

# Research Methodologies in Computer Science (Vers 2)

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This is a collection of notes I have accumulated regarding research methodologies, especially for the use of my project students. It is a document mainly directed for my students, and not an official document by the department of computer science.

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## 1 Definition of Research Methodology

Definition (private communication by Markus Roggenbach)

The methodology is the general strategy that outlines the way in which the project is to be undertaken and, among other things, identifies the methods to be used in it.

## 2 List of Research Methodologies

- A good book (directed at Humanities) is [vPHZ12].
- [Ama15] lists as research methodologies the following: formal, experimental, build, process, model.
- [Wik15d] list under “See also” the following methodologies:
  - Action Research (good description: [Val16], handout [Val17]; other source: [Jär05]; Wikipedia: [Wik15a]).  
Many computer science third year and MSc projects are in accordance with this methodology. Is closely related to Agile Software Deveopment Life Cycle.

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- Design research (mentioned in [Jär05]),
- Constructive Research (Wikipedia: [Wik15c]).
- Participant Observation (Wikipedia: [Wik15f]).
- Empirical Research (Wikipedia: [Wik15e]).
- Case Study (Wikipedia [Wik15b]).
- Design Science Research.
  - \* Good source: [CLM15], Sect. 2, p. 4 - 6.
  - \* Other sources: Basekerville et. al. [BKS15], Vaishnavi/kuechler [VK15], Hevner et. al. [HMPR04] and Wikipedia entry [Wik15d].
- Sources about general scientific methods
  - Dodig-Crnkovic [DC02] is a good scientific article describing research methodologies in computer science.
  - Vera Goebel and Thomas Plagemann [GP15].
  - [HAH<sup>+</sup>06] is a scientific article, but more concerned about how to teach research methodologies.
- Research Onion [UKE13]. More a description of the various aspects of research.

### 3 Research Methodologies, especially suitable for student projects

- For student projects in developing of software the following are particularly suitable (others might be suitable as well):
  - Action Research (closely related to agile software development life cycle).
  - Design Research
  - Design Science Research
  - Case Study
  - Constructive Research.
- For HCI projects (private communication by Matt Jones)
  - Good source book [CC08]
  - User centred design
  - experimental studies
  - Ethnography
  - Participative design
  - Technology probes

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