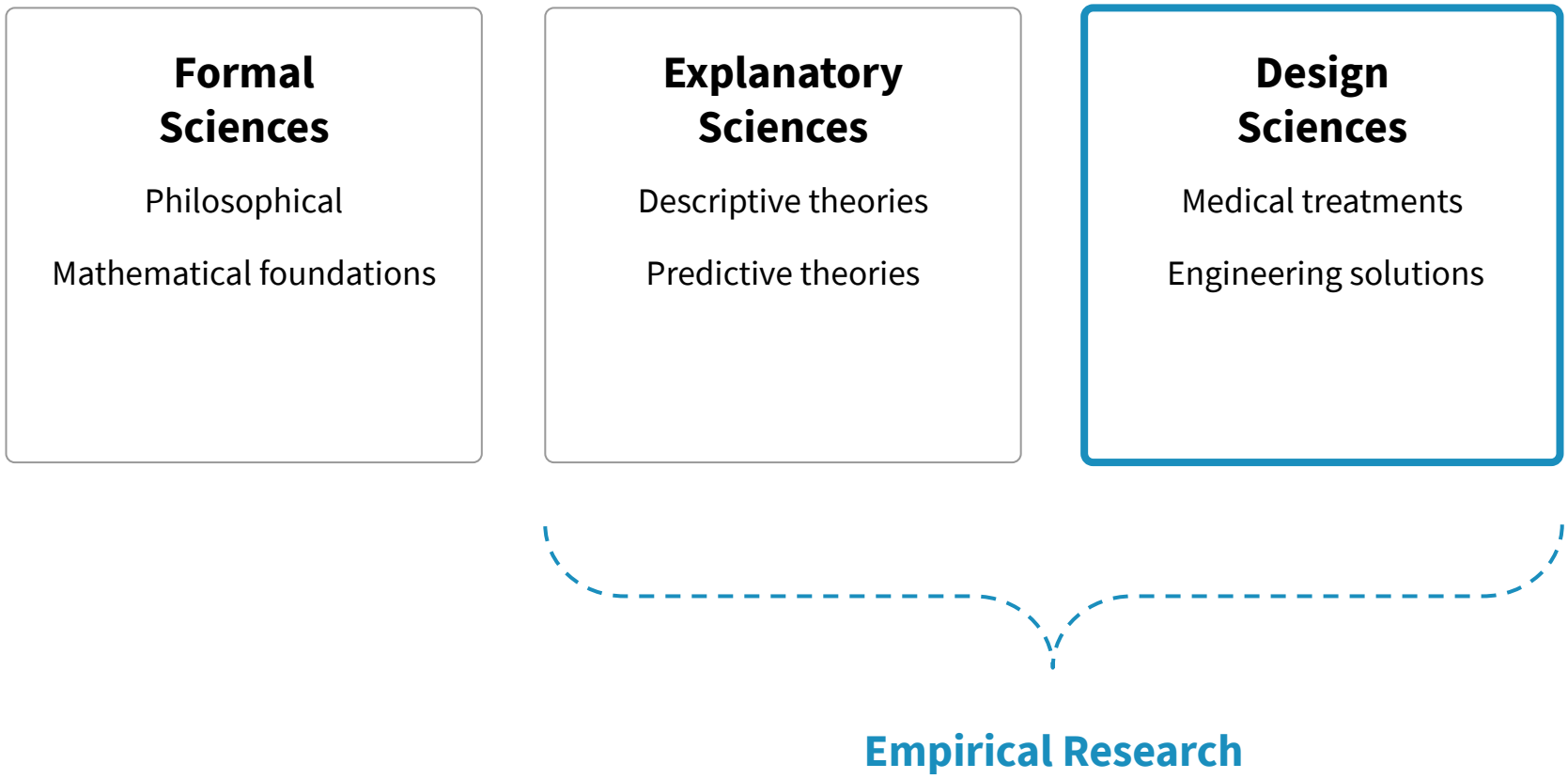
A Topics Course in Empirical Software Engineering: Bridging Research and Practice

Part 2, Week 2, Sept 18th 2020

Instructor: Margaret-Anne (Peggy) Storey

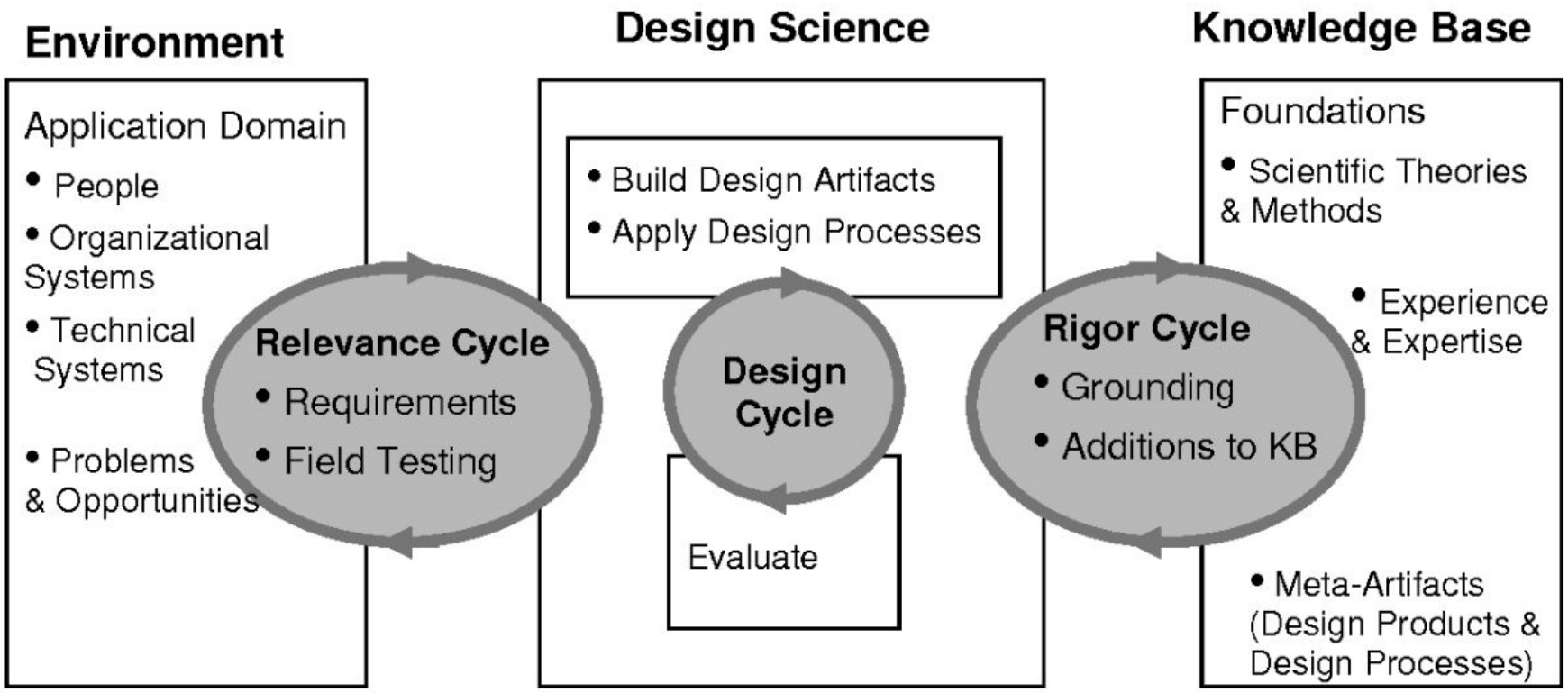
Design Science

Design Science Research in Software Engineering by Storey, Enstrom, Host and Runeson, ESEM 2017.

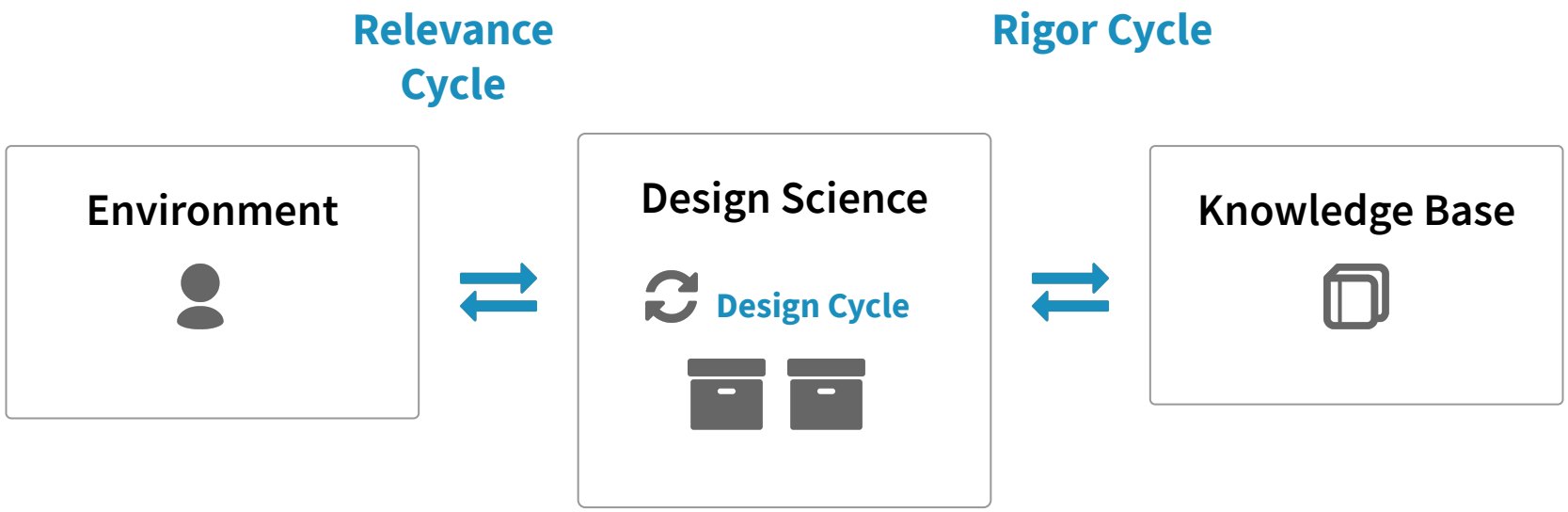


Types of Research Contributions

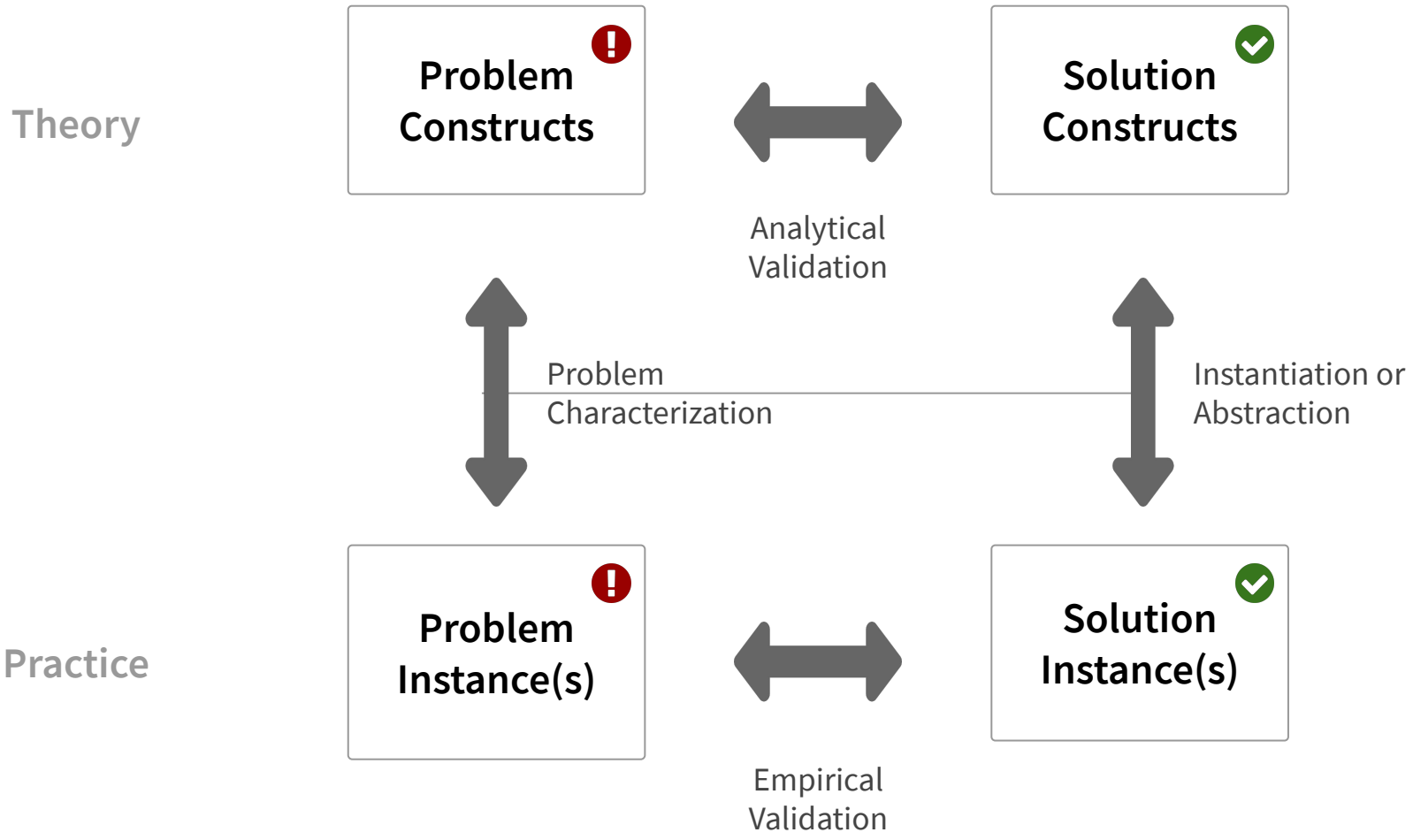
van Aken, 2004



Design Science — Hevner (2007)

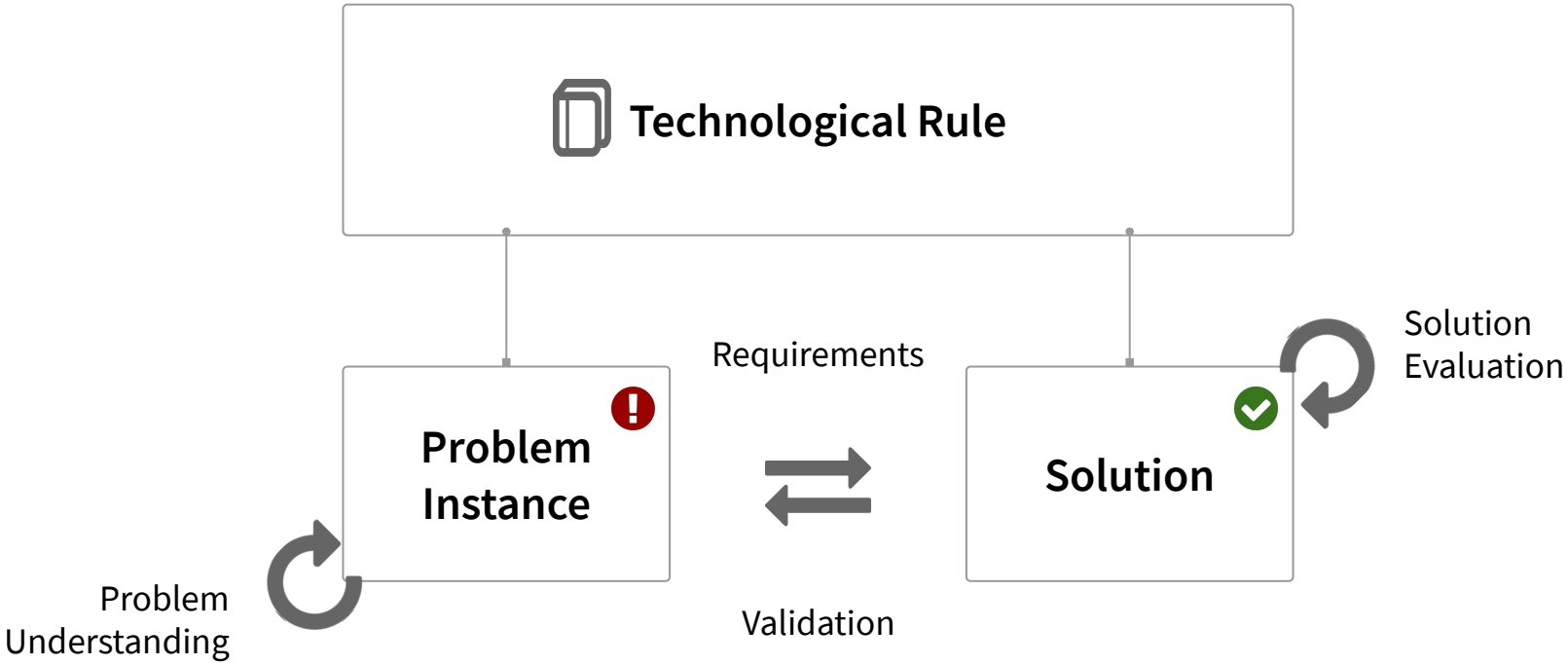


Design Science — Hevner (2007)



Design Science - Our View

Problem Solution



Design Science — Our View (Simplified)

van Aken, 2004

Technological Rule
(Theory Fragment)

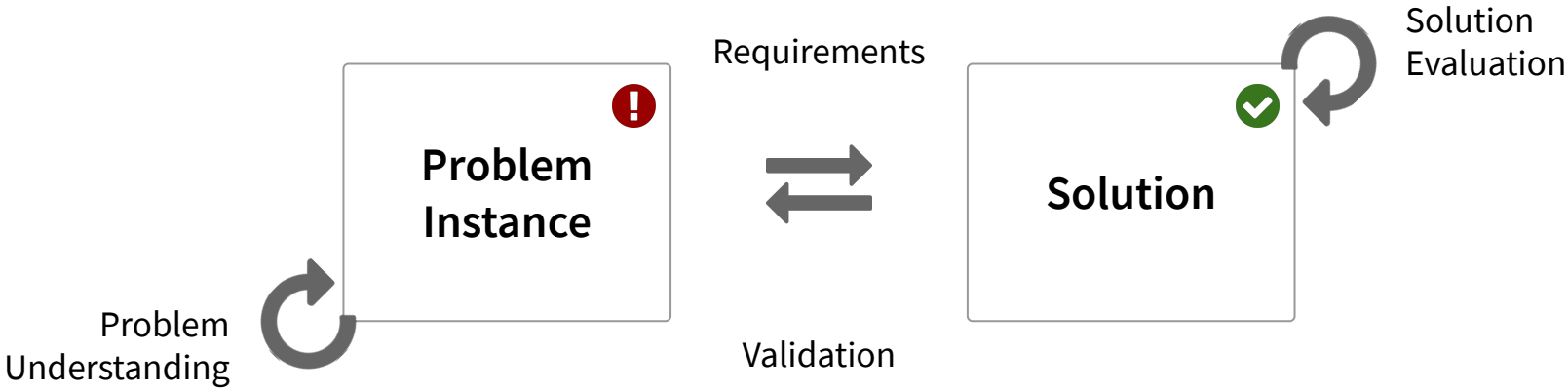
To reduce errors in open source projects use continuous integration.

To achieve an effect in a given context **use / do intervention.**

x y z

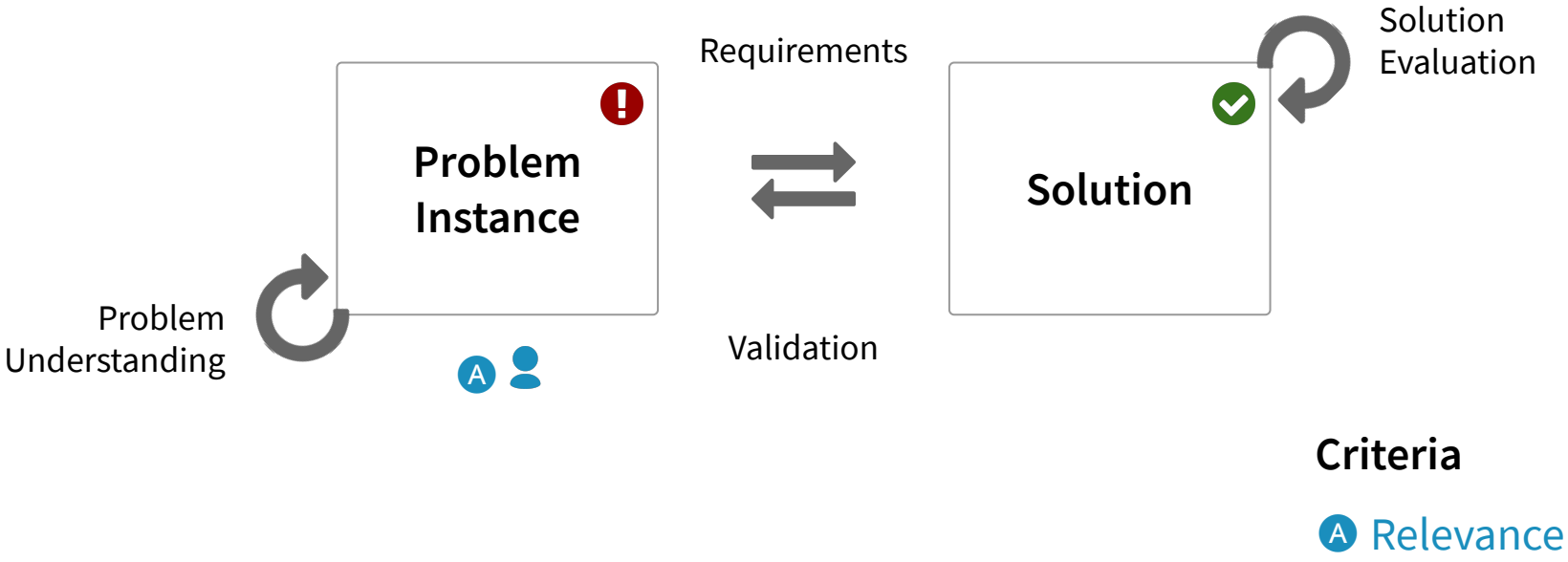
Technological Rules

van Aken, 2004

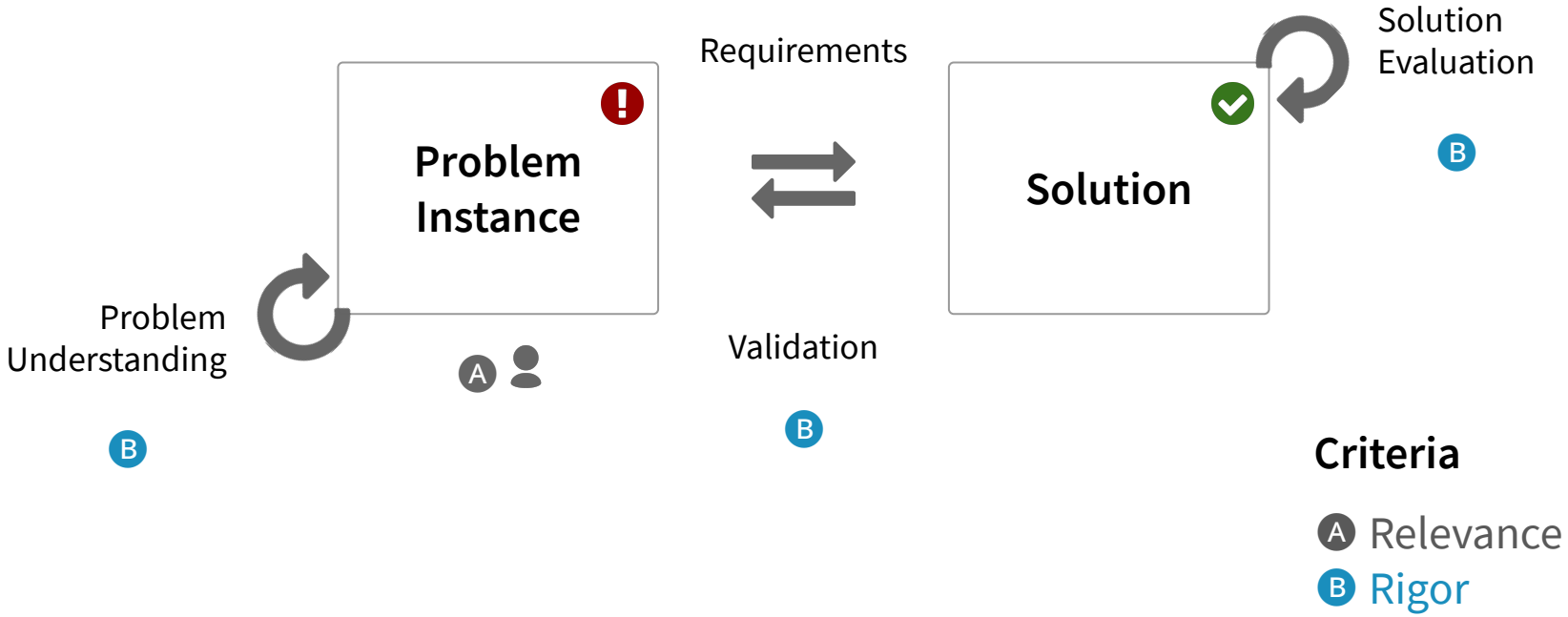


Evaluation Criteria

Storey et al., 2017

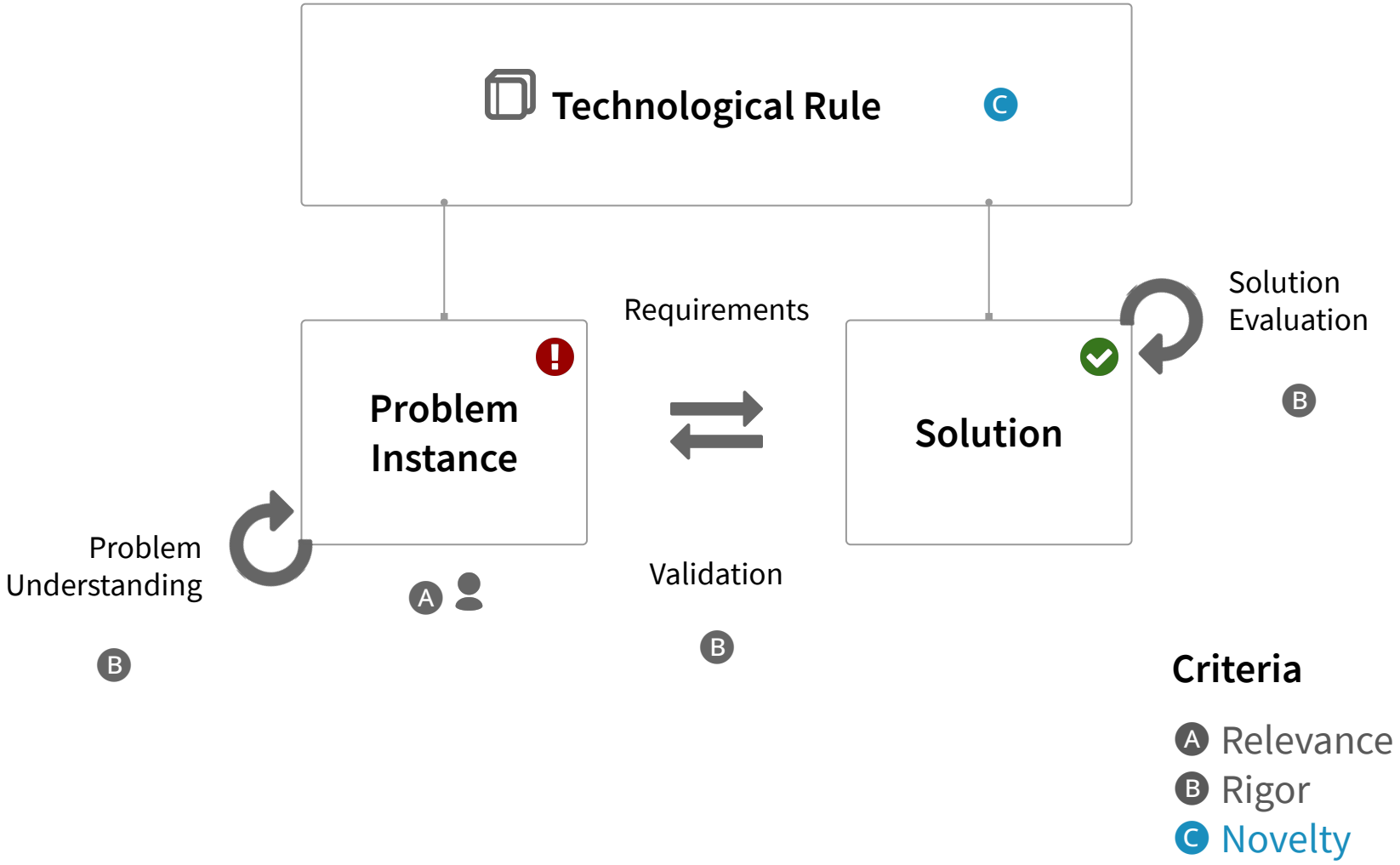


Evaluation Criteria



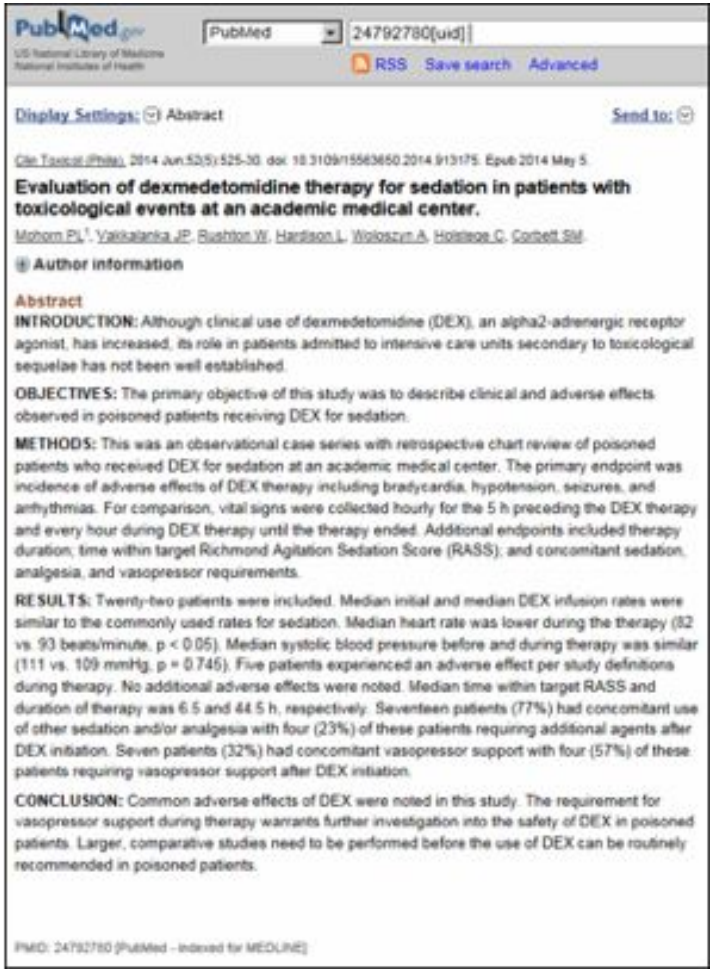
Evaluation Criteria

Evaluation Criteria



A **structured abstract** is an **abstract** with distinct, labeled sections (e.g., Introduction, Methods, Results, Discussion) for rapid comprehension.

In comparison, visual abstracts provide additional insights with a more flexible reading order



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Clin Toxicol (Phila). 2014 Jun;52(5):525-30. doi: 10.3109/15563650.2014.913175. Epub 2014 May 5.

Evaluation of dexmedetomidine therapy for sedation in patients with toxicological events at an academic medical center.

Mohorn PL[1], Vaikkalanka JP, Rushton W, Hardison L, Woloszyn A, Holstege C, Corbett SM.

Author information

Abstract

INTRODUCTION: Although clinical use of dexmedetomidine (DEX), an alpha2-adrenergic receptor agonist, has increased, its role in patients admitted to intensive care units secondary to toxicological sequelae has not been well established.

OBJECTIVES: The primary objective of this study was to describe clinical and adverse effects observed in poisoned patients receiving DEX for sedation.

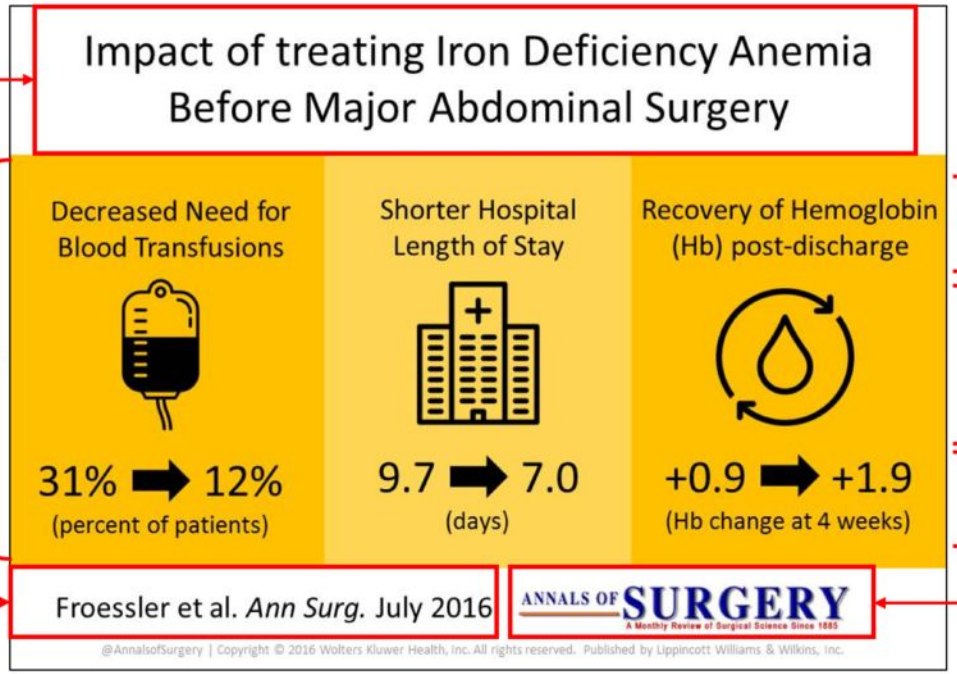
METHODS: This was an observational case series with retrospective chart review of poisoned patients who received DEX for sedation at an academic medical center. The primary endpoint was incidence of adverse effects of DEX therapy including bradycardia, hypotension, seizures, and arrhythmias. For comparison, vital signs were collected hourly for the 5 h preceding the DEX therapy and every hour during DEX therapy until the therapy ended. Additional endpoints included therapy duration; time within target Richmond Agitation Sedation Score (RASS); and concomitant sedation, analgesia, and vasopressor requirements.

RESULTS: Twenty-two patients were included. Median initial and median DEX infusion rates were similar to the commonly used rates for sedation. Median heart rate was lower during the therapy (82 vs. 93 beats/minute, $p < 0.05$). Median systolic blood pressure before and during therapy was similar (111 vs. 109 mmHg, $p = 0.745$). Five patients experienced an adverse effect per study definitions during therapy. No additional adverse effects were noted. Median time within target RASS and duration of therapy was 6.5 and 44.5 h, respectively. Seventeen patients (77%) had concomitant use of other sedation and/or analgesia with four (23%) of these patients requiring additional agents after DEX initiation. Seven patients (32%) had concomitant vasopressor support with four (57%) of these patients requiring vasopressor support after DEX initiation.

CONCLUSION: Common adverse effects of DEX were noted in this study. The requirement for vasopressor support during therapy warrants further investigation into the safety of DEX in poisoned patients. Larger, comparative studies need to be performed before the use of DEX can be routinely recommended in poisoned patients.

PMID: 24792780 [PubMed - indexed for MEDLINE]

COMPONENTS OF AN EFFECTIVE VISUAL ABSTRACT



Summarize Key Question Being Addressed

Summary of Outcomes

Author, Citation

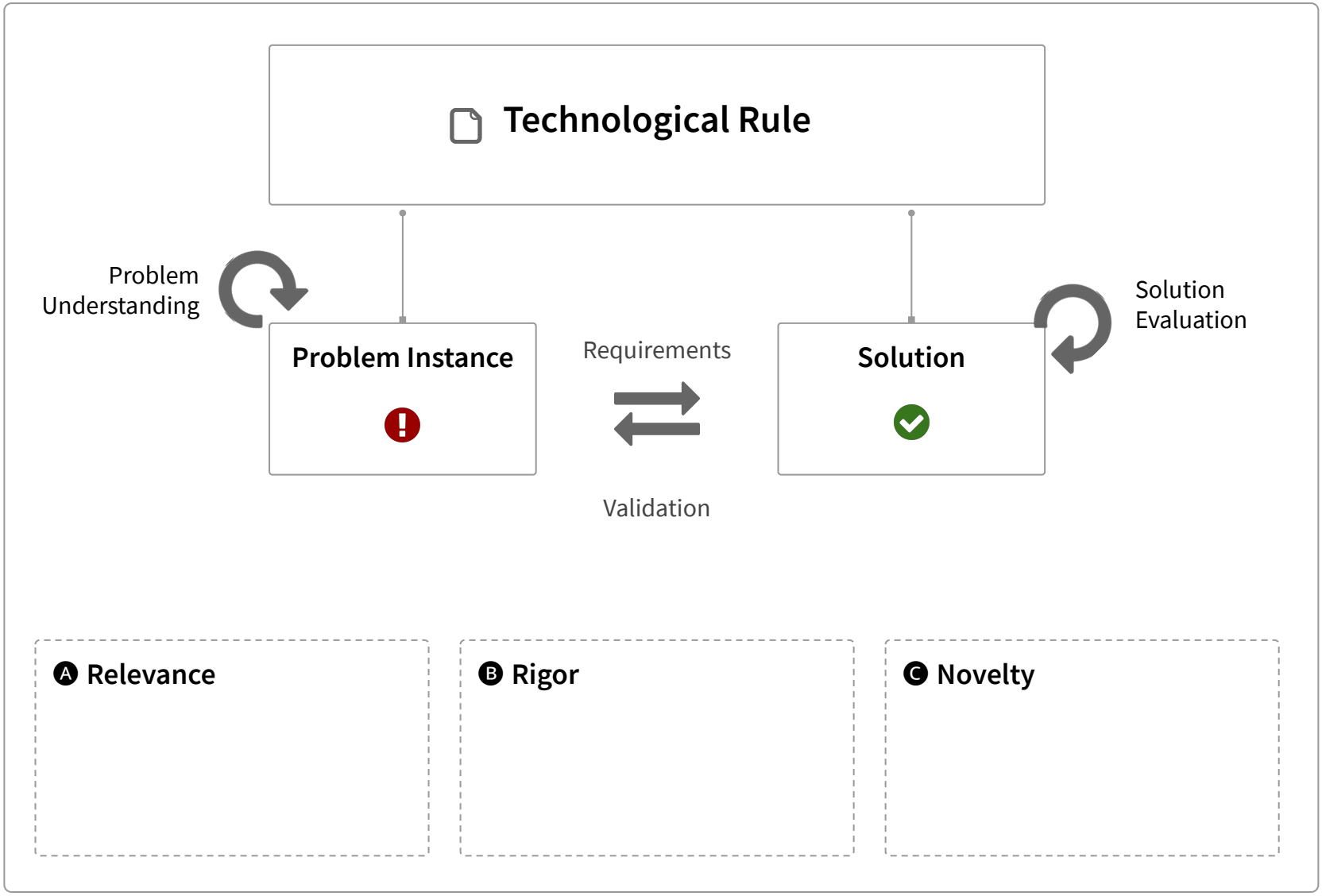
State Outcome Comparison

Visual Display of Outcome

Data of Outcome (Units)

Who Created the Visual Abstract (often the journal)

https://www.surgeryredesign.com/resources/



Design Science Visual Abstract Template

Storey et al., 2017

Generic Visual Abstract

Technological rule: To achieve effect/change in situation/context apply solution/intervention

Problem Instance

Concrete case of the problem described in the Technological Rule in terms of real data and/or stakeholders' needs

Problem Understanding: Studies to support conceptual understanding of the problem instance

Validation approach: Studies to validate the effect of the solution on the problem instance

Solution

Concrete implementation of the solution described in the Technological Rule

Solution design approach: Studies or theoretical foundation supporting core design choises

Relevance: Characteristics of the context that are likely to impact applicability and potential value of the proposed solution

Rigor: Characteristics of the three knowledge creating activities (problem understanding, solution design and in context evaluation) that adds to the strength of the empirical support of the Technological Rule

Novelty: Positioning of the Technological Rule in terms of previous knowledge

Some feedback from you (already!)

How did the community receive this? Has it been adopted?

What about lessons learned? Or limitations faced during the research?