

# A Framework of Process Redesign Heuristics in Healthcare

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# Agenda

1. Motivation
2. Research Methodology
3. Implication and Limitation
4. Outlook

# 1. Motivation

- Healthcare institutions are increasingly facing pressure to reduce costs and provide a higher quality at the same time
  - e.g., due to the introduction of DRG systems and ageing populations
- To cope with these challenges:  
Use the concept of Business Process Redesign (BPR)  
→ Redesign of cross-functional processes

# 1. Motivation

Systematical support for the redesign activity



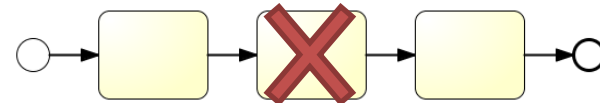
General creativity techniques  
(e.g., brainstorming)



- Are criticized in the research for potentially leading to an incomplete spectrum of redesign proposals

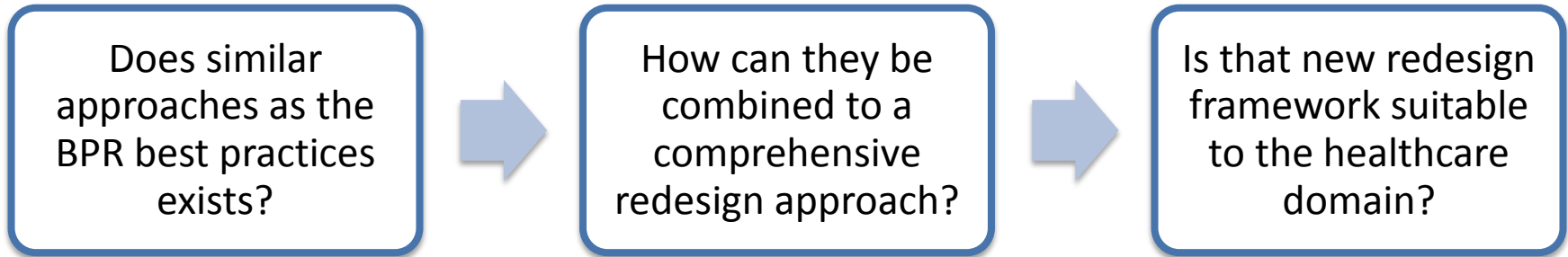


Specific alternative is the  
usage of BPR best practices  
(e.g., task elimination)



- The BPR best practices by Reijers & Liman Mansar (2005) have been gathered with a bias towards their suitability to redesign administrative processes → may not be complete for the healthcare domain

# 1. Motivation



- Goal:

- Create a collection of *redesign heuristics* based on existing BPR methods by taking also approaches from other research domains into account
- Captured them in a redesign framework which will include several *components*

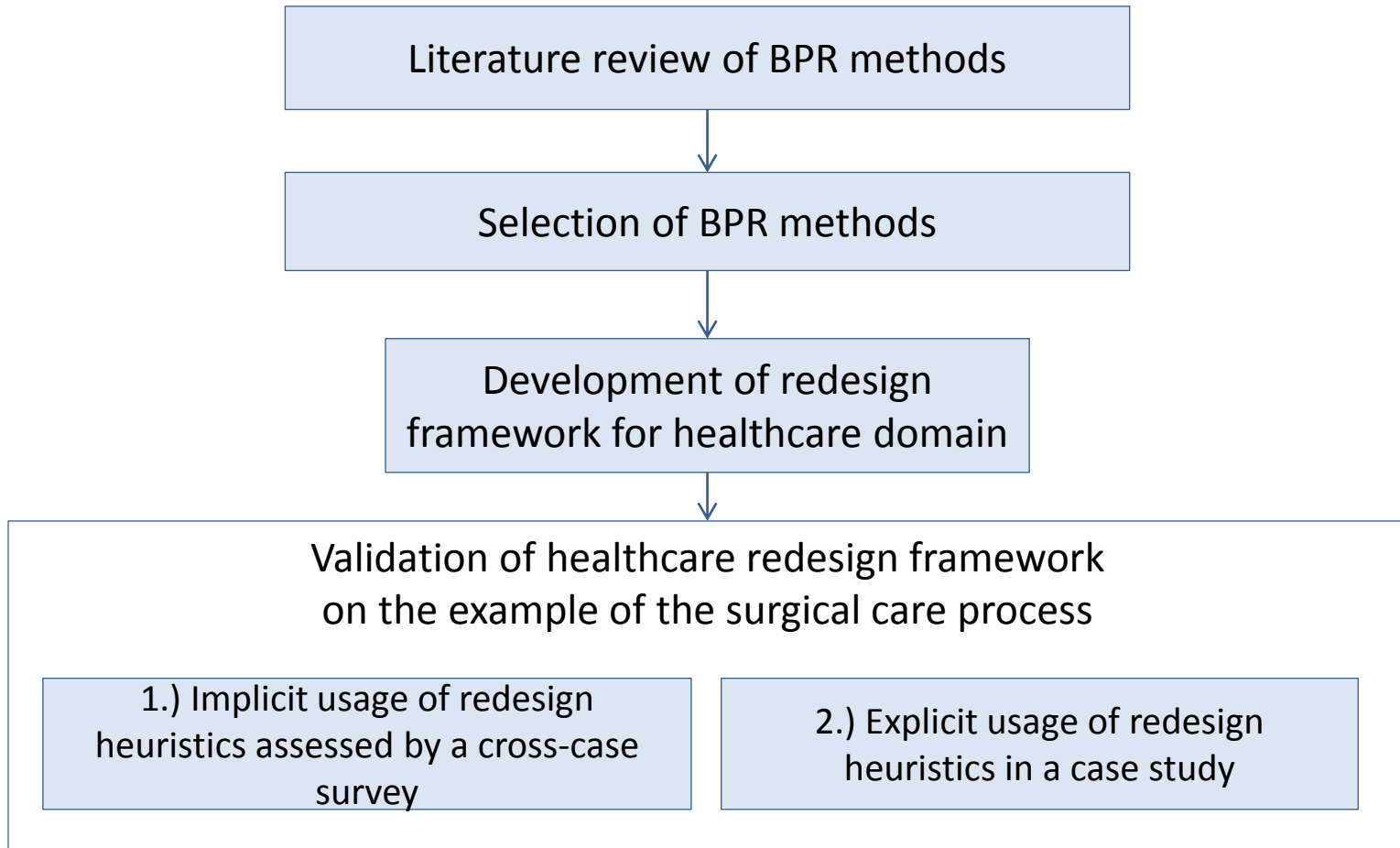
**Redesign heuristic:**

Principle which can be applied locally on a specific element of any healthcare process → may help to improve the overall performance

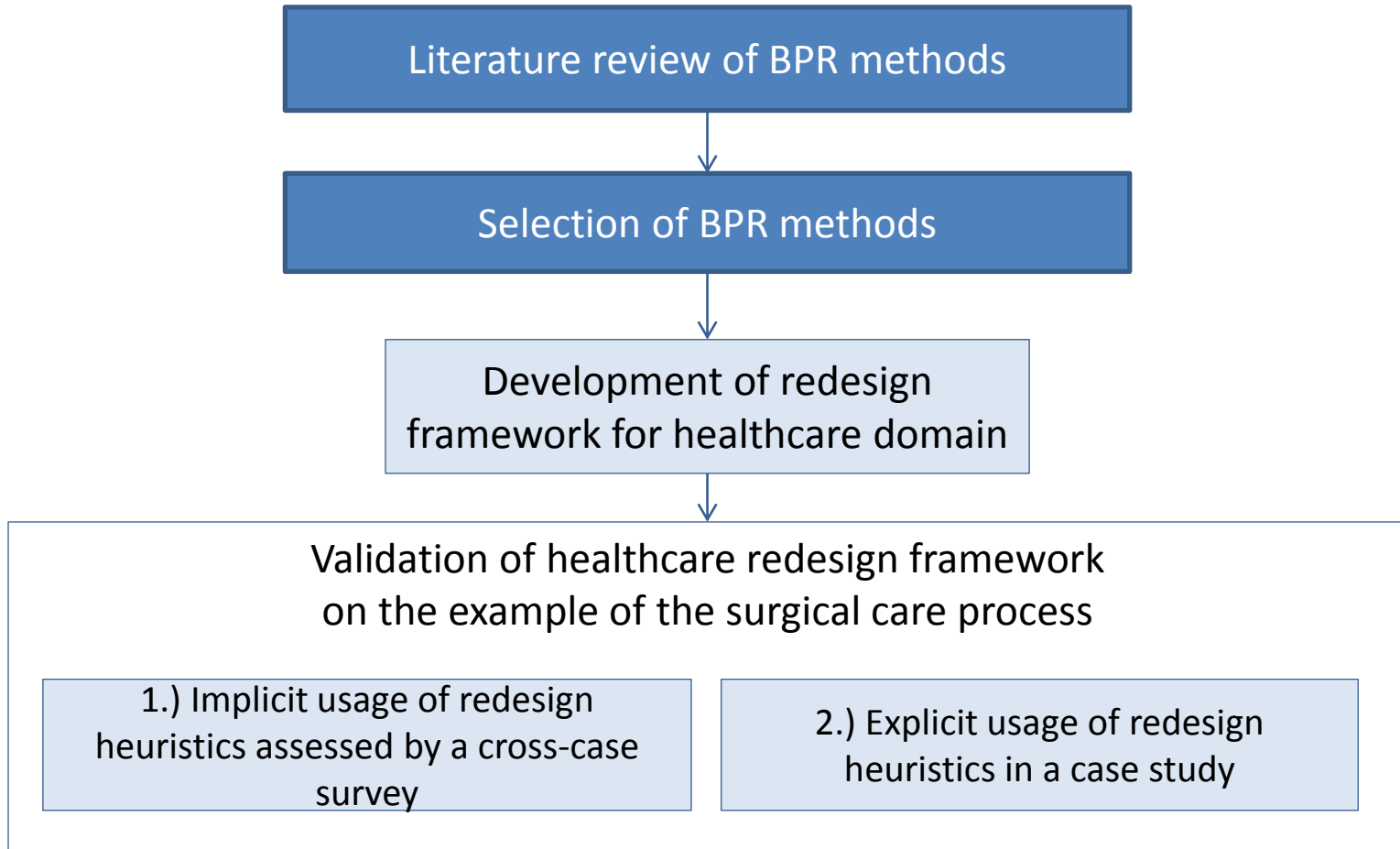
**Redesign framework components:**

Different process elements that are potential candidates for redesign

# 2. Research Methodology



# 2. Research Methodology



# 2.1 Review of BPR methods

- In the BPR research, several reviews like
  - Kettinger et al. (1997), Zellner (2011) and Griesberger et al. (2011)reveal mainly creativity techniques as support for the redesign stage
- Also established industry-based concepts mainly creativity techniques are proposed
  - as in Six Sigma or Lean Management
- In the healthcare domain no specific BPR method exists
  - but approaches of other domains such as Six Sigma or Lean Management were often applied
- Suitability of the BPR best practices by Reijers & Liman Mansar (2005) for the healthcare domain was shown in Netjes et al. (2010)
  - but as well that they may not be complete



# 2.1 Selection of BPR methods

- Derived from an extensive literature review 29 so-called BPR best practices
- Captured in a BPR framework which contains 11 components

BPR best practices by Reijers and Liman Mansar (2005)

Healthcare Redesign Framework

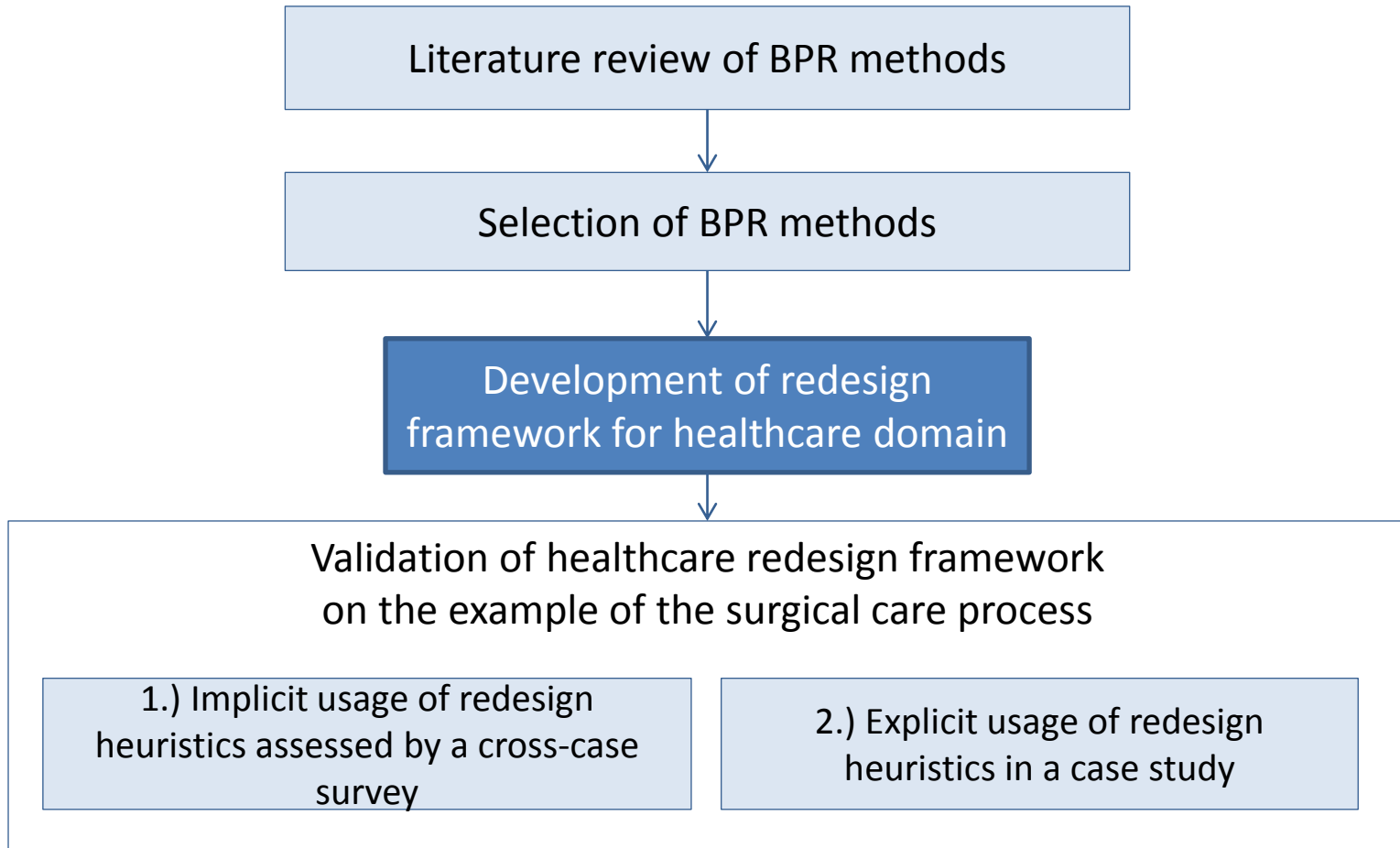
Re-engineering tools for workflows by Blitzer and Kamel (1997)

TRIZ principles by Altshuller

- Developed for the product innovation domain
- Are part of the Theory of Inventive Problem Solving (TRIZ) methodology
- 40 inventive principles were derived from the inspection of several thousand patent files

- Reviewed BPR pioneers' works synthesized with workflow technology
- Provided in their 5-phase workflow re-engineering methodology a list of 11 re-engineering tools

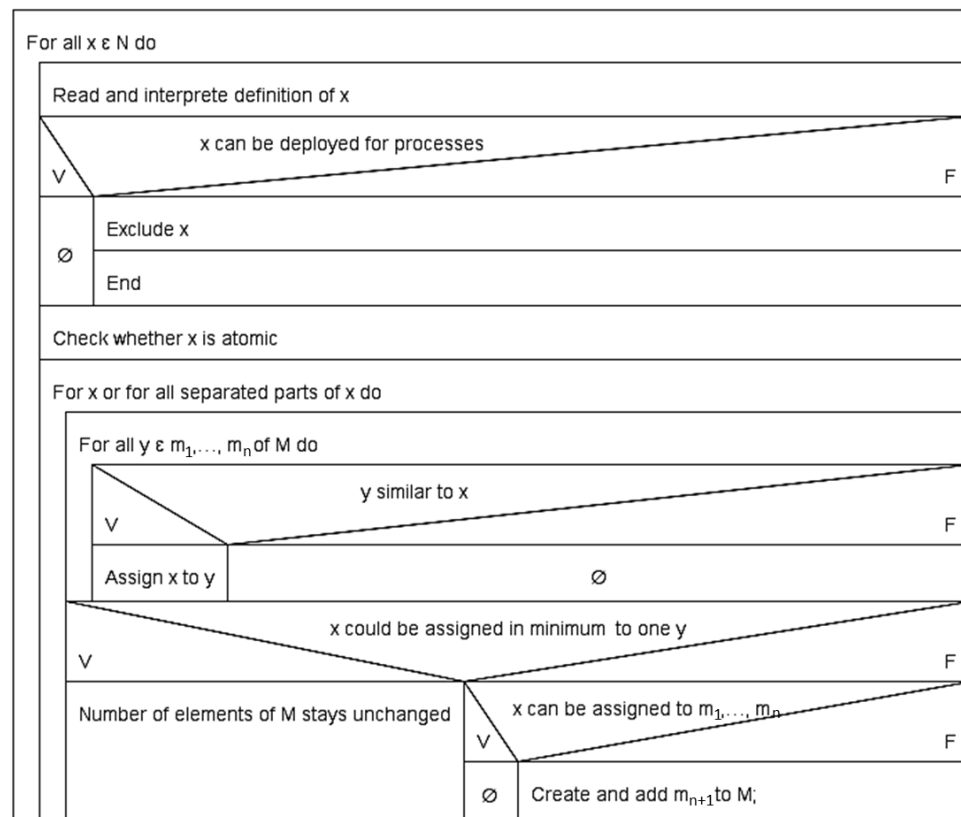
# 2. Research Methodology



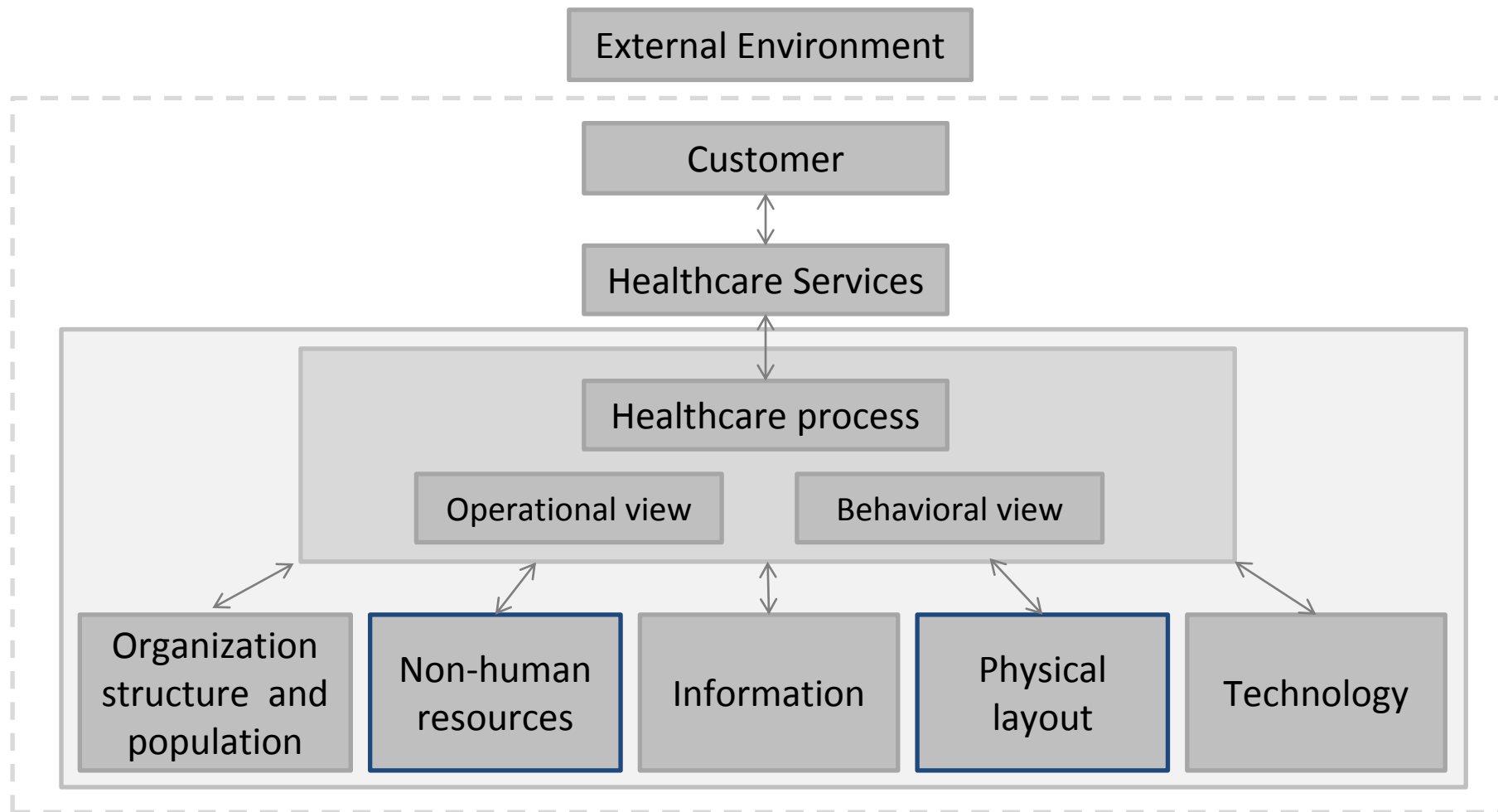
# 2.2 Development of redesign framework for healthcare domain

Structured procedure:

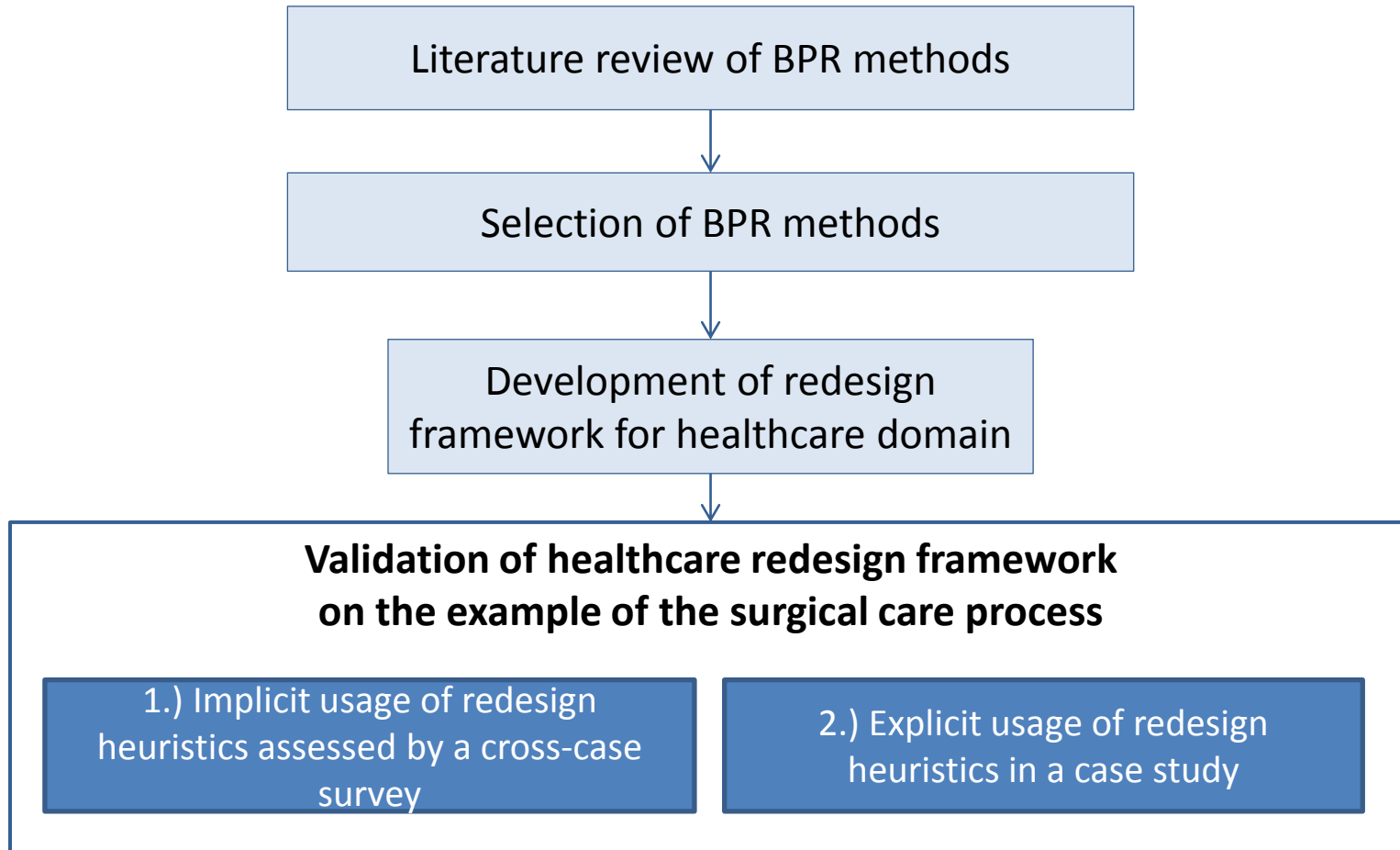
- Set  $M$ : set of established redesign heuristics which consists of the categories  $m_1, \dots, m_n$
- Set  $N$ : set of potential new redesign heuristics
- 1<sup>st</sup> Iteration:  
 $M$  includes all BPR best practices,  
 $N$  includes all workflow re-engineering tools
- 2<sup>nd</sup> Iteration:  
 $M$  is the result of 1<sup>st</sup> iteration,  
 $N$  includes all TRIZ principles



# 2.2 Development of redesign framework for healthcare domain



# 2. Research Methodology



## 2.3 Validation

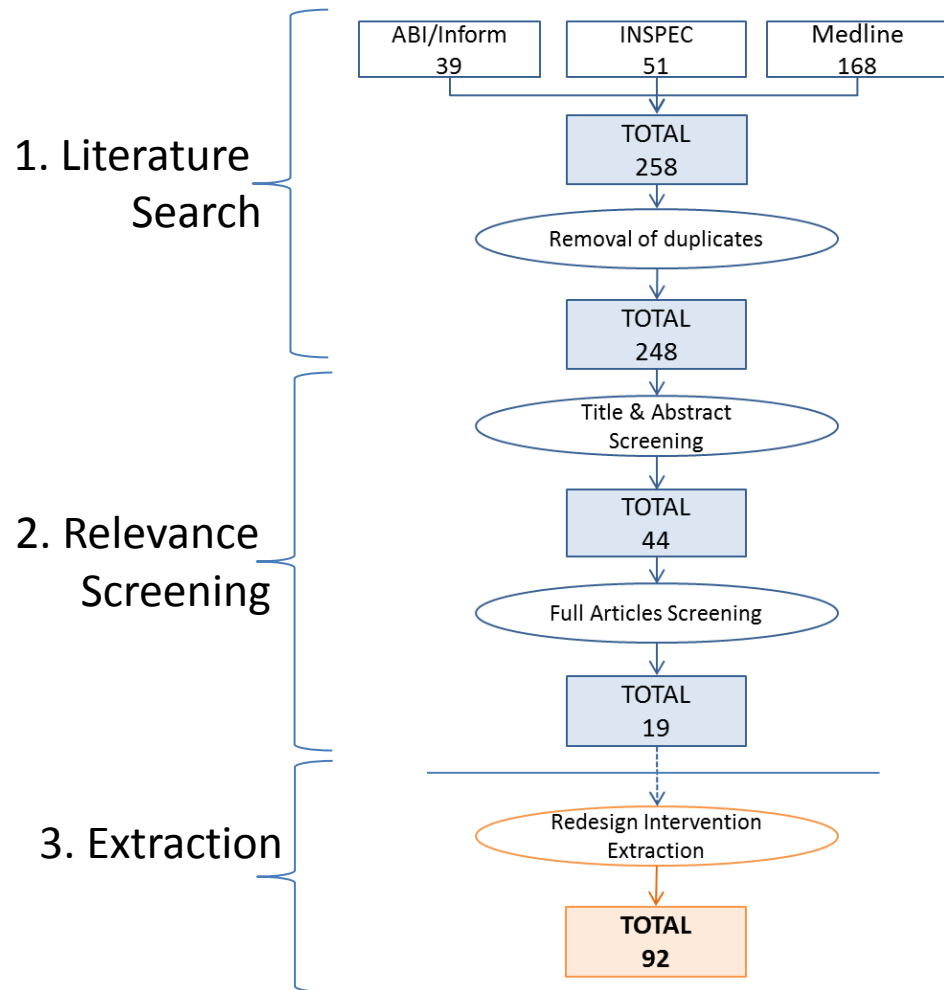
- On the example of the surgical care process  
→ one of the core processes of hospitals
- Two-step validation procedure was used:
  1. Cross-case study: measuring the extent to which the redesign heuristics were already implicitly used in surgical redesign initiatives
  2. Case study: explicit application of the healthcare redesign framework by healthcare practitioners in a BPR project in a Dutch Ambulatory Surgery Center

# 2.3 Validation: Cross-Case Study

## Methodology:

- Followed the structured literature review methodology proposed by Vanwersch et al. (2011)
- Used a similar Boolean expression for the literature search with synonyms and acronyms for the key search terms:

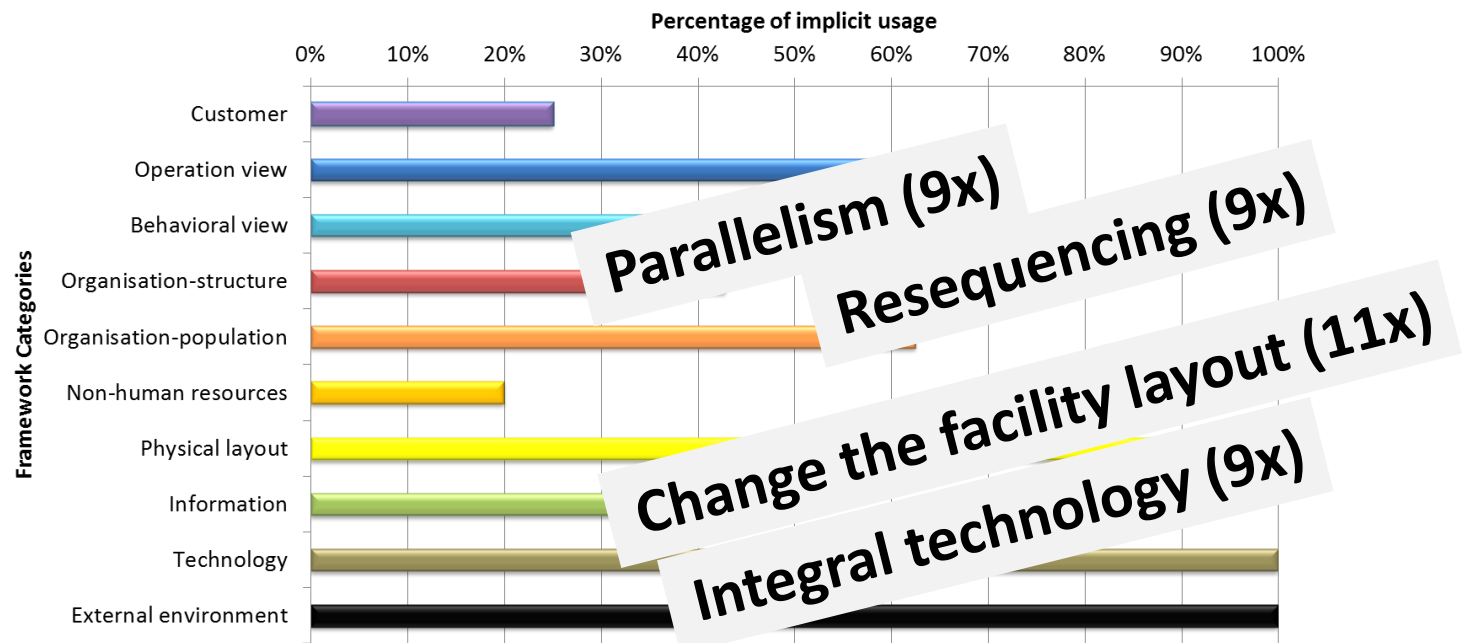
((‘process’ AND ‘redesign’) OR ‘process redesign’) AND ‘surgical care’



# 2.3 Validation: Cross-Case Study

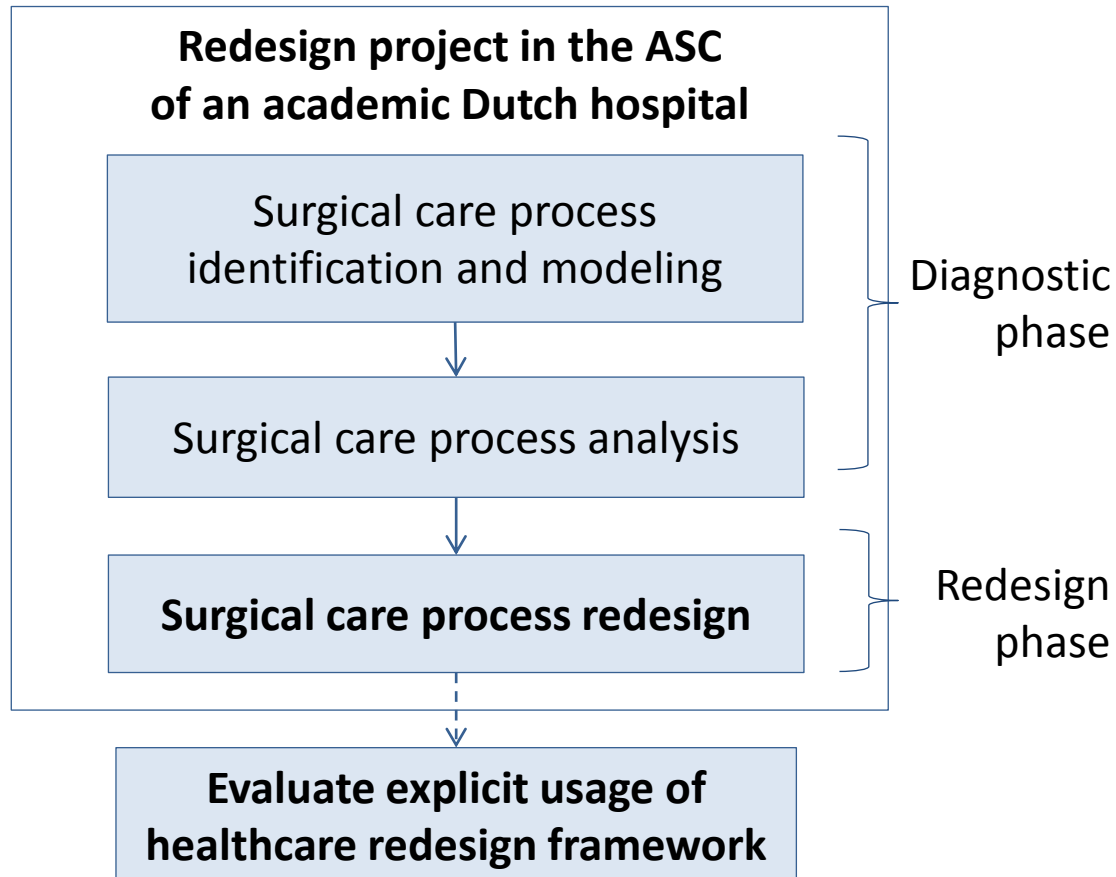
## Result

- 57 % of the available redesign heuristics have been applied implicitly in the surgical care setting
- Percentage of implicitly used redesign heuristics per category:





## 2.3 Validation: Case Study



# 2.3 Validation: Case Study

## Methodology:

**(a) Two-part-redesign workshop with 6 participants from different disciplines (surgeon, anesthesiologist etc.)**

### 1. Part:

- Presenting of analysis results and a short training on the healthcare redesign framework
- Asking participants to create different redesign ideas with the redesign heuristics individually

### 2. Part:

- Presenting of the merged redesign ideas
- Feasibility assessment by the participants

Redesign principle	Definition	Redesign idea for the surgical case process in the ACM Day Care Center
1. Control situation	Under control observation of customer e.g. introduce "self-help" via forms e.g. reduce the number of questions	Customer (e.g. Patient) ACM Day Care Center
2. Contact situation	Reduce the number of contacts with customer e.g. introduce the appointment card e.g. introduce the day of appointment e.g. introduce the patient's name e.g. introduce the patient's name e.g. introduce the patient's name	
3. Information	Control the flow of information e.g. introduce the patient's name e.g. introduce the patient's name e.g. introduce the patient's name	
4. Feasibility	Control the flow of information e.g. introduce the patient's name e.g. introduce the patient's name e.g. introduce the patient's name	
5. Case Types	Determine whether tasks are relevant e.g. introduce the patient's name e.g. introduce the patient's name e.g. introduce the patient's name	Operation view
6. Task elimination	Control the flow of information e.g. introduce the patient's name e.g. introduce the patient's name e.g. introduce the patient's name	
7. Case-based work	Control the flow of information e.g. introduce the patient's name e.g. introduce the patient's name e.g. introduce the patient's name	
8. Storage	Control the flow of information e.g. introduce the patient's name e.g. introduce the patient's name e.g. introduce the patient's name	
9. Task simplification	Control the flow of information e.g. introduce the patient's name e.g. introduce the patient's name e.g. introduce the patient's name	

# 2.3 Validation: Case Study

## Result:

- Healthcare practitioners were able to develop several redesign ideas for the selected healthcare setting
- 78% of all heuristics were used by them → participants used their individual sets of redesign heuristics for creating ideas
- 1/3 of the heuristics were applied differently as intended

→ limited available time during the workshop for training and language difference

Table 5: Overview about explicit Usage of Healthcare Redesign Framework

Participants	1	2	3	4	5	6	Total
# of created redesign ideas	12	9	20	5	5	7	58
# of used redesign heuristics	13	12	22	5	7	7	66
# of correctly used redesign heuristics	6	6	12	3	6	7	40
% of correctly used redesign heuristics	46%	50%	55%	60%	86%	100%	61%

# 2.3 Validation: Case Study

## Methodology:

### (a) User Acceptance of the healthcare redesign framework

- Measured with the help of the TAM by Davis (1989) → three theoretical constructs:

- Perceived ease of use e.g. *“I found it easy to learn how to apply the redesign heuristics.”*
- Perceived usefulness e.g. *“I think this framework enables me to generate more redesign ideas than without it.”*
- Intention of use e.g. *“In the future I will use the healthcare redesign framework in preference to the brain storming technique.”*

- Creation of a post-task questionnaire with 12 items measured by using a 5-point Likert scale

Questionnaire about the usage of the healthcare redesign framework

Questions	Fully Disagree	Partly Disagree	Neutral	Partly Agree	Fully Agree
1. I found it complex and difficult to apply the healthcare redesign framework.	○	○	○	○	○
2. I found it easy to learn how to apply the redesign principles.	○	○	○	○	○
3. The redesign principles were clear and understandable for me.	○	○	○	○	○
4. I found it difficult to apply the redesign principles to the DCC surgical care process.	○	○	○	○	○
5. I am confident that I am now competent to apply the healthcare redesign framework in practice (e.g. in other process improvement projects).	○	○	○	○	○
6. I believe that the redesign principles help to find more quickly improvement ideas for healthcare process.	○	○	○	○	○
7. The healthcare redesign framework would make it easier for healthcare practitioners to redesign (improve) their processes.	○	○	○	○	○
8. Overall, I found the healthcare redesign framework useful.	○	○	○	○	○
9. I think the redesign principles do <u>not</u> provide an effective solution to the problem of finding a new process design.	○	○	○	○	○
10. I think this framework enables to generate more redesign ideas than without it.	○	○	○	○	○
11. I am intending to use the redesign principles also in the practice for other process improvement projects.	○	○	○	○	○
12. In the future I will use the healthcare redesign framework in preference to the brain storming technique.	○	○	○	○	○

# 2.3 Validation: Case Study

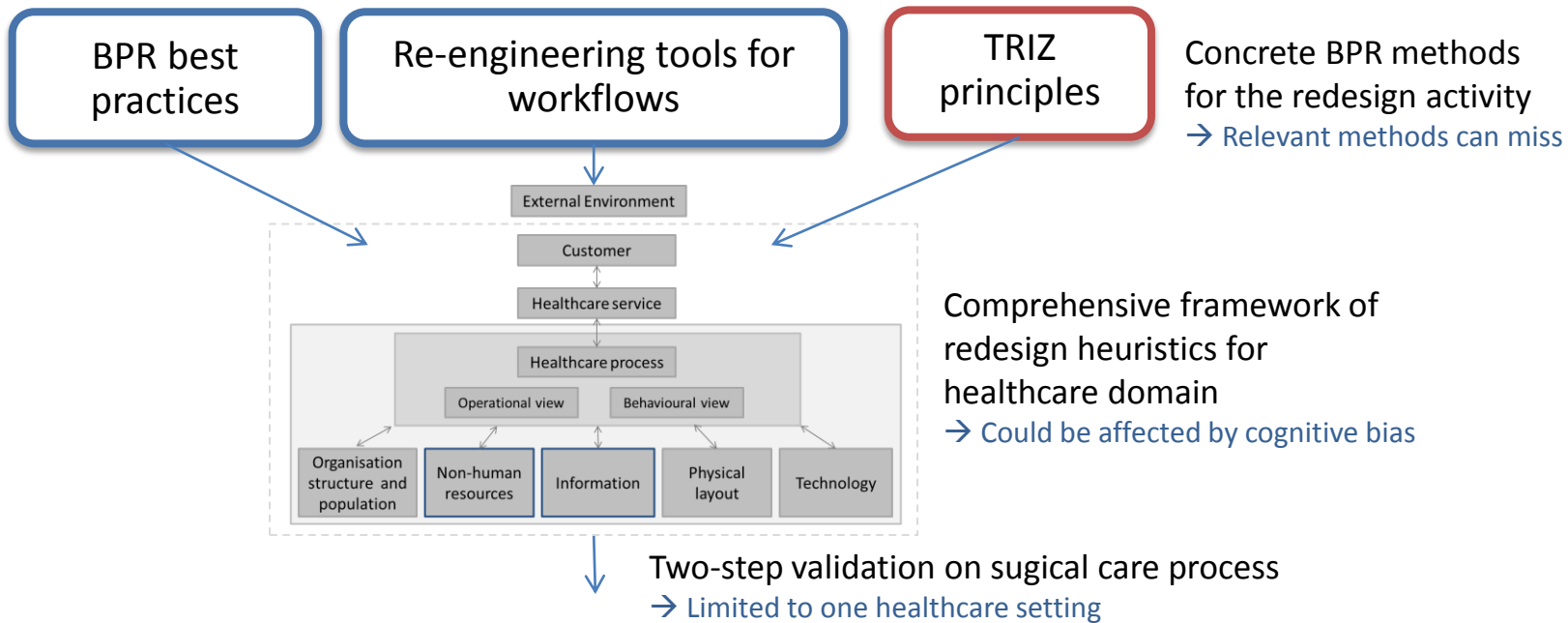
## Result:

Table 6: Evaluation Results by Healthcare Practitioners of the Post-task Survey

Constructs of the TAM	Mean	Fully Disagreed (-2)	Partly Disagreed (-1)	Neutral (0)	Partly Agreed (1)	Fully Agreed (2)
Perceived ease of use	-0.20	4%	52%	12%	24%	8%
Perceived usefulness	1.12	0%	0%	20%	48%	32%
Intention to use	0.00	0%	30%	40%	30%	0%

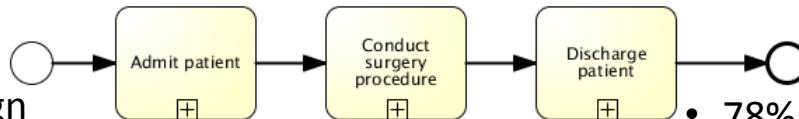
- -2 indicates a complete disagreement,
- 0 indicates a neutral position and
- +2 indicates the complete agreement of the respondents

# 3. Implication and Limitation



## Implicit Usage:

- 56% of all redesign heuristics were implicitly applied
  - Pattern of resequencing activities, parallelizing tasks, changing the facility layout and deploying technologies
- First validation step can be biased: 2<sup>nd</sup> reviewer needed



## Explicit Usage:

- 78% of all redesign heuristics were explicitly applied
- Should be tested against other techniques e.g. by using an experimental research design
- Survey on UA reveals a higher perceived usefulness, but a lower perceived ease of use

# 4. Outlook

- Future research options:
  1. Suitability of the redesign heuristics should be assessed for other healthcare processes with different characteristics than the surgical care process (e.g. a higher variability)
  2. Healthcare redesign framework should be tested against other common used redesign techniques, e.g. brainstorming → laboratory experiment
  3. Research on the question how the ease of use of the healthcare redesign framework can be improved for healthcare practitioners



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Thank you very much  
for your attention