Design Science Research

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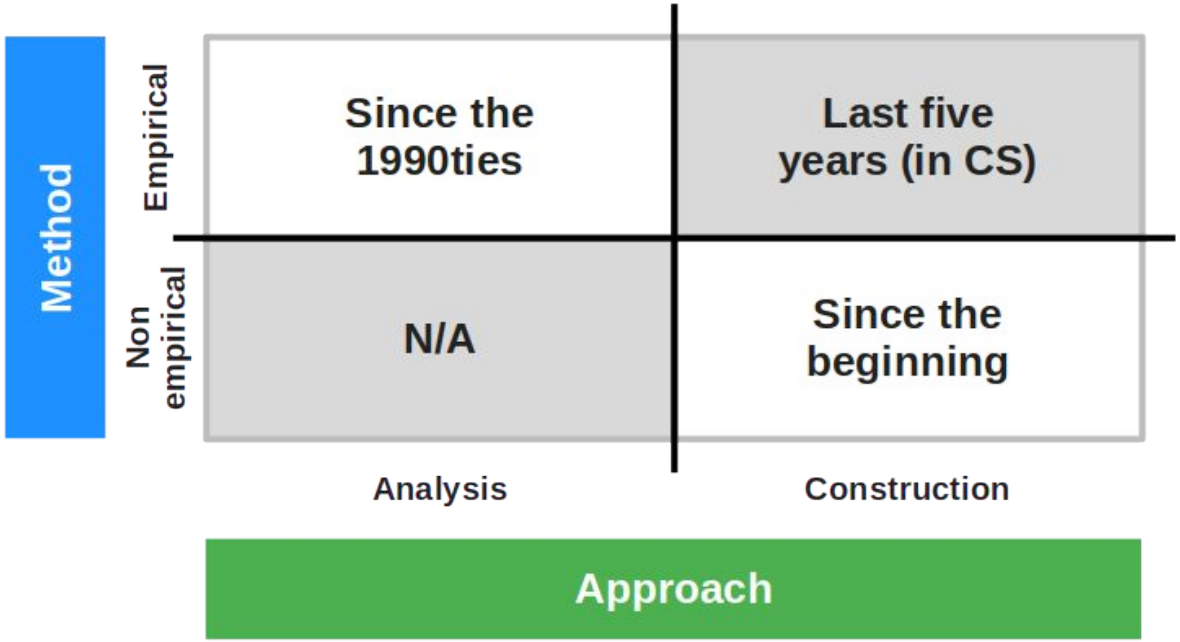
NYT C03

Agenda

1. A short research history
2. Design science research

1. A Short SE Research History

A Short Research History



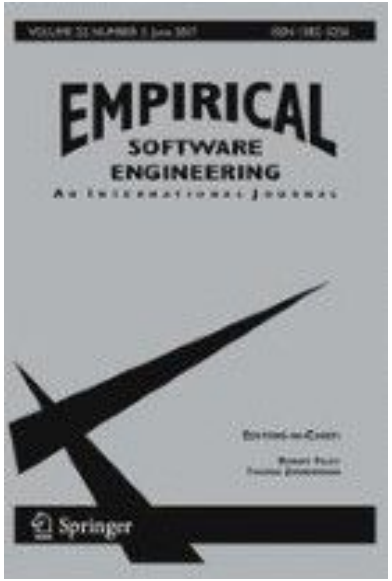
1. Software Engineering Research of Old

Engineering is building artifacts

Engineering science (research) is building-to-learn

Building-to-learn was often only casually or not at all evaluated

Empirical Software Engineering



Victor R. Basili, Ph.D.

2. (Overly) Analytical Software Engineering Research

Fastest way to research paper

1. Formulate hypothesis
2. Test with GitHub data
3. Write and submit paper

3. Design Science Research

Empirically grounded innovation

2. Design Science Research

Design Science Research [1]

Design science is a

- Paradigm for conducting scientific research
- Methodology if you follow a specific textbook

The goal of design science research is to

- Find innovative solutions to current problems

[1] Paradigm = methodology category

Design Science Research [1] Activities and Their Purpose

#	Activity	Purpose
1.	Problem identification	Build theory of problem domain
2.	Objective definition	Define objective (“research question”)
3.	Solution design	Design solution (the “design science artifact”)
4.	Demonstration	Demonstrate viability (should we continue?)
5.	Evaluation	Evaluate theory as embodied in artifact
6.	Publication	Communicate findings

[1] According to Peffers et al. (2007)

What’s Scientific About Design Science Research?

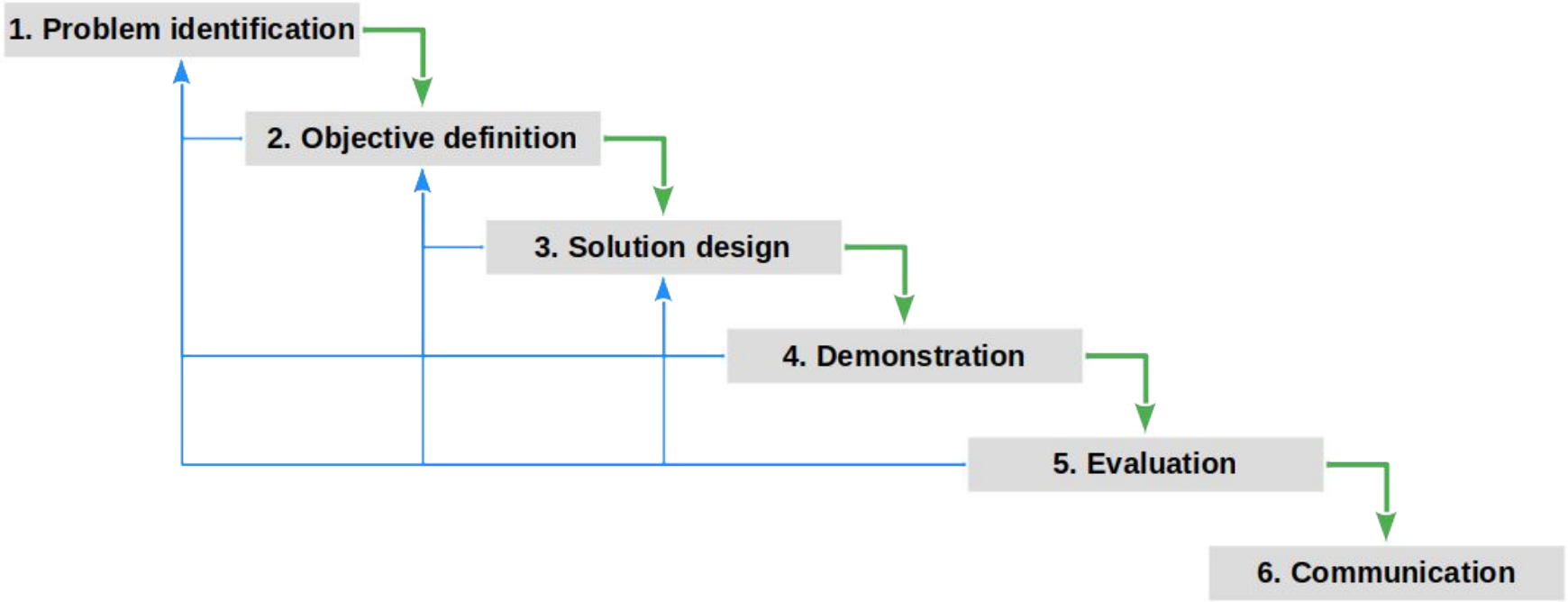
Problem identification

- Theory building methodologies
  - Structured literature survey
  - Qualitative survey
  - Questionnaire
- Research methods
  - Qualitative data analysis
  - QDA associated practices

Evaluation / validation

- Theory building methodologies
  - Action research
  - Case study research
  - …
- Hypothesis testing
  - Controlled experiments
  - Hypothesis testing surveys

Iteration in Design Science Research



Design Science and Engineering Theses

#	Design Science Activity	Final Thesis
1.	Problem identification	Related work
2.	Objective definition	Requirements for work
3.	Solution design	Design and implementation
4.	Demonstration	Demonstration
5.	Evaluation	Evaluation against requirements
6.	Publication	Final thesis

Where Effort is Spent in Design Science Research [1]

#	Activity	% (Master Thesis)	% (Ph.D. Thesis)
1.	Problem identification	4%	29%
2.	Objective definition	1%	1%
3.	Solution design	70%	20%
4.	Demonstration	15%	5%
5.	Evaluation	0%	35%
6.	Publication	10%	10%

[1] According to me, spitballing… [DR]

Thank you! Any questions?

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