



Aalto University
School of Science



TU-E6080 Master's Thesis seminar

Professor Riitta Smeds

Industrial Engineering and Management,

Business and service processes in digital networks

SimLab research group

Spring 2019

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Aalto University
School of Science

Ojectives and schedule

- Prerequisites: taken when the planning of the Master's Thesis starts
- For students in the Master's Program in Information Networks, and in the Master's Program in Industrial Engineering and Management, optional course.
- Learning outcomes
 - the student is able to apply the principles of scientific work to his/her own Master's Thesis.
 - (S)he is able to write and orally present his/her own Thesis in its different phases.
 - the student can evaluate other Master's Theses, to discuss research and to give and receive feedback about scientific work.
- Teaching Period: I-V, Wednesdays at 14.15-16.00, in TU3160
- Grading Scale: Pass-fail

Scope: 1 or 2 credits

1 credit: the following oral PowerPoint -presentations

- 1) the evaluation of an Example Master's Thesis
- 2) the research plan of own Master's Thesis
- 3) the intermediate version of the Thesis
- 4) peer-review of the intermediate Thesis version of another student (no PowerPoints required)
- 5) the official Master's Thesis presentation

2 credits: in addition to the presentations 1-5 above

- research diary on altogether eight seminar sessions, with the following topic: how have the seminar sessions supported you in conducting the thesis research and writing the thesis?

Voluntary additions to the presentations: experiences about writing a thesis

- To the evaluation of an Example Master's Thesis
 - Based on interviewing the author, “The real story behind writing the thesis”: experiences, challenges, surprises, ... and how I dealt with them”
- To the official Master's Thesis presentation
 - Sharing your own experiences: “What did I learn from writing my thesis?” Positive things, challenges, surprises, ... and how I dealt with them”.

Master's Thesis: first scientific Thesis

The description and scientific explanation of behaviour:

- WHAT HAPPENED AND WHY?

1. CAUSAL EXPLANATION

- Cause-effect
- Positivistic research approach ("natural sciences")

2. TELEOLOGICAL EXPLANATION

- The objective is the reason for the behaviour: 'in order to'
- Hermeneutic i.e. interpretative research approach ("behavioural science")
- The cause of behaviour is explained from its objective

Teleological explanation

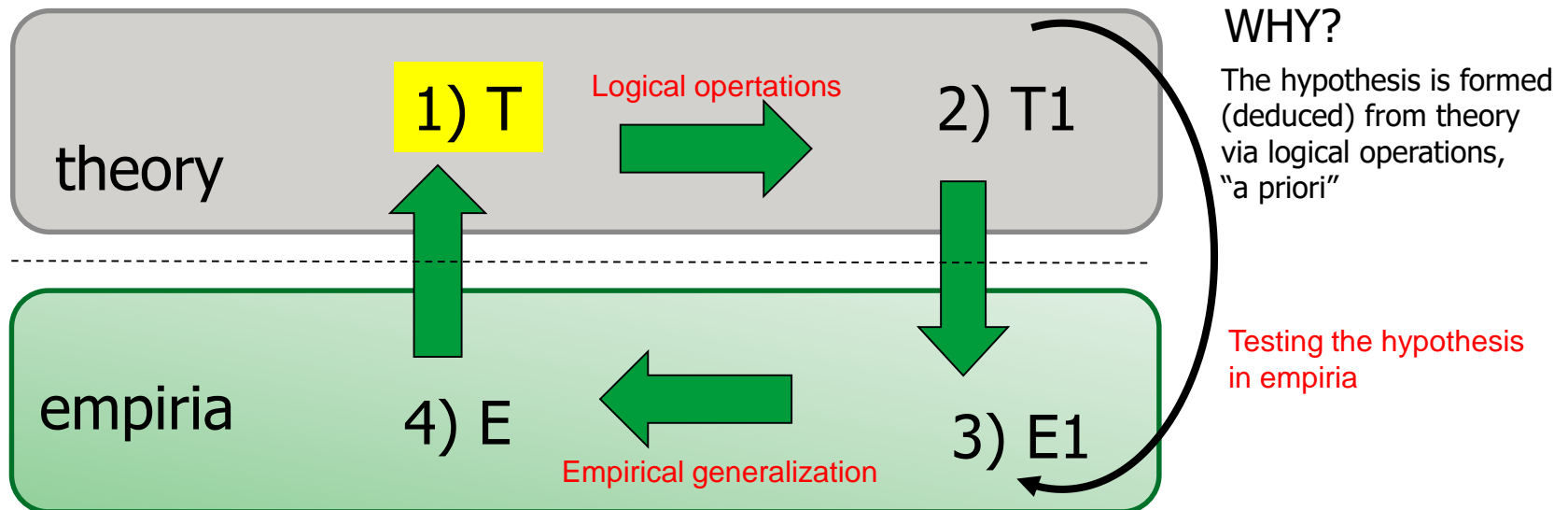
- TECHNICAL NORM X
 - If you want A objective A
 - And believe that you are in situation B present state B
 - You have to do X “construction” = solution to the problem
- The objective A is the “reason” for X in situation B
- Ilkka Niiniluoto: Tieteellinen päättely ja selittäminen, 1982
- Based on: Georg Henrik von Wright: Explanation and Understanding, Oxford University Press, 1971

Logics of Scientific Reasoning

- Deductive logic
- Inductive logic
- Abductive logic

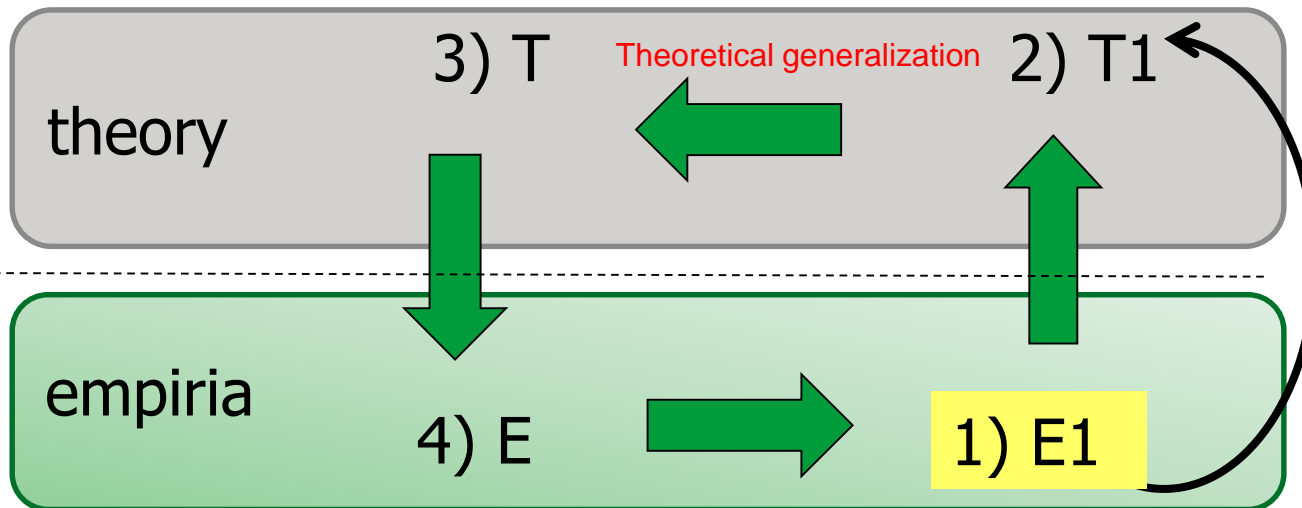
Deduction

- Reasoning starts from known facts (a priori) towards empirical generalization
 - The hypothesis is logically concluded i.e. deduced from theory, and tested in empirical data
 - If the hypothesis is confirmed, the results can be empirically generalized
 - Cause-effect; Positivistic, deterministic research



Induction

- Reasoning starts from empirical observations towards theoretical generalization
 - the hypotheses is formed based on empirical data
 - If the hypothesis is confirmed, the results can be generalized to theory as propositions, hypotheses
 - Hermeneutic, interpretative approach

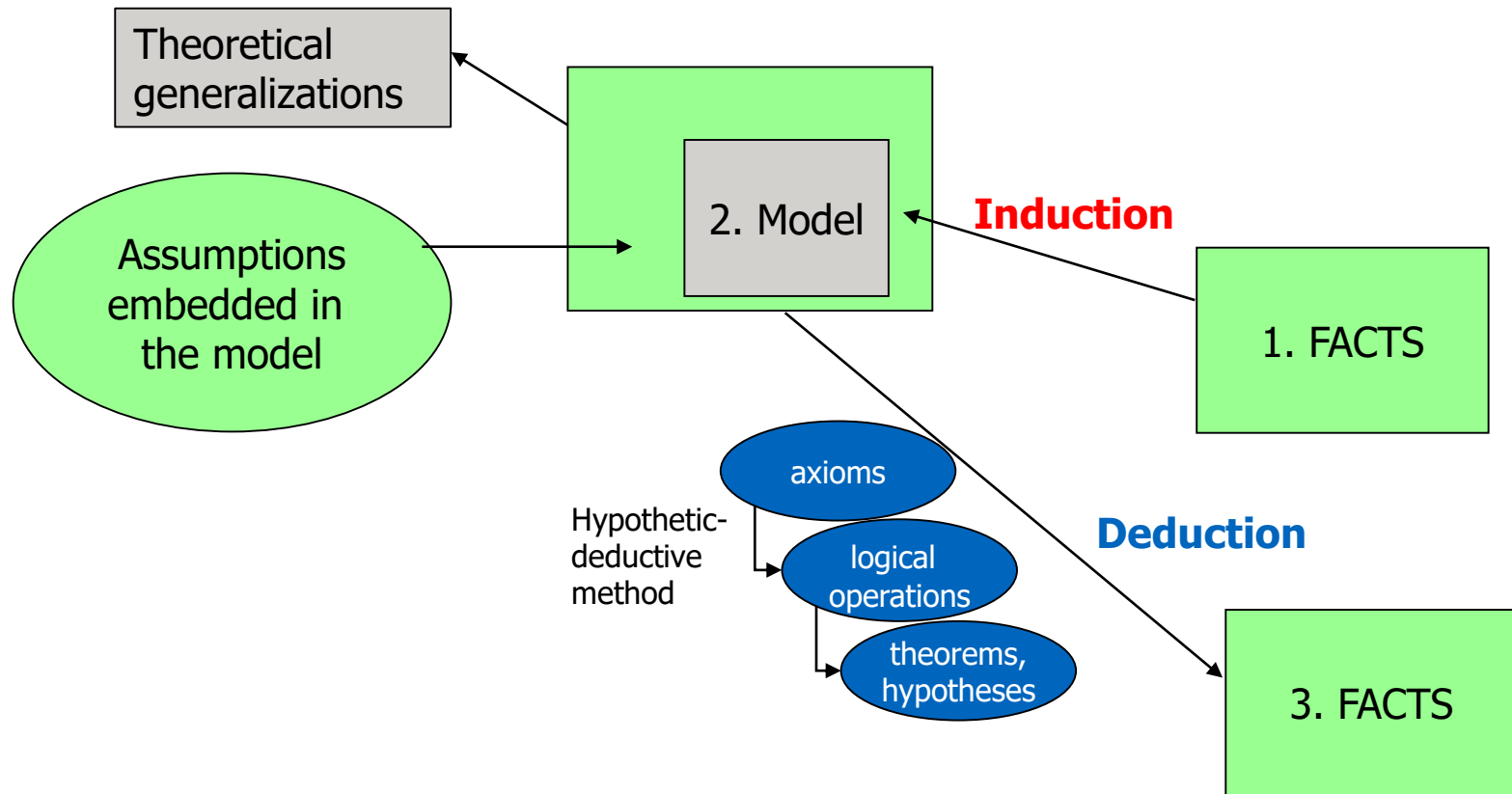


WHY?

The hypothesis is formed (induced) from empirical data, "a posteriori"

Observation!

Scientific reasoning: induction and deduction

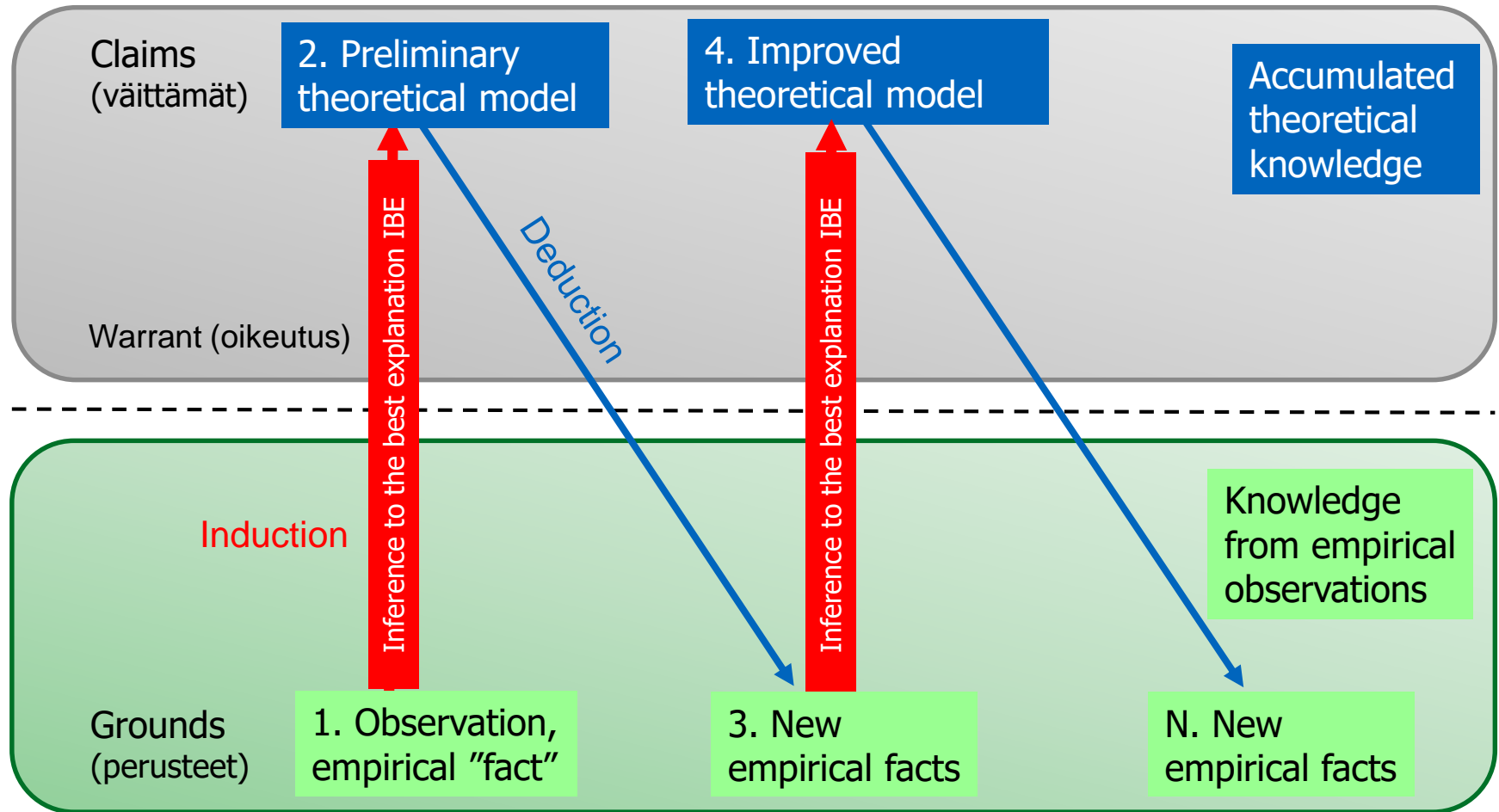


Elaborated from Ray Levitt, Stanford University, 18.2.2010

Abduction

- Abduction: starting with a surprising observation and taking a preliminary scientific framework to explain the observation
- Developing the framework through several rounds of testing, to improve its explanatory power
 - Difference compared to induction: starting with an initial framework
 - Difference compared to deduction: the framework can be abandoned or changed during the research, and many frameworks can exist simultaneously
 - Abduction can be used many “test rounds”
- Grönfors, M. (1985) Kvalitatiiviset kenttätöyömenetelmät. WSOY, Juva.
- Danemark, B., Ekström, M., Jakobsen, L., and Karlsson, J. C., (1997) Explaining society, critical realism in the social sciences. Routledge, London, UK.
- Flick, U., von Kardorff, E., Steinke, I. (Eds) (2004) A companion to qualitative research. London: Sage.
- Paavola, S., Hakkarainen, K., Sintonen, M. (2006) Abduction with dialogical and triological means
- **Ketokivi, M ja Mantere S. (2010) Two Strategies for Inductive Reasoning in Organizational Research, Academy of Management Review, Vol. 35, No. 2, 315–333.**

Abductive reasoning process



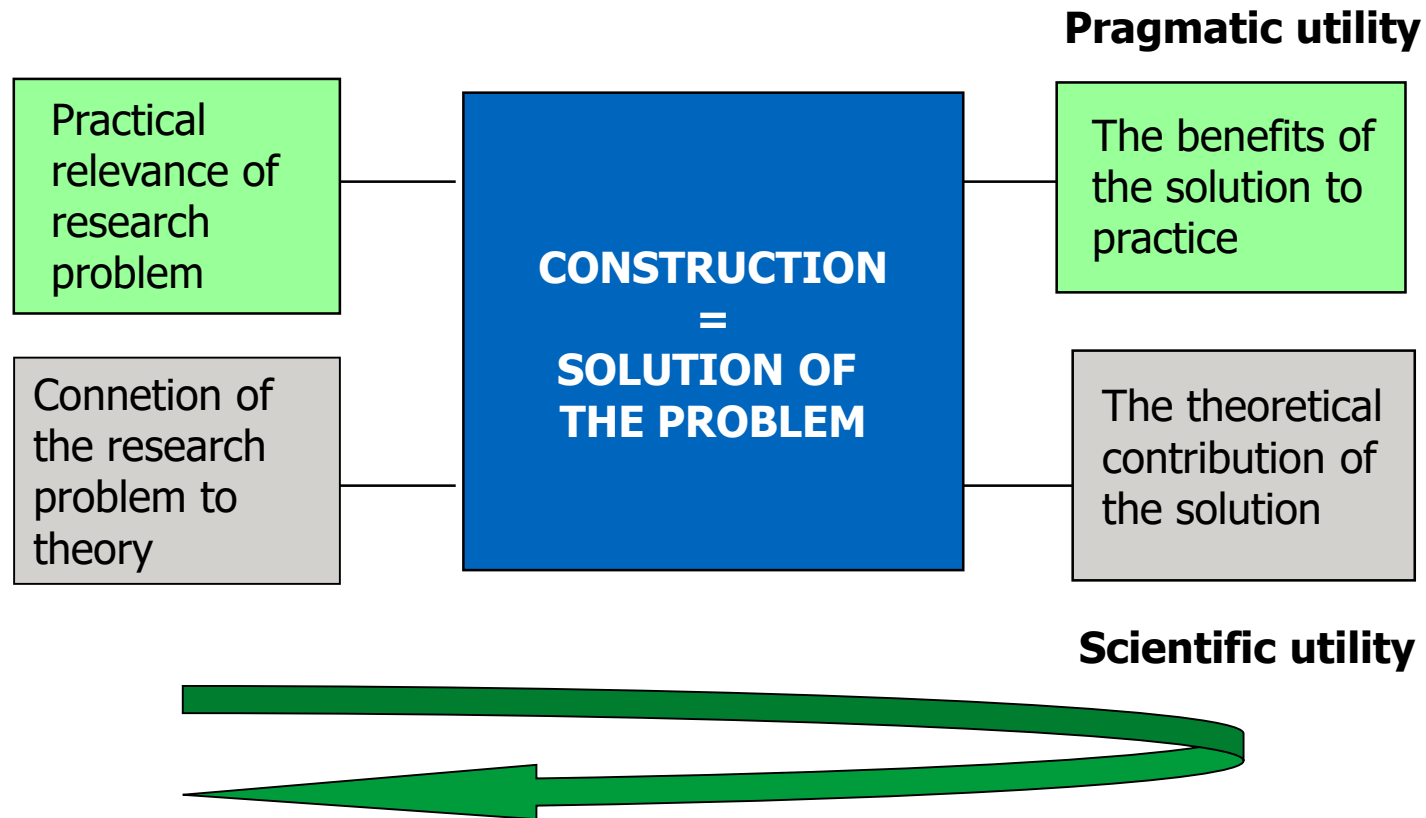
How do you cross the line from the grounds (empiria) to the claims (theory)?

An example of abductive reasoning in research

- Following the abduction logic, we first constructed a **preliminary analytical framework** as a synthesis from theory and our empirical understanding about the phenomenon under study.
- Thereafter, we conducted a detailed case study to test the framework through **deductive reasoning**.
- The results were **generalized back to theory through induction**, and summarized into a **new refined framework**.
- The refined framework aims to solve the practically relevant case company problem, but cannot as such be generalized to other empirical cases. However, it can be **theoretically generalized into propositions for future research**.
- This research approach can be called constructive research (Kasanen et al. 1993) or innovation action research (Kaplan 1998).

Lavikka, R., Smeds, R., Jaatinen, M. (2009) Coordinating the service process of two business units towards a joint customer. Production Planning and Control. Vol. 20, Number 2, pp 135-146.

Constructive research approach: an application of abductive reasoning



Testing the pragmatic utility of constrictive research

1. Weak market test

- The solution is in use in the researched company

2. Strong market test

- The company reached through the solution the practical benefit that was set as its objective, and this can be proven.

Constructive research approach

- Kasanen, Lukka, Siitonen (1991):
 - Konstruktiiivinen tutkimusote liiketaloustieteessä, Liiketaloudellinen aikakauskirja 3, 301 – 32
- Kasanen, Lukka, Siitonen (1993)
 - The Constructive Approach in Management Accounting Research: Journal of Management Accounting Research, Fall 1993, 243-264
- Kaplan, R. (1998)
 - Innovation Action Research: Creating New Management Theory and Practice. Journal of Management Accounting Research, 10, 1998, 89-118

Action research

- In action research, the researcher affects the object of her study (the behavior of the system she is studying), and thus the data that she is collecting.
- This means that
 - The **role and motivation** of the researcher has to be described in the **research methods** section of the thesis (Why is the topic interesting? What did she do? How did she participate?)
 - The **impact** of the researcher on the results has to be evaluated in the thesis, in the **evaluation of the study** section.

Action research

- More deeply, the question becomes: is there objective research, or is research finally always dependent on the researcher, i.e. subjective?
 - The definition of your research problem it is already subjective
 - Also your choice of the theories is based on your subjective interest
 - When you interview or observe respondents, this affects their thinking, and thus their answers and behavior (= the data).
 - Conclusions for your thesis
 - justify your choices clearly in the thesis. Why do you define the problem in this way? Why do you choose these theories?
 - Describe your role as researcher from the point of view how it might affect the data and results...
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”Typical” case research at tuta and info

- Case Study
- Problem based, theory creating (instead of theory testing)
- constructive research approach and abductive reasoning:
 - Developing a preliminary theoretical framework to research an empirical problem
 - Applying the framework in a case company (or network, ecosystem) to analyze the problem and to develop the results
 - Based on the results
 - improving the theoretical framework (theoretical generalization)
 - presenting the practical managerial implications (solutions) to the case company (no empirical generalization)
- Qualitative research methods
 - Data: Interviews, documents, observations
 - Qualitative content analysis of this data

Example structure of a Thesis based on constructive research 1/2

Introduction

- The studied phenomenon, and why it is important to study (motivation)
- The objectives of the research, and research problem, often in the form of an initial research question
- The focus of the study (delimiting the study)
- Justified choice of research approach and methods

Theoretical background

- Literature review **according to the focus of the study**, often from multiple research fields
- Synthesis of the literature into **a theoretical framework**
- Refined research questions for the empirical research

Empirical research

- The case and its context (described without analysis)
- The research methods:
 - **Data collection** (How was the data collected, e.g. if an interview: background of the respondents; who interviewed, what was asked, when, how?)
 - **Data analysis** (How was the data analyzed, e.g. content analysis of interviews, and coding under thematic categories,...)
- Findings
 - description of the collected and analyzed data, and highlighting the empirical findings

Results

- Theoretical interpretation of the findings **applying the theoretical framework**, highlighting the results that the **framework does and does not explain!** The parts of the framework that **does not get supported** by the data.
- Answers to the research questions

Example structure of a Thesis based on constructive research 2/2

Conclusions and Discussion

- **Practical contribution** (pragmatic utility): managerial implications; practical recommendations. Limited to the researched case.
- **Scientific contribution** (scientific utility): How well does the framework explain the results theoretically? Are the results in line with existing research that lies behind the framework, and thus give support to these existing theories? Or do the results contradict earlier research? Or suggest new theoretical formulations?-> How should the framework be improved? -> **new propositions, hypotheses, generation of new theory!**

Evaluation of the research

- Limitations of the study
- (Evaluation criteria for quantitative research: internal and external validity, reliability, objectivity)
- **Evaluation criteria for qualitative research** e.g. based on Lincoln and Guba 1985:
- Credibility, Transferability, Dependability, and Confirmability of the research.
- If you use action research, remember to evaluate the impact of the researcher on the research!

Discussion

- The results are put into the bigger picture, the generalizability of the results are discussed and future research questions are outlined.

Evaluation of validity ex post versus creating validity ex ante!

- Get acquainted with the evaluation criteria when you have chosen the method, and **before** you start the research.
- The criteria give good guidelines how to conduct valid research!
- **It is hard to improve the validity of the research that is already done**

Quantitative and qualitative evaluation criteria

Criteria for Judging Quantitative Research	Alternative Criteria for Judging Qualitative Research
Internal validity	<p>Credibility</p> <p>the results of qualitative research are credible or believable from the perspective of the participant in the research</p>
External validity	<p>Transferability</p> <p>results of qualitative research can be generalized or transferred to other contexts or settings. The qualitative researcher can enhance transferability by doing a thorough job of describing the research context and the assumptions that were central to the research. The person who wishes to "transfer" the results to a different context is responsible for making the judgment of how sensible the transfer is.</p>
Reliability (replicability, repeatability)	<p>Dependability</p> <p>emphasizes the need for the qualitative researcher to account for the ever-changing context within which research occurs. The researcher is responsible for describing the changes that occur in the setting and how these changes affected the way the research approached the study</p>
Objectivity	<p>Confirmability</p> <p>Qualitative research tends to assume that each researcher brings a unique perspective to the study. Confirmability refers to the degree to which the results could be confirmed or corroborated by others. There are a number of strategies for enhancing confirmability. The researcher can document the procedures for checking and rechecking the data throughout the study. Another researcher can take a "devil's advocate" role with respect to the results, and this process can be documented. The researcher can actively search for and describe and <i>negative instances</i> that contradict prior observations. And, after the study, one can conduct a <i>data audit</i> that examines the data collection and analysis procedures and makes judgements about the potential for bias or distortion.</p>

Evaluation of qualitative research, references

- Yin, R.K., 2009. *Case Study Research: Design and Methods*. SAGE.
- Lincoln, Y. and Guba, E., 1985. *Naturalistic inquiry*. Beverly Hills, CA: SAGE
- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 105-117). London: Sage.
- <http://www.qualres.org/HomeLinc-3684.html>
- <http://www.qualres.org/HomeEval-3664.html>
- <http://www.socialresearchmethods.net/kb/qualval.php>