Method association approach for situational product implementations

Session 10
25 March 2019
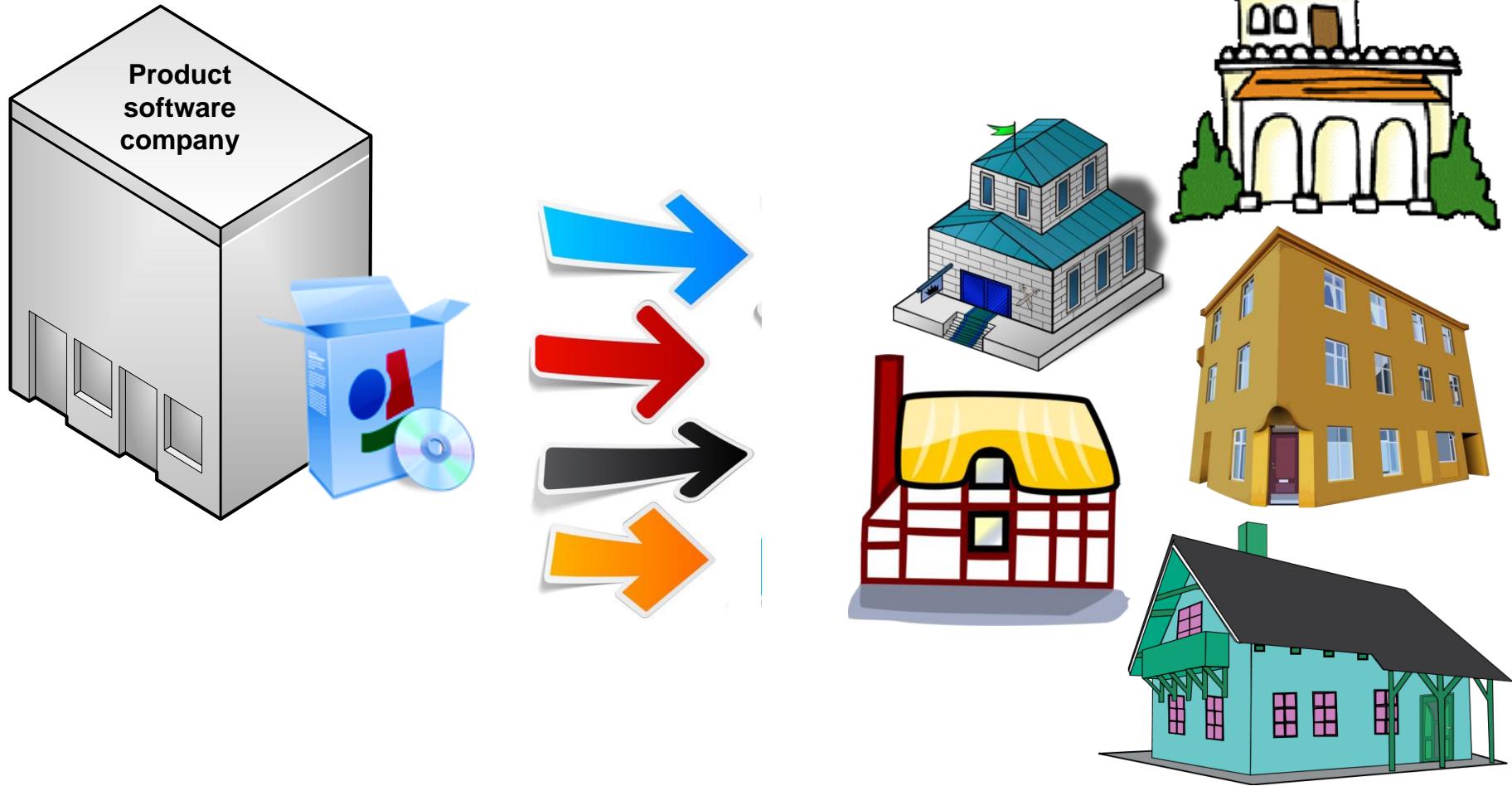
Universiteit Utrecht

Objectives for this lecture

- Show the scientific approaches in Method Engineering
  - Method Engineering for software product implementations
  - Refinement of concepts and definitions
  - Case studies for the validation of new methods

Software implementation

Implement: Workplace by Facebook

- Have a look at workplace.fb.com

- Suppose you are a young ICT consultant and get the task to implement Workplace at:

  1. Utrecht University
  2. University Medical Centre Utrecht
  3. Shell

- How would you execute the project?
- What is common over all three, what is different?

What do these products have in common?

- SAP R3
- Microsoft Dynamics
- Unit4 Agresso
- AFAS Profit ERP
- SalesForce CRM

- Complex standard products
- Deployment in different organizations
- Company-wide implementations
- Each customer organization is different
- Customizations (= customer specific extensions) required

Outline

- Method association approach
- Case 1: Web Content Management
- Case 2. Disease Management
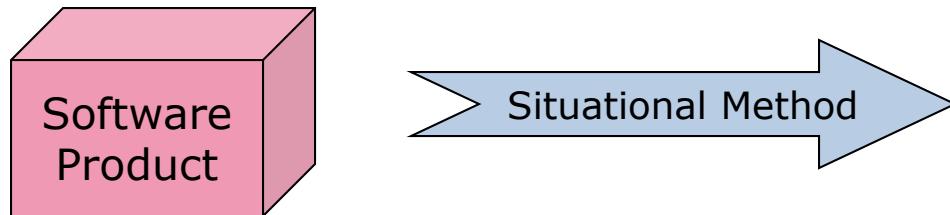
Introduction

Main research issue:

What is the most effective way to implement software products in organizations?
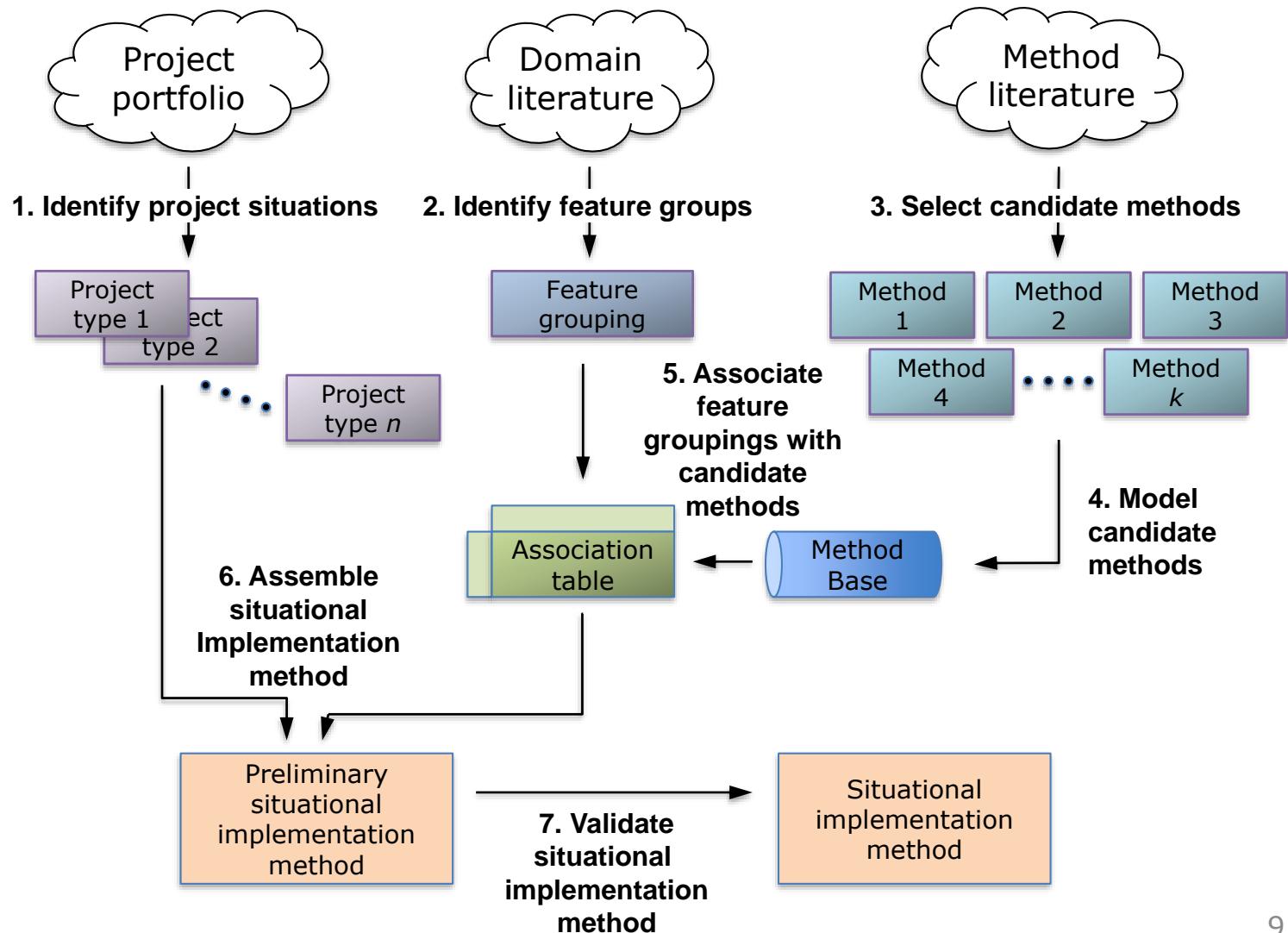
Hypothesis:

The most effective way is a method that is situationally engineered for the product and the organization at hand.

Hypothesis:
Method association approach

Implementation

Implementation is a often misused term in the ICT industry

See wikipedia: Implementation

Computer science:

- an implementation is a realization of a technical specification or algorithm as a program, software component, or other computer system through computer programming and deployment

IT Industry:

- implementation refers to post-sales process of guiding a client from purchase to use of the software or hardware that was purchased.

Political science

- implementation refers to the carrying out of public policy.

Theory testing case studies

- Case studies on situational methods for product implementations are performed in different industries:

  - Web content management system, called WebManager, from GX company targeted at the corporate website market.

  - Disease management system, called Vital, from Vital Health Software targeted at the health care industry.

Case study 1: GX Content Management

- <GX> Creative online development
  - ISV of a Web Content Management System
  - 140 employees
  - Located in the Netherlands
  - Customers: AFC Ajax, KPN, Asics, Schiphol Group, SNS bank, SBS Broadcasting and many more…

- Locations
  - Nijmegen (HQ, R&D centre and solutions), Amsterdam (solutions), Eindhoven: (GX-public)

- Product: <GX> WebManager 9

Problem definition (1)

- Implementations of WCMS are complex due to fast-changing requirements
  - Affects costs of web application development

- Software vendors have difficulties in creating a design method to meet the situational design context of an implementation project
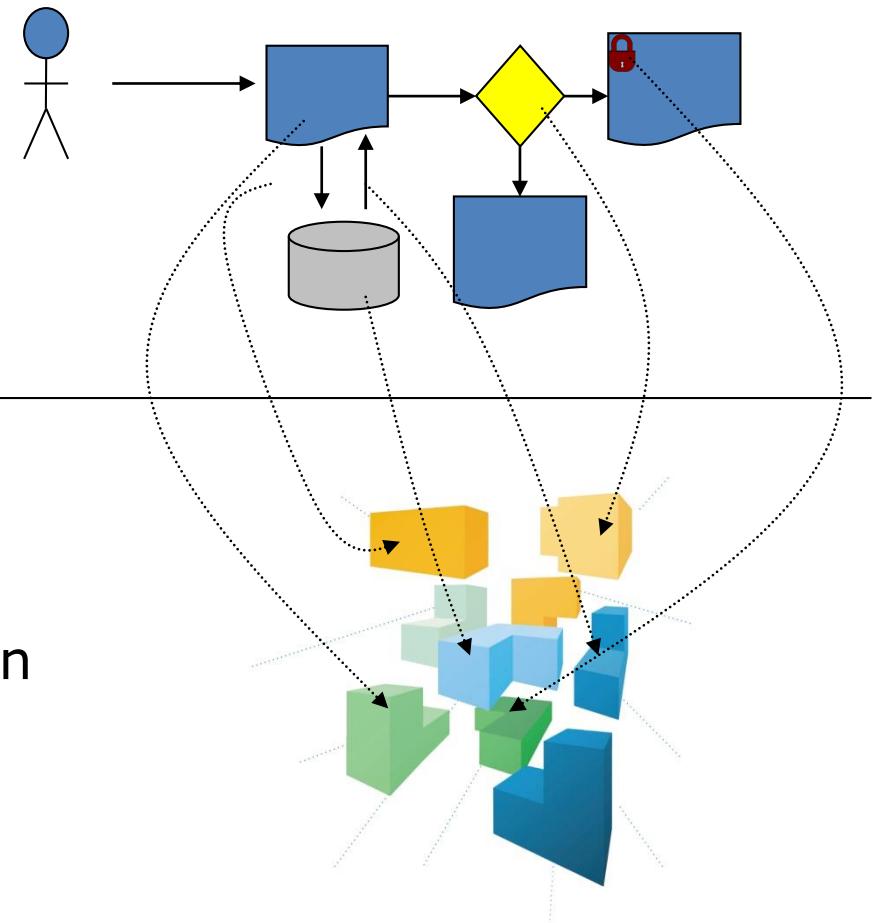
Problem definition (2)

- No generic approach is available to support product software design aiming to create maintainable software designs for implementation projects

- Many web modeling languages available, but…

- …how to create a design method that fits your domain and your product?
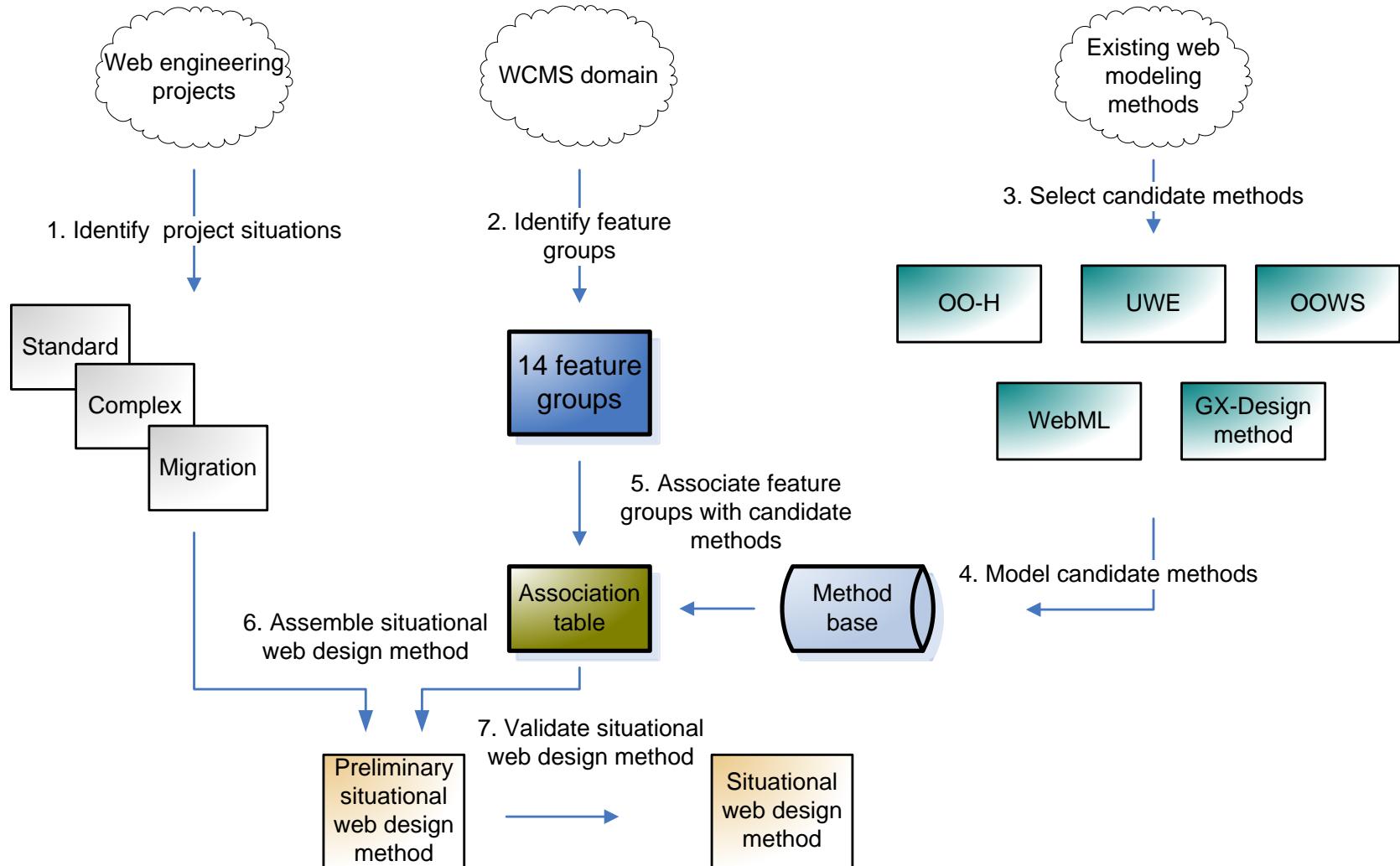
Complexity of WCMS implementations

Web visitor perception
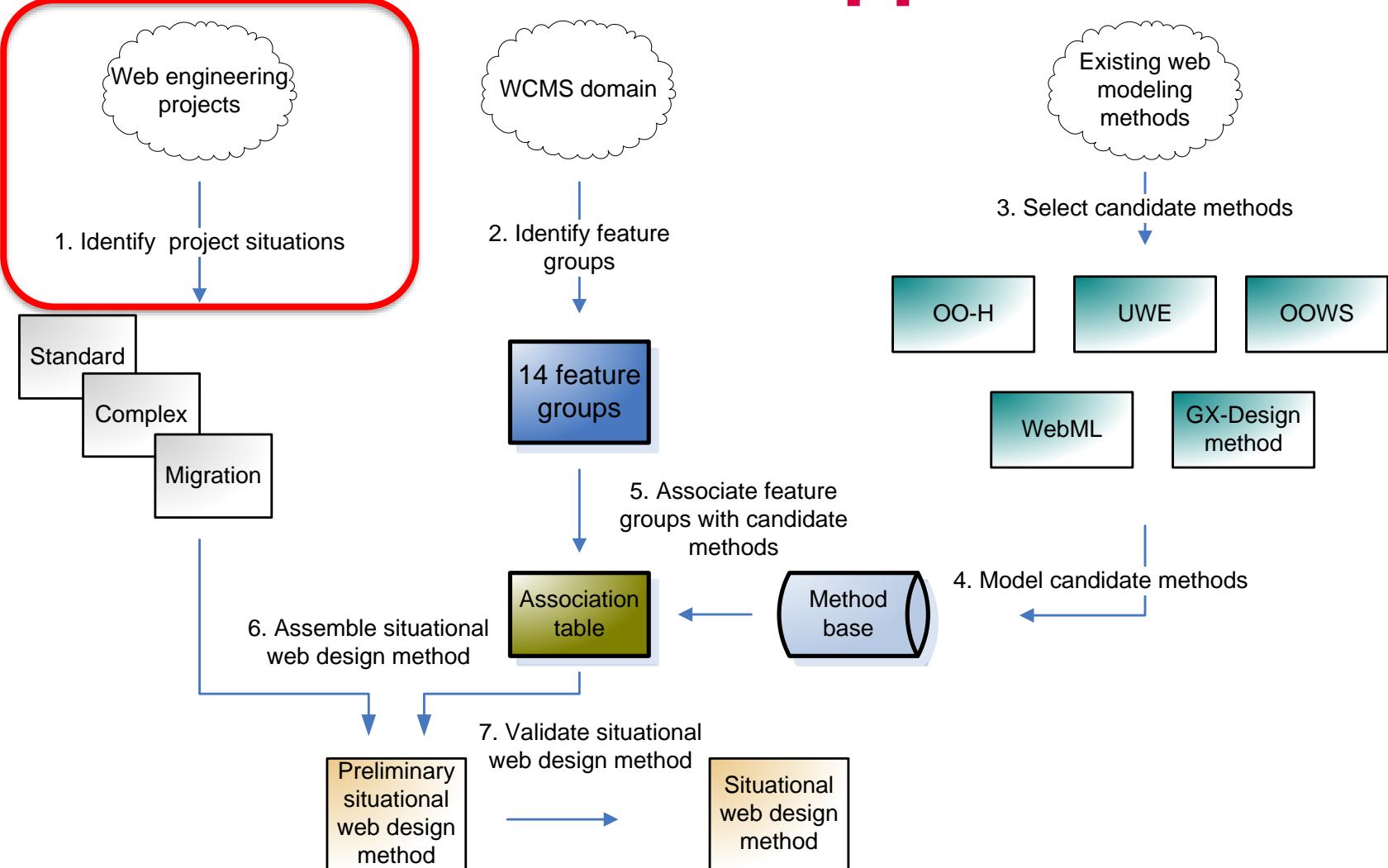
CMS-based web application

Method association approach

Based on Van de Weerd et al. (2006), based on Ralyté et al. (2003)

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Method association approach

Web engineering projects

1. Identify project situations

Standard
Complex
Migration

WCMS domain

2. Identify feature groups

14 feature groups

Existing web modeling methods

3. Select candidate methods

OO-H   UWE   OOWS

WebML   GX-Design method

5. Associate feature groups with candidate methods

Association table ← Method base   4. Model candidate methods

6. Assemble situational web design method

7. Validate situational web design method

Preliminary situational web design method → Situational web design method
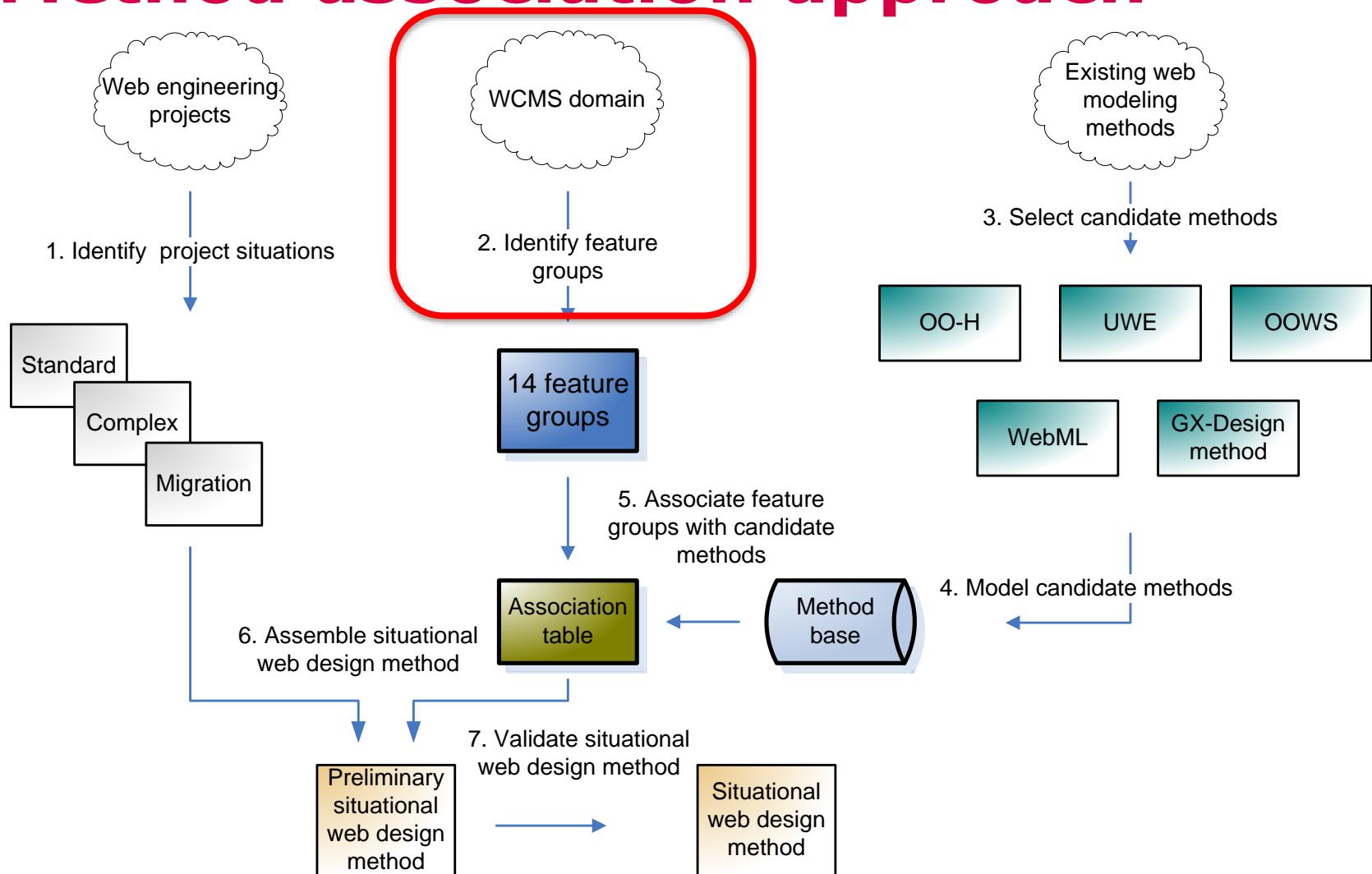
Step 1: Identify project situations

- Project portfolio

- Identification of similarities and generic projects (or parts thereof)

- Interviews with experienced project managers

- 3 Project situations:
  - Standard
  - Complex
  - Migration

Method association approach

Based on Van de Weerd et al. (2006), based on Ralyté et al. (2003)

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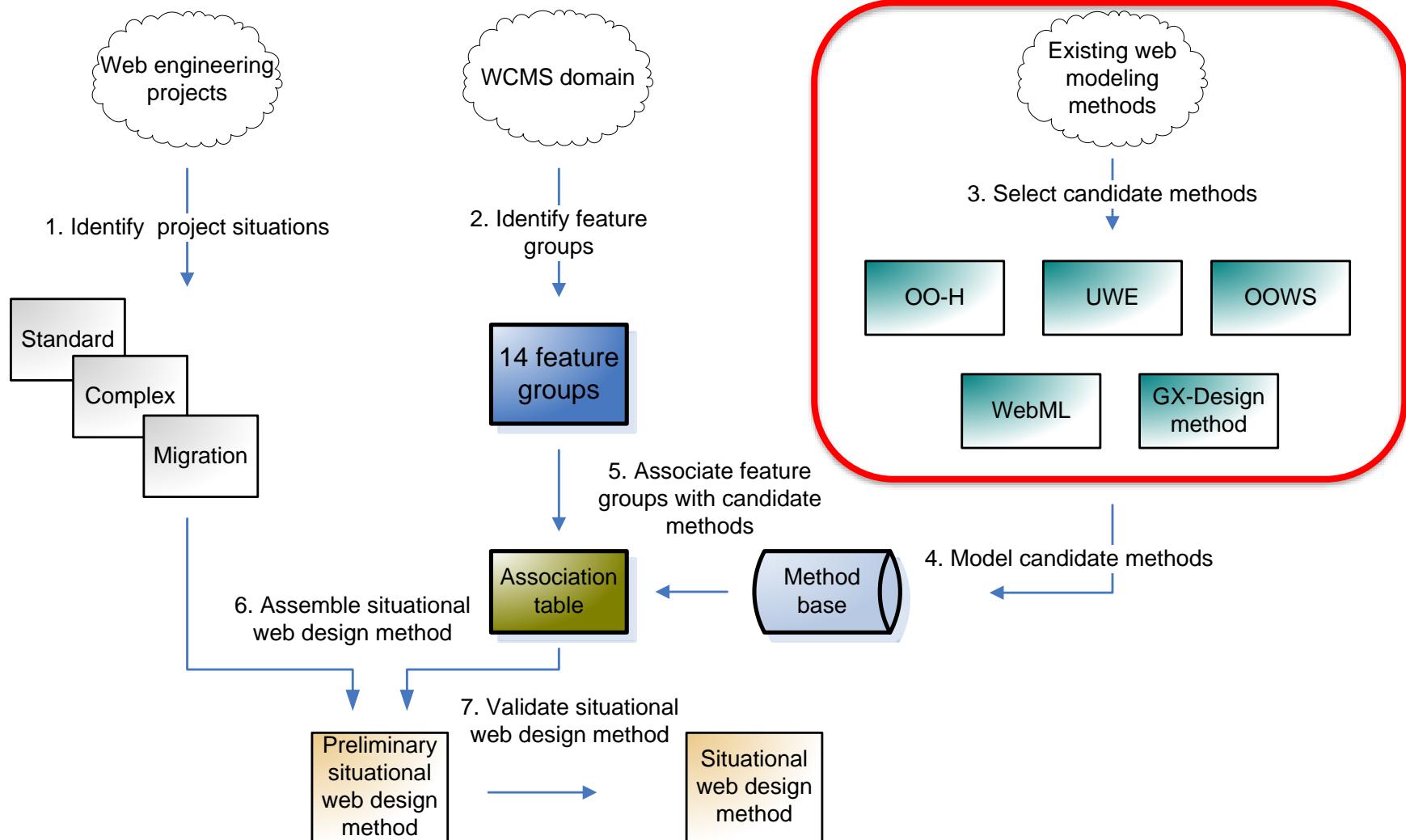
Step 2. Identify feature groups

- Analysis of Literature on Web Content Management Systems

- Analysis of functionality of existing commercial and scientific tools

- Leads to 14 Feature Groups:

1. E-forms / Transaction management
2. Personalization
3. Authoring
4. Authorization management
5. Community technologies
6. Connectivity management
7. Content repository
8. Deployment and replication
9. Digital Asset Management
10. Layout and presentation management
11. Multi-channel delivery and syndication
12. Site Management
13. Web usage Mining
14. Workflow

Method association approach

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Based on Van de Weerd et al. (2006), based on Ralyté et al. (2003)

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Step 3: Select candidate methods

- Many methods: OO-H, UWE, WebML, OOWS, OOHDM, HDM, HDM-lite, W2000, Autoweb, WSDM, RMM, SOHDM, WAE, WAE2 etc…

- Many comparative studies performed aiming at various topics like requirements engineering and navigation modeling

- Selection of methods, based on the following criteria:
  - Acceptation in the web community
  - Extensive tool support
  - In development

- Selected:
  OO-H, UWE, WebML, OOWS and GX-Design method

Method association approach

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Based on Van de Weerd et al. (2006), based on Ralyté et al. (2003)

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Step 4: Model candidate methods

- Method base
  - 32 fragments
  - 12 high-level

Method association approach

Web engineering projects

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Step 5: Let's associate!

Problem:

Which WCMS functionalities are addressed by current web modeling languages?

- WCM domain established by means of feature groups
- Web modeling languages have been selected and modeled
- How to associate feature groups and method fragments?
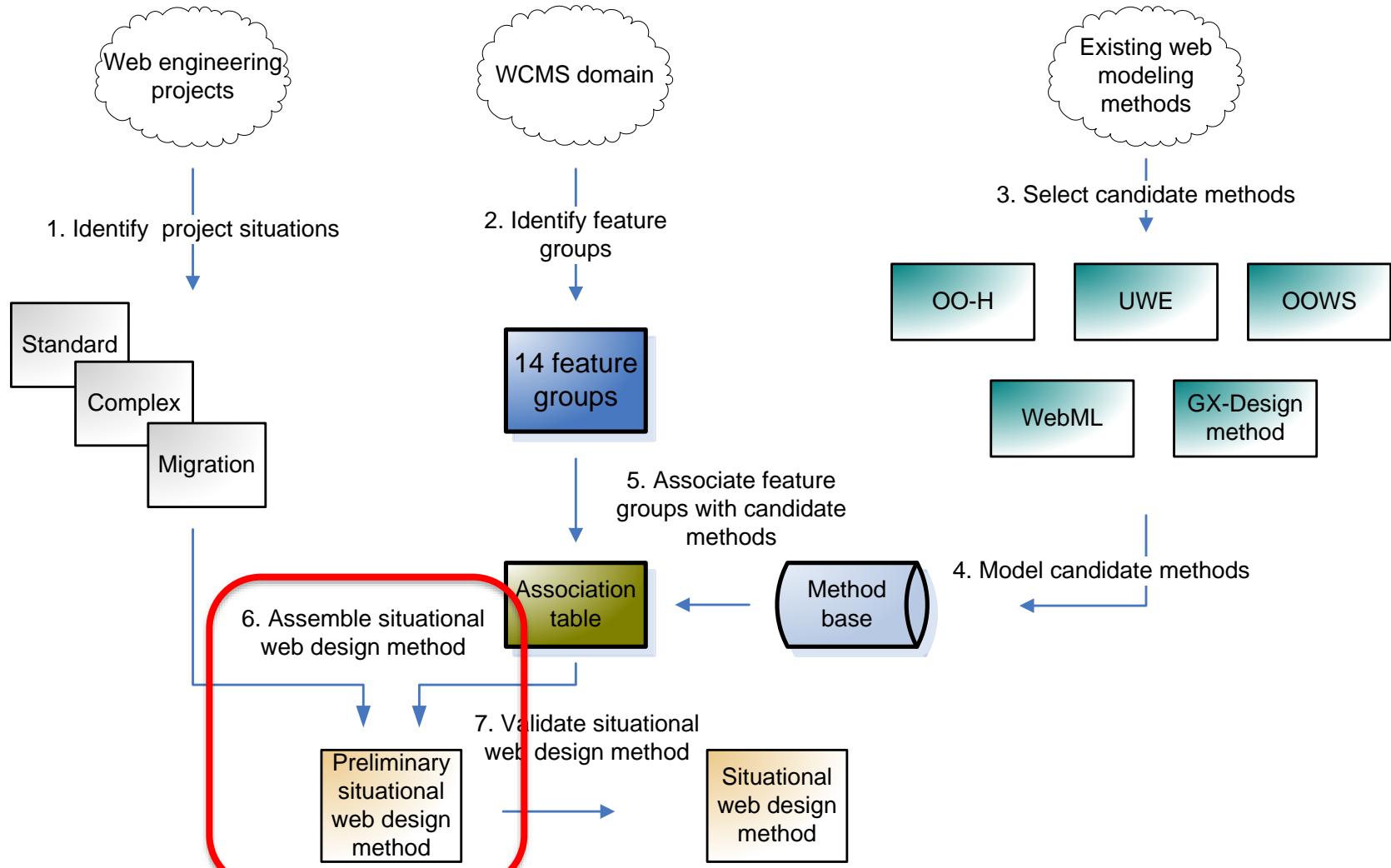
Matching:
- WCMS features on concepts
- WCMS feature groups on method fragments
- Determining the purpose and meaning for a match
- Complete match – partial match
- Subjective choice

Association matrix

		WebML																
		E-R schema								Hypertext model								
		Entity	Relationship	User entity	Core sub-schema	Interconnection sub-schema	Access sub-schema	Personalization sub-schema	Process sub-schema	Site view	Page	Content unit	Operation unit	Display unit	Entry unit	Selector	Link	Link parameter	Process management unit
E-Form	Step	x							x				x		x				x
	Handler	x											x						
	Validation												x					x	
	Router												x				x		
	Field	x																	
Personalization	Personalization rule	x										x	x		x			x	
	User profile	x		x				x					x						
	User access									x			x						

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Method association approach

Web engineering projects

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Step 6: Assemble situational web design method

Situational web design method

Four main activities:

1. Conceptual design
2. Architecture design
3. Presentation design
4. Detail component design

- Two route maps:
- Standard for implementations requiring standard WCMS functionality
- Complex for implementations requiring complex additional functionality and technology

Step 6. Assemble situational web design method (2)
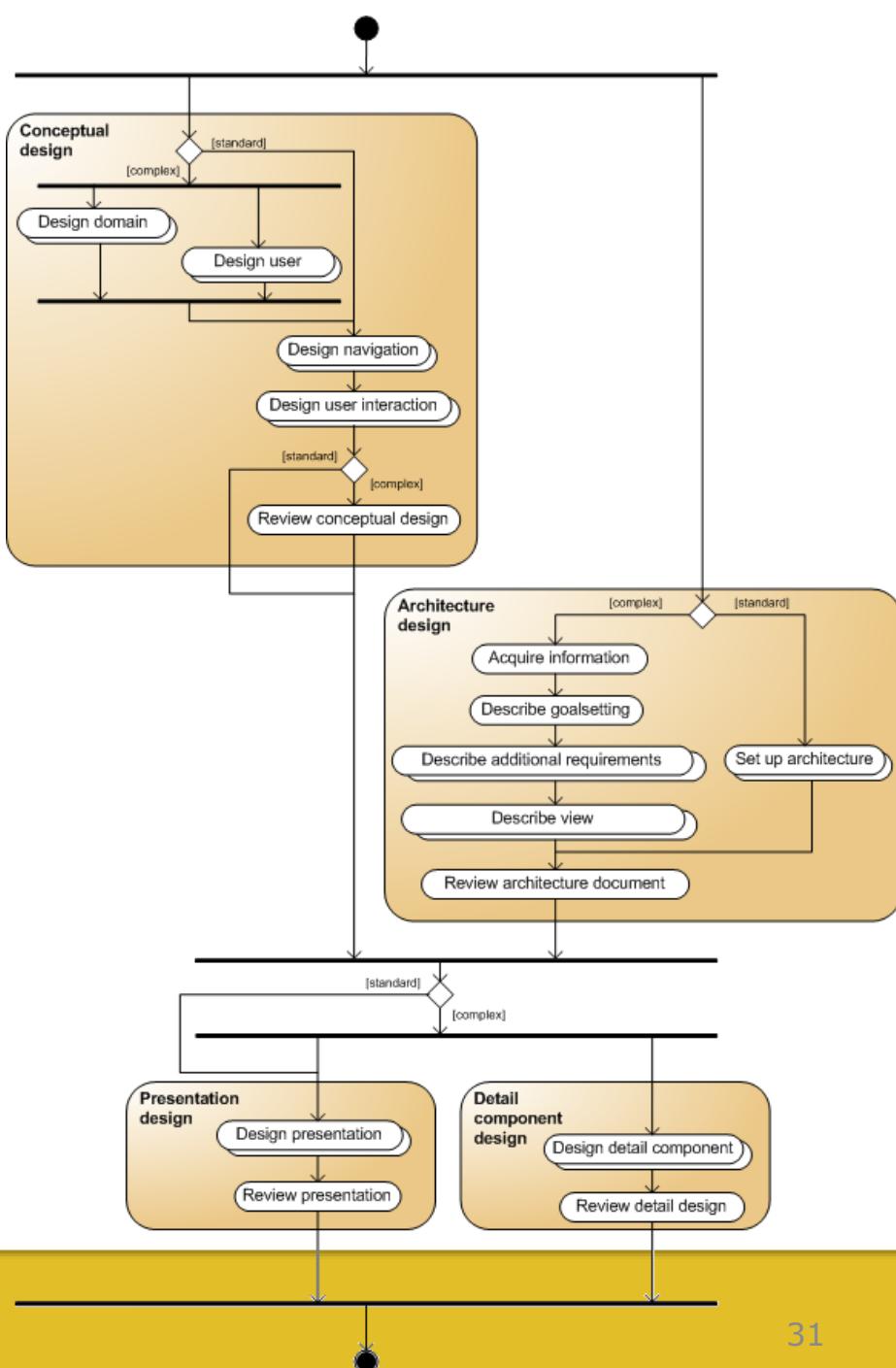
- Static analysis by means of the quality measures proposed by Brinkkemper et al. (1999).
  - Completeness
  - Consistency
  - Efficiency
  - Reliability
  - Applicability

See lecture on Method Assembly
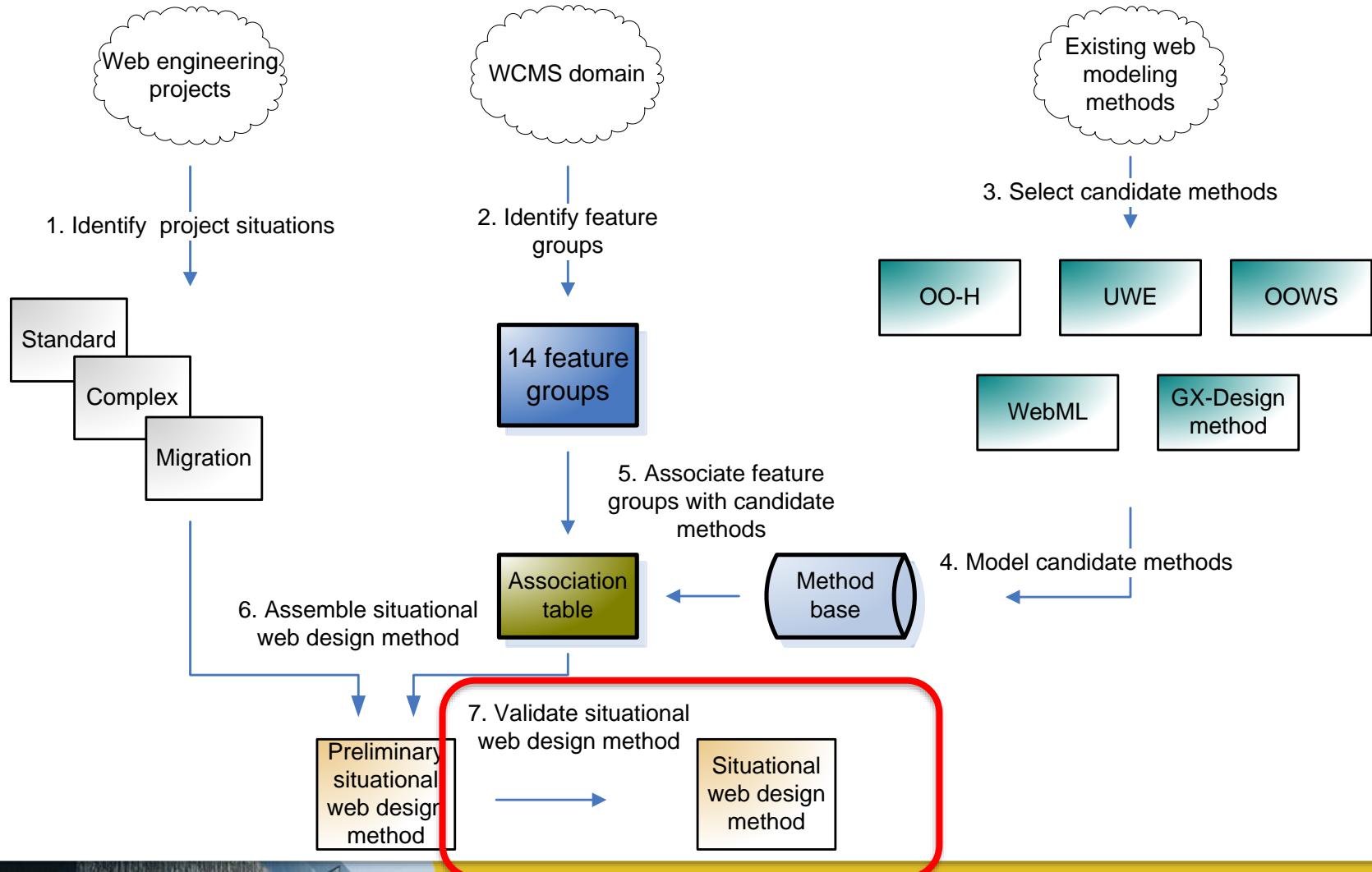
Step 6. Assemble situational web design method (3)

Top level PDD with main activities:

- – Conceptual design
- – Architecture design
- – Presentation design
- – Detail component design

Method association approach

Web engineering projects

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Based on Van de Weerd et al. (2006), based on Ralyté et al. (2003)

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Step 7: Evaluation (1)

- Expert validation

- Two case studies performed to validate conceptual design
  - Design intranet for Dutch Governmental Organization (DGO)
  - Design personal space of a Dutch Telecommunications Provider (DTP) from a retrospective

- Deliverables of case studies: domain model (incl. description), user model, navigation model, business process model and change list

Example: business process model (1)

Example: business process model (2)

Step 7: Evaluation (2)

Results

- The new method is evaluated as 'good'
- Consultants have contradicting perceptions about the usefulness, readability, abstraction level and correctness of the navigation model
- All respondents indicated that the user model should be more integrated in the domain model
- Consultants and engineers do not agree upon tool support of a domain model in WebManager
- In comparison to other models, all respondents agreed upon tool support for the business process model

Conclusion

- A situational method for the design of WCMSs has been constructed and validation results were positive

- The Method Association Approach is a helpful approach in assembling domain and product specific design methods

- Method refinement will be conducted in later projects

QUESTIONS?

Case Study 2: VitalHealth Disease Management

VitalHealth Software
– The organization
– The software
– Disease management

– Implementation method development
– Problem definition
– Method association approach – in practice
– VH-Systems Implementation Method
– Evaluation

VitalHealth Software (1)

- Founded in 2005

- HQ in Ede; 300 employees

- By Noaber Foundation (Dutch) and Mayo Clinic Foundation (US)

- Main product: VitalHealth: Generic software platform for Health management

- Recently acquired by Philips
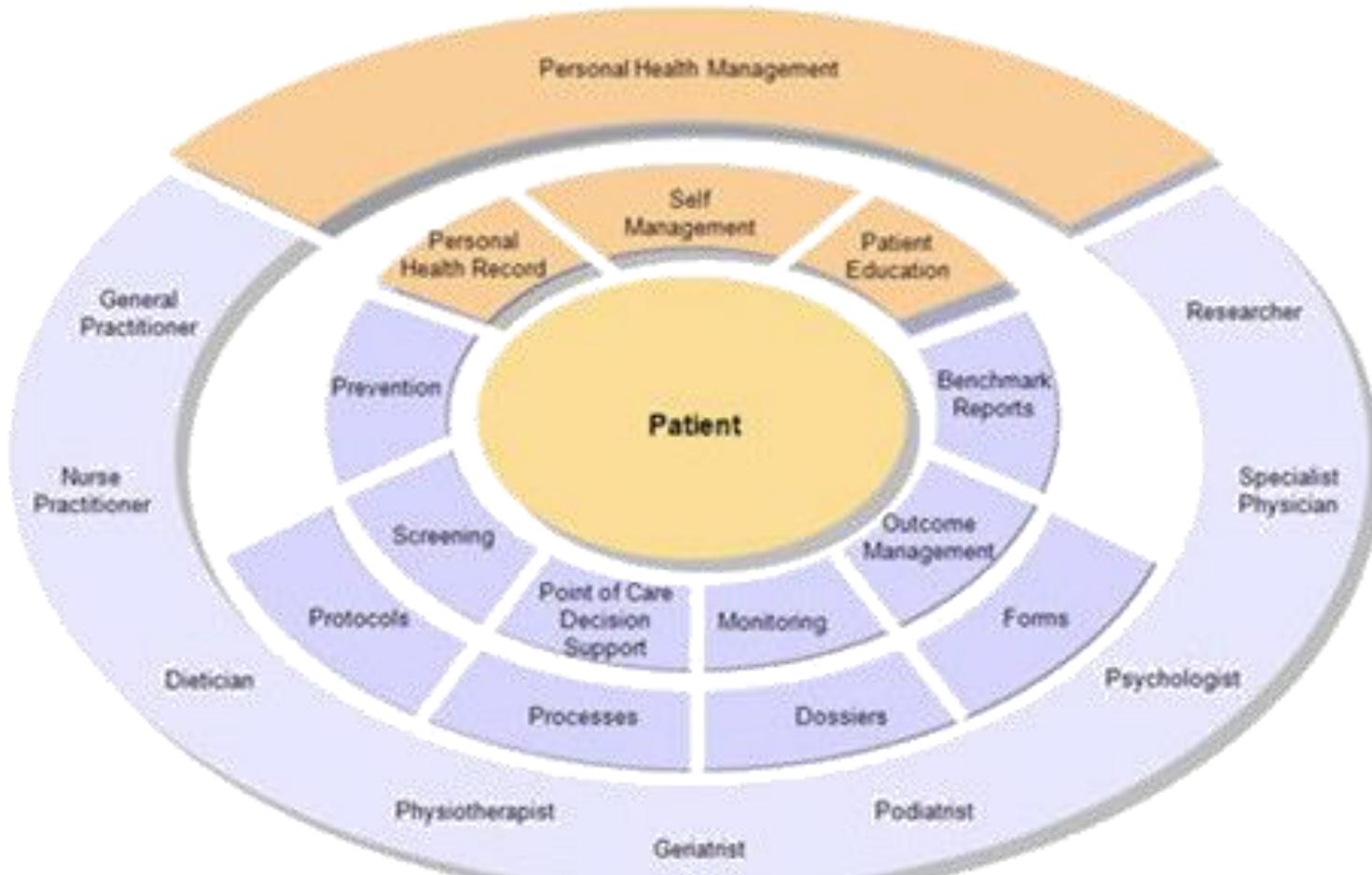
VitalHealth Software (2)

- Web-based software solutions for:

    - Personal health management
    - Chronic Diseases (Diabetes, COPD, etc)
    - Disease Management
    - Chain Care
    - Medical decision support

Disease management & chain care

Problem definition

- VitalHealth needs:

  - More structure in projects
  - Implementation method
  - Improved project planning
  - Tool support

Research question

What is the most suitable method for the implementation of web-based software for personal health management?

Sub questions:
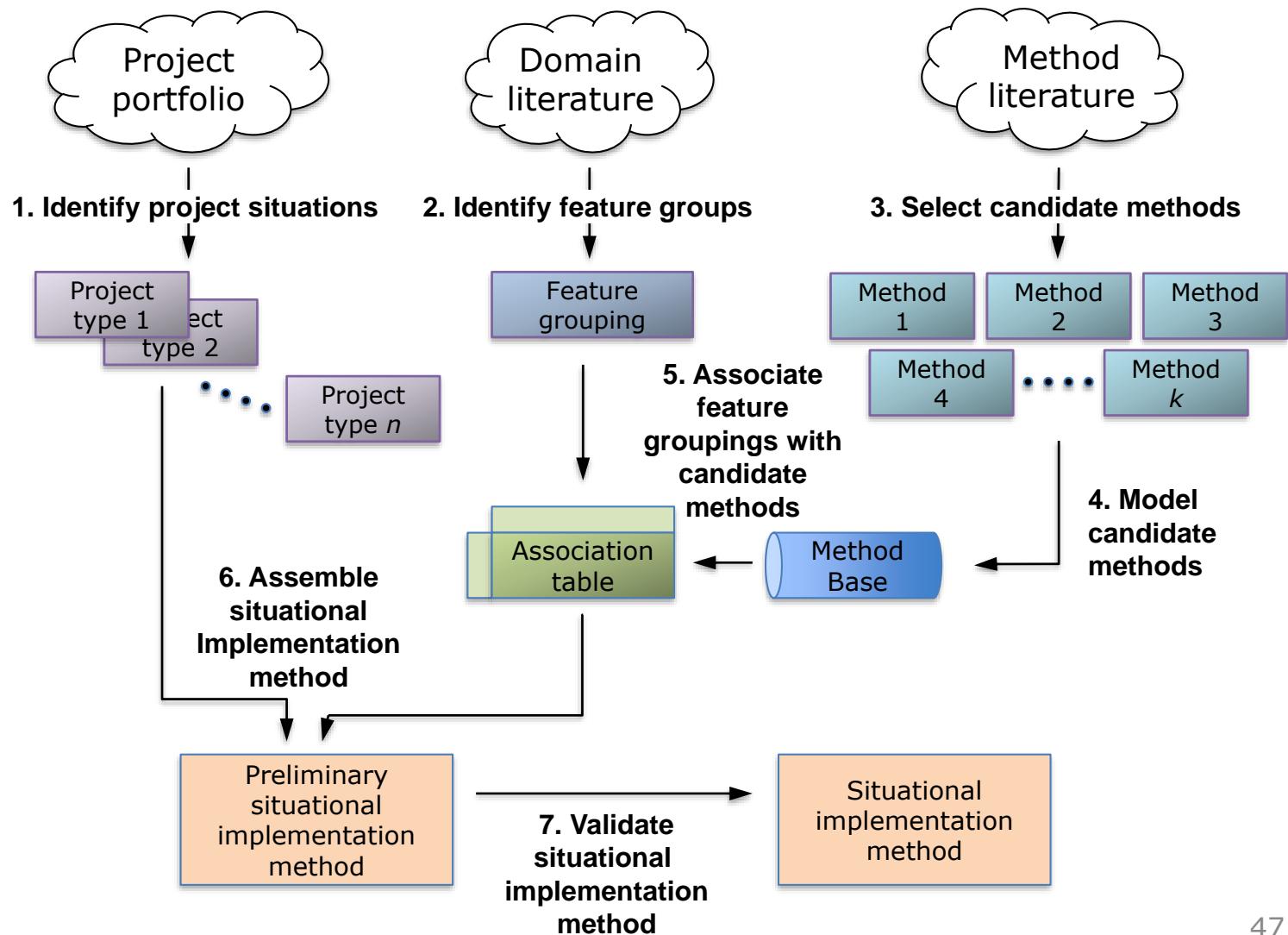
- What are the implementation methods already available nowadays?
- What are the feature groups of the web-based software for health management?
- What are the situational factors of a successful implementation of web-based software for health management?
- Which kind of implementations are there for web-based software for health management in VitalHealth Software?
- What are the roles within the implementation processes and method?
- How should the method be documented for VitalHealth Software, their partners and customers (in a tool, on paper, etc.)?

Research approach
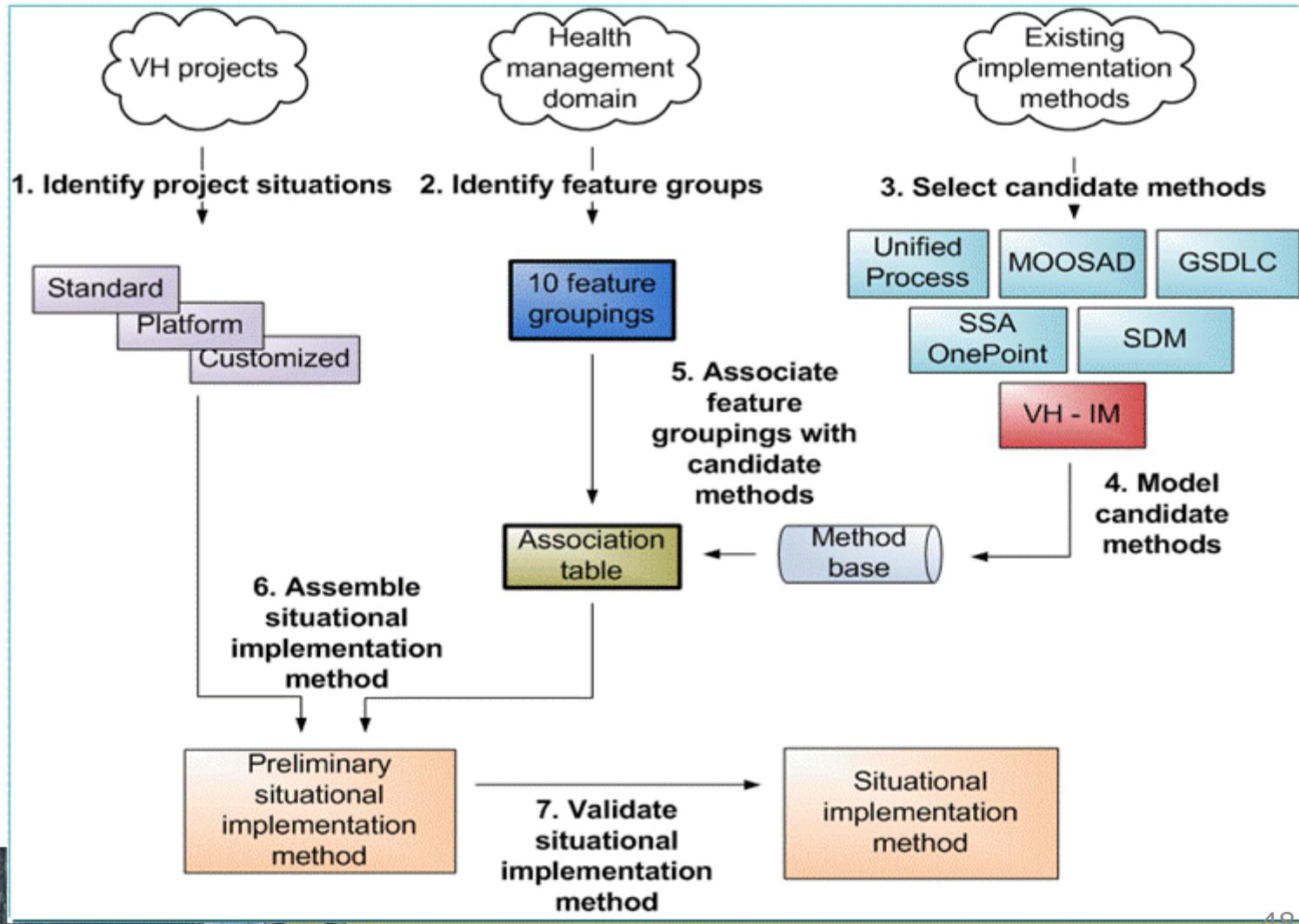
- Literature study

- Field study

- Method development

- Evaluation

- Conclusions

Method association approach

Project portfolio → **1. Identify project situations** → Project type 1, Project type 2, ... Project type n

Domain literature → **2. Identify feature groups** → Feature grouping

Method literature → **3. Select candidate methods** → Method 1, Method 2, Method 3, Method 4, ... Method k

4. Model candidate methods → Method Base

5. Associate feature groupings with candidate methods → Association table

6. Assemble situational Implementation method → Preliminary situational implementation method

7. Validate situational implementation method → Situational implementation method

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Method association approach

Step 1. Identify project situations

- Standard implementation: just existing product functionalities are configured

- Custom implementation: additional functionalities and technology is required

- Platform implementation: restricted implementation where customer organization will develop specific disease mgmt functionality based on VH-platform

Step 2. Identify feature groups

1. Project management
2. Infrastructure arrangements
3. Healthcare management software security
4. Healthcare management software installation
5. Healthcare management system integration
6. Clinical data conversion
7. Healthcare professionals and patient authorization
8. Healthcare management system introduction
9. Project Evaluation
10. Support/Maintenance
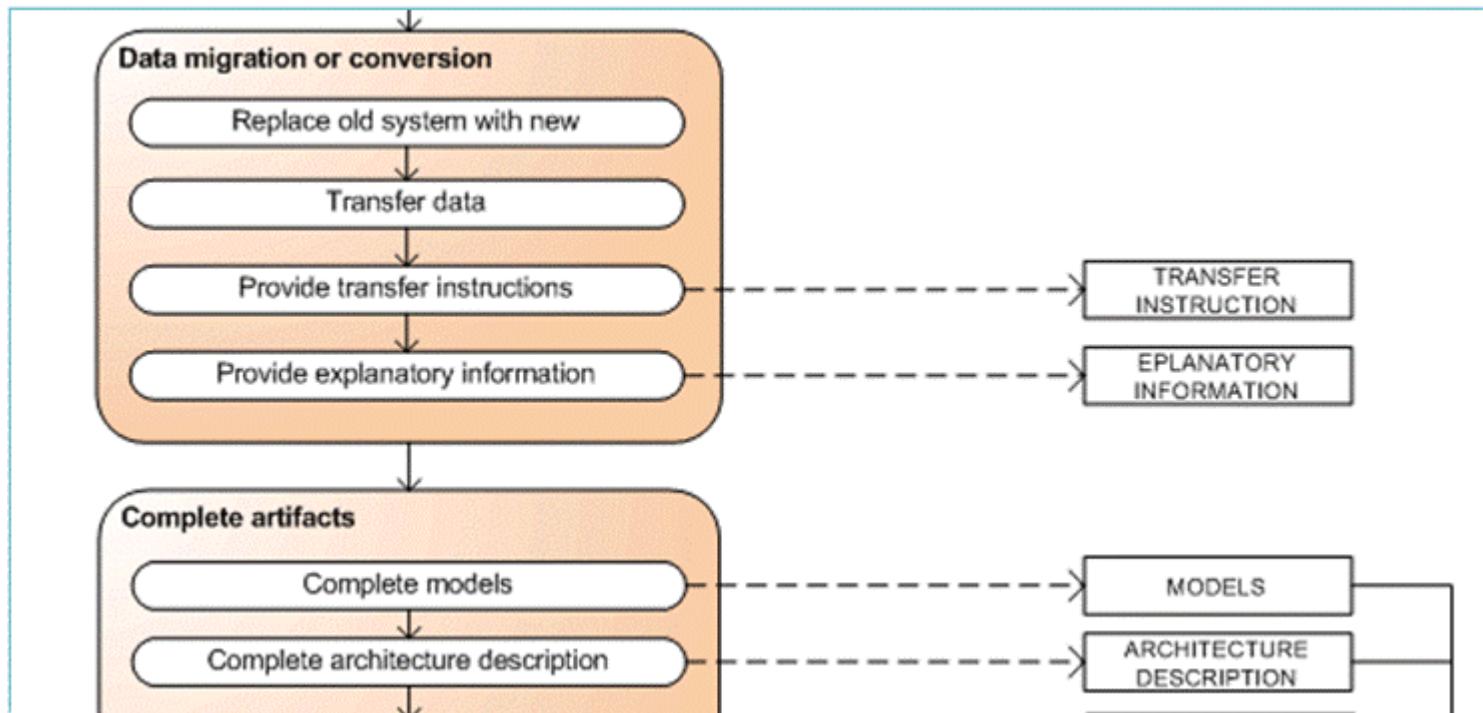
Feature grouping

|	Category	Concepts	Source
1	Health care system Integration	Replace and integrate existing systems with emerging technologies	Raghupathi et al. (2002)
2		Internal integration	
3		External integration	
4		Integrate clinical and administrative information about patients means physicians	
5		Integrated decision-support systems	
6	Infrastructure arrangements	Linking with outside organizations and agencies	
7		Web technology	
8		Internet	
9		Access to online insurance service data	
10		Networking and ATM technology	
11		Virtual health care, or networks of partners	
12		Distributed, client/server networks	
13		OO technology	
14		Asynchronous transfer mode (ATM) network technology	
15	Healtcare professionals	Confidentiality of the doctorpatient relationship	
16	and patientaspects	Political and societal effects	
17		Usability	
18		Proper controls, procedures, and policies	
19	Healthcare system security	Technology's security	
20		The privacy of patient medical data	
21		Standards, ethics, patient privacy, data confidentiality, and security	
22	Clinical data conversion	Document management and data warehouses	
23		Applications to combine data warehouses, electronic data entry, messaging, and GUI tools	
24		Computerized patient records	
25	Clinical Data(base) aspects	Multidirectional dataflow	Kimberlee et al. (2002)
26		Avoid unnecessary data agglomeration	

Step 3. Select candidate methods
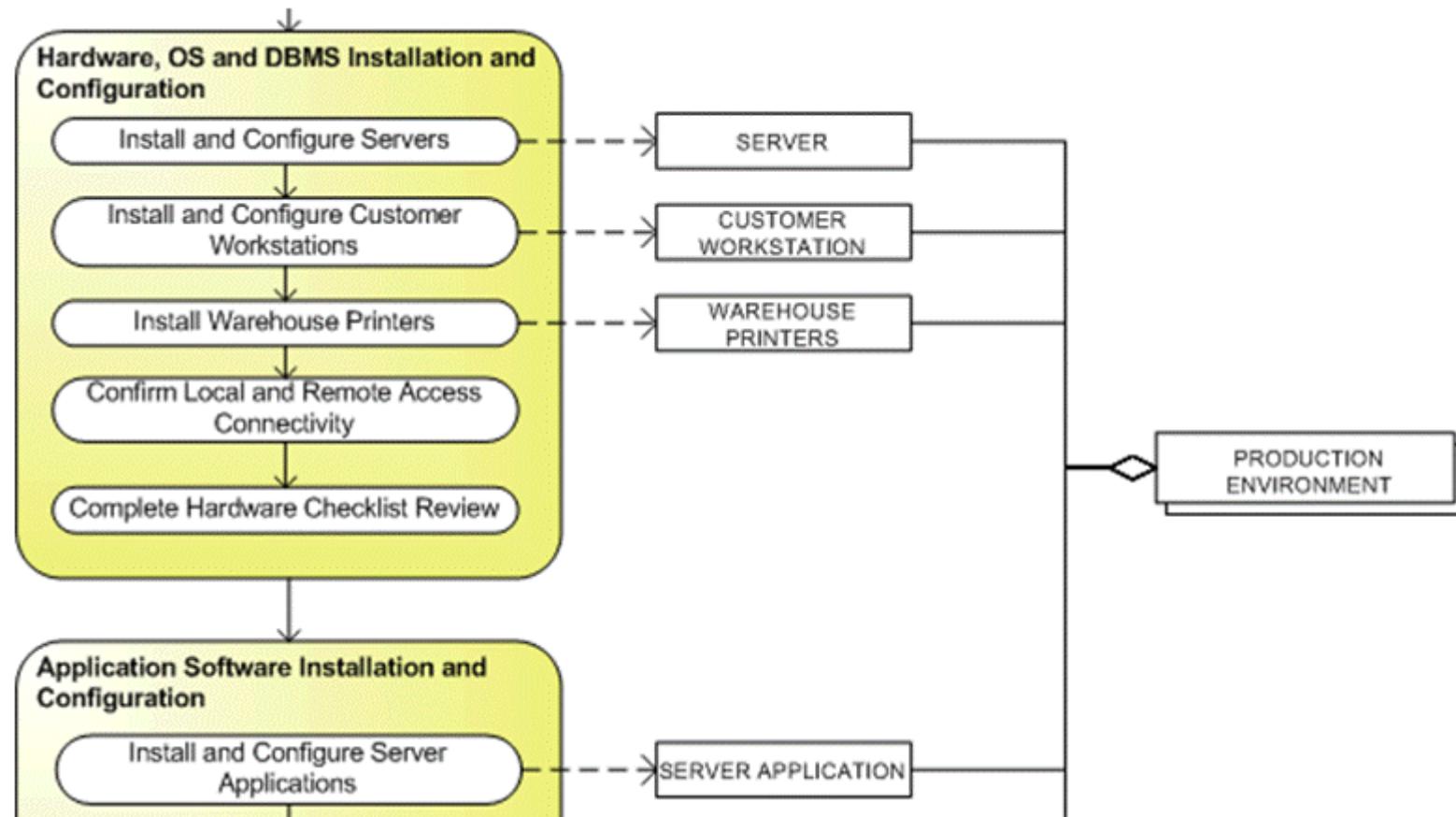
- Literature:
  - Unified Process (Booch et al., 1999)
  - Minimalist Object-Oriented System Analysis and Design
  - (MOOSAD) (Dennis et al., 2005)
  - Generic System Development Life Cycle (GSDLC) (Flaatten et al., 1992)
  - SSA OnePoint (SSA Global Technologies. INC, 2006)
  - System Development Methodology (SDM)
  - (Turner et al., 1990)

- Field:
  - VH-Implementation method

# Step 4. Model candidate methods (1)
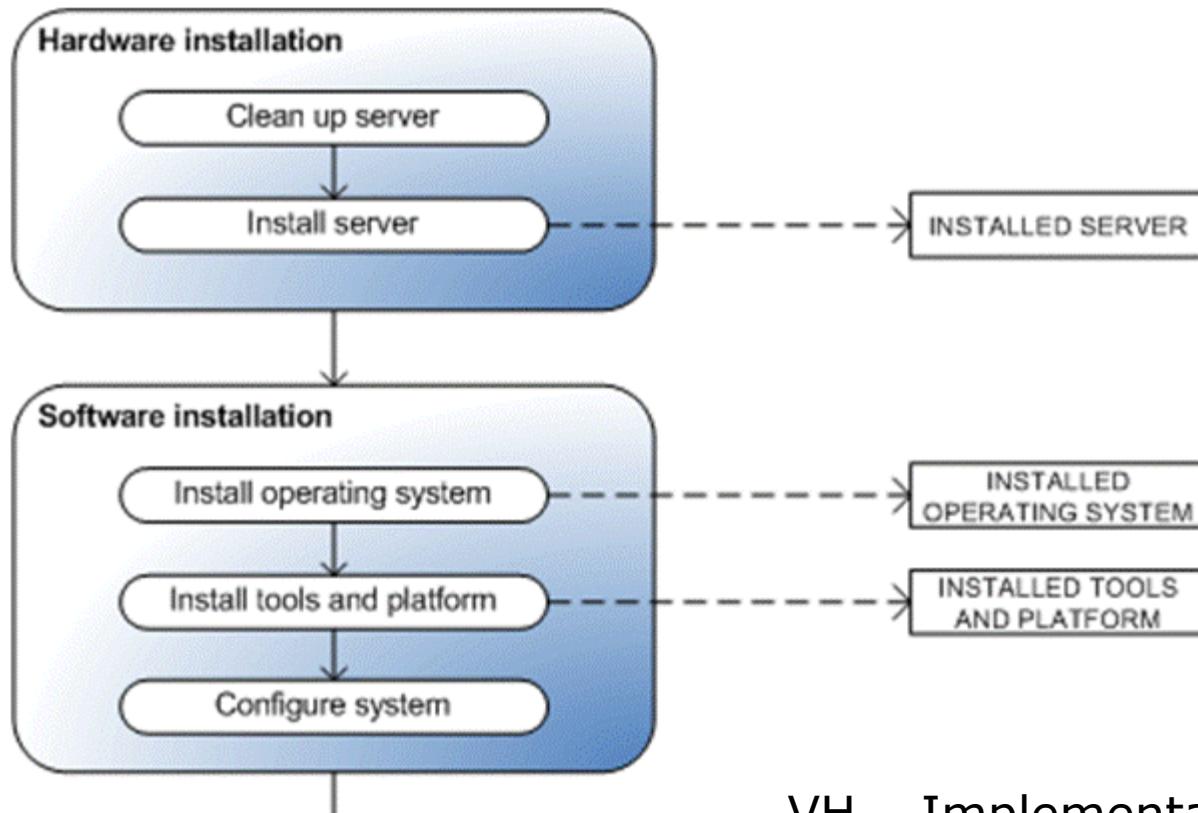
Unified Process (Booch et al., 1999)

Step 4. Model candidate methods (2)

SSA OnePoint method (SSA Global Technologies, 2006)

Step 4. Model candidate methods (3)
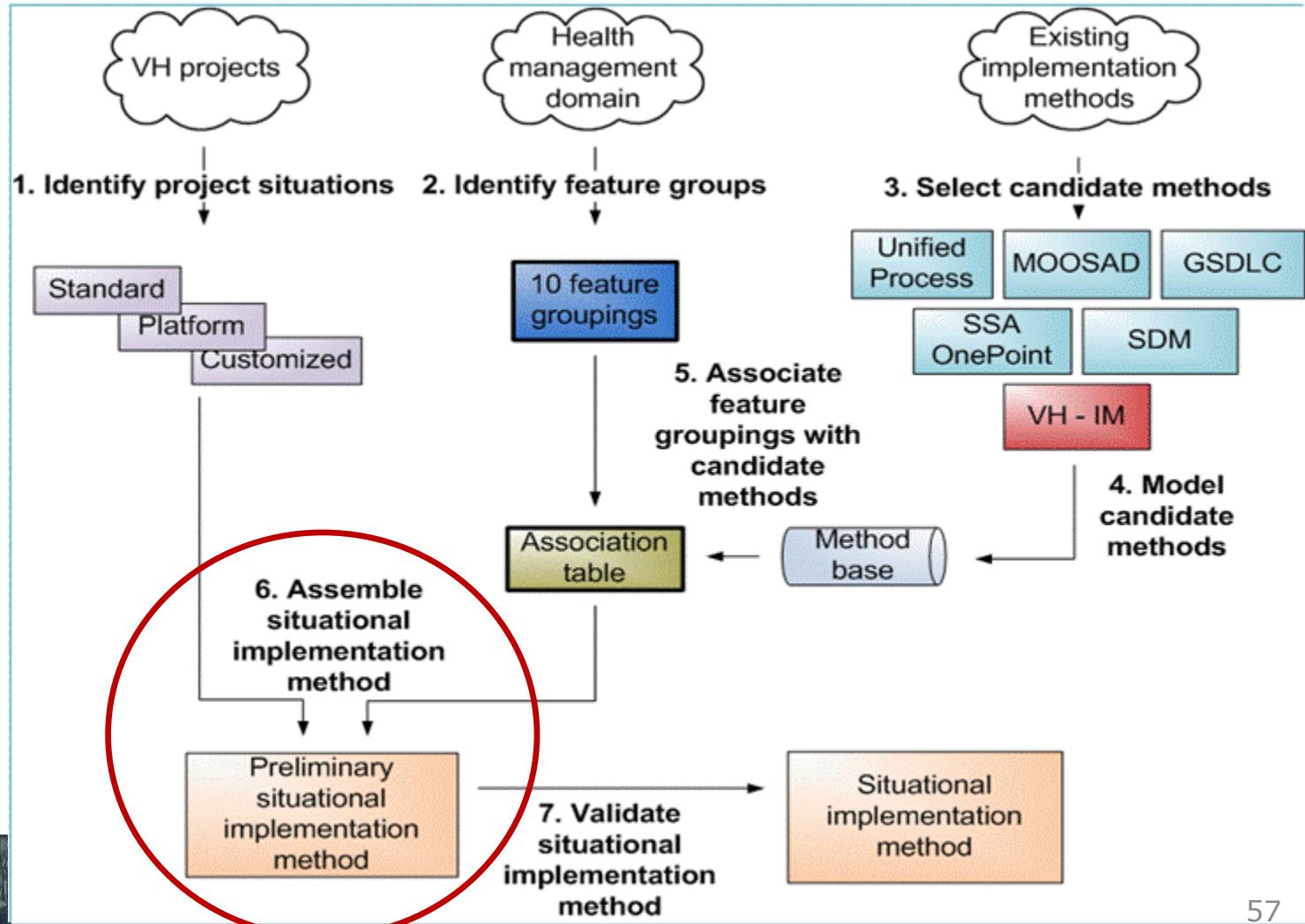
VH – Implementation method
*(based on semi-structured interviews, documentation)*
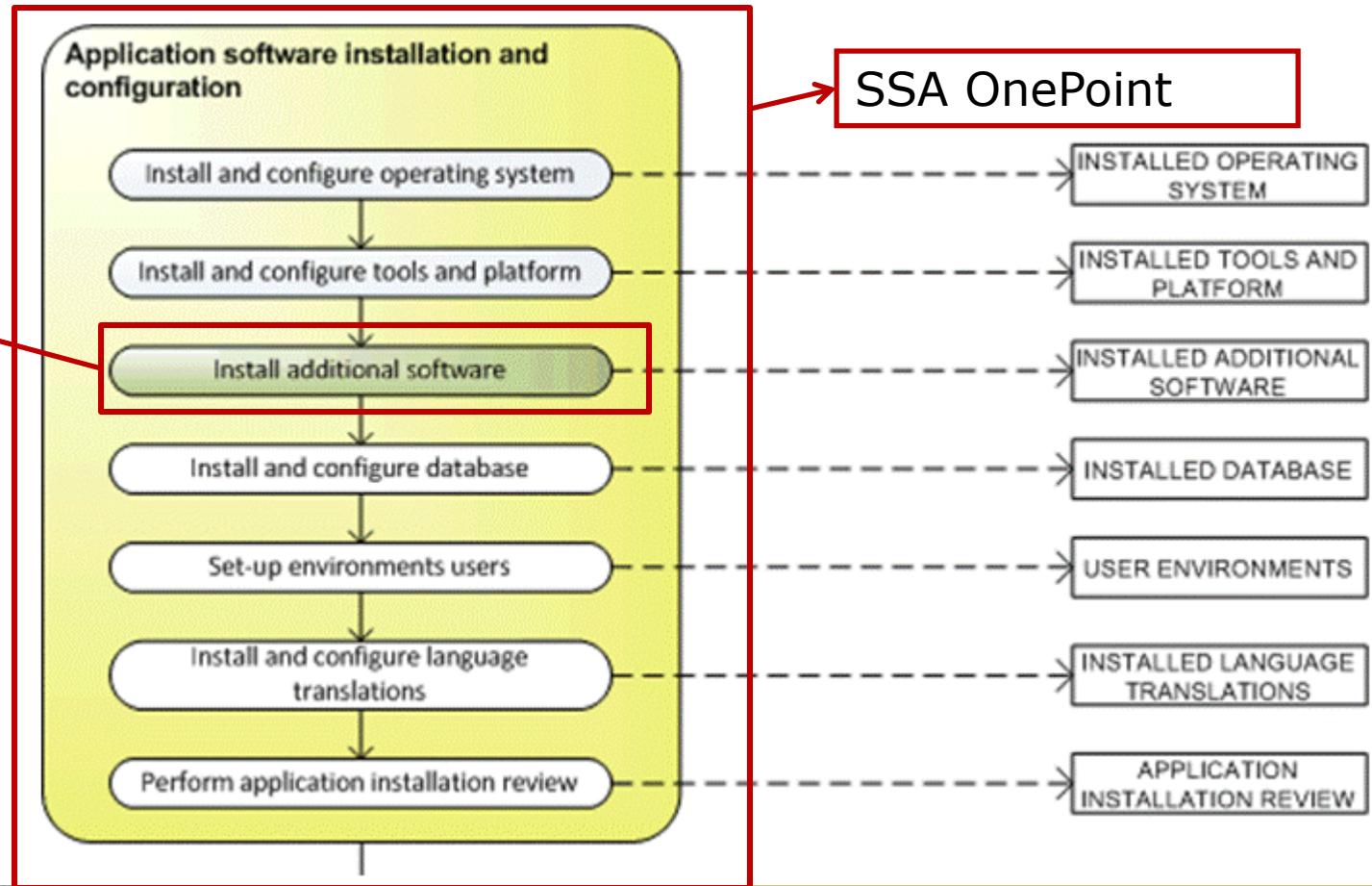
Step 5. Associate feature grouping with candidate methods

			Unified process													
			Planning	Beta release preparation	Beta release installation	Software installation	Data migration or conversion	Complete artifacts	controlling transition process	Assess Transition phase	Next release	Testing	Developing documentation	Conversion Schedule	Hardware	Software
ation of health management	Project management	Planning	X									X		X		
		Communication			X											
		Reporting			X					X						
	Infrastructure arrangements	Server installation													X	
		Client installation													X	
		Internet integration														
		Intranet integration														
		Hosting														
	Healthcare management software security	Technology security														
		Data security														
	Healthcare management software installation	Software installation			X	X										X
		Additional software installation														X
		Installation manuals		X	X		X						X			
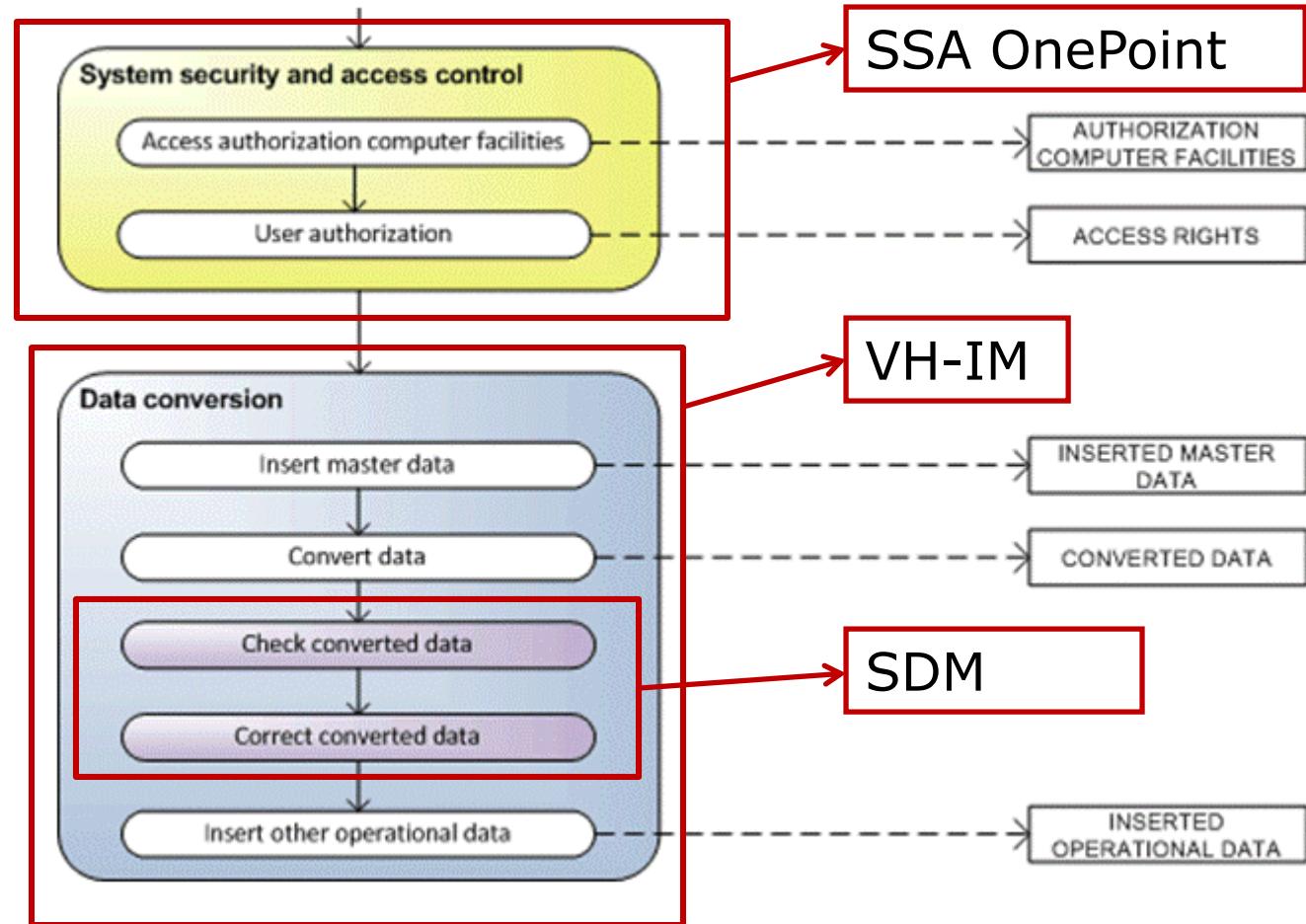
Method association approach

Step 6. Assemble situational implementation method VH-SIM (1)

Step 6. Assemble situational implementation method VH-SIM (2)

Step 7. Validate situational implementation method

- Case studies
  - 2 Custom implementations (Groot Klimmendaal, Arnhem & Dermatology, UMC Utrecht)
  - 1 Standard implementation (Security Force Hospital, Saudi Arabia)
  - 1 Platform implementation (Winbase, Haarlem)

- Experts interviews/questionnaires

- Tool: MS Project (for now…)

Validation tool (1)

	Case study/Interview (Date)			
	Name activity	**Complete / Partial**	**Permanent / Situational**	**Motivation**
Removed				
Changed				
Inserted				

Validation tool (2)

VIM (Sjaak 6-5-2009)

	Name activity	Complete / Partial	Part	Permanent / Situational	Motivation (why and
Removed	Design & Modeling	Partial	Make installation manual	Permanent	There is an installation manual that can every impleme
	Delivery & Testing / Implementation	Partial	Check workstation	Permanent	This activity is performed in the
	Testing and training environment - Data conversion & entry	Partial	Correct converted data	Permanent	This activity is not performed if the dat made to the write conversion software so again with fixed conve
Changed	Hardware/software inventarisation	Complete		Permanent	This activity is performed after the project on the Design en mo
	Testing and training environment/Operational environment - Hardware installation & configuration	Partial	Complete hardware checklist review	Permanent	The name of this activity is changed i
	Testing and training environment/Operational Environment - Software installation & configuration	Partial	Complete application installation review	Permanent	The name of this activity is changed i
	Testing and training environment - Data conversion & entry	Partial	Select conversion ...	Situational	These three activities are only performe
	Pre Go Live/Go live	Partial	Determine Go or No-GO	Permanent	If there is a NO-GO bugs must be fixe performe
	Delivery & Testing / Implementation	Partial	Access authorization computer facilities	Permanent	The name of the activty is changed in A because it is not the access for the com
	Implementation	Partial	Training	Permanent	The training of the users is performed p hardware and s

Conclusion

- Method Association is a new perspective in the field of Method Engineering
- Refinement of concepts and definitions
- Tools still hardly available

- What will be the next steps?

- Incremental methods
- Knowledge Infrastructures

Discussion and further research

- Only the conceptual design phase has been validated by means of case studies… more validation is needed in similar and different domains

- Feature groups might enable and can be fed by Product Roadmaps

- No built-in validation mechanism for method association table
    - The application of metrics in order to support method fragment selection
    - Qualitative descriptions and overlapping features in matching

- The feasibility of tool support needs to be tested by means of constructing a CASE tool prototype

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