

UiO : **Institutt for informatikk**

Det matematisk-naturvitenskapelige fakultet

Research methods: How to choose a research method for your project

Bendik Bygstad

January 11, 2022

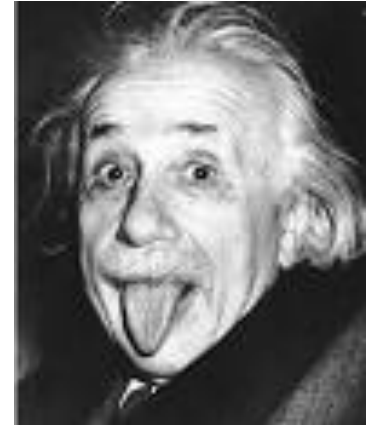


Professor IFI, UiO
Professor II NHH
Program director
Digital Economy and
Management



Aims of lecture

1. Get an overview of available research methods in informatics field
2. To understand the research process
3. To be able to choose a method, in co-operation with the supervisor



Scientific method

Science as **knowledge derived from the facts of experience**
(not religion, state authority, classic texts, popular wisdom etc.)



Aristotle



Descartes

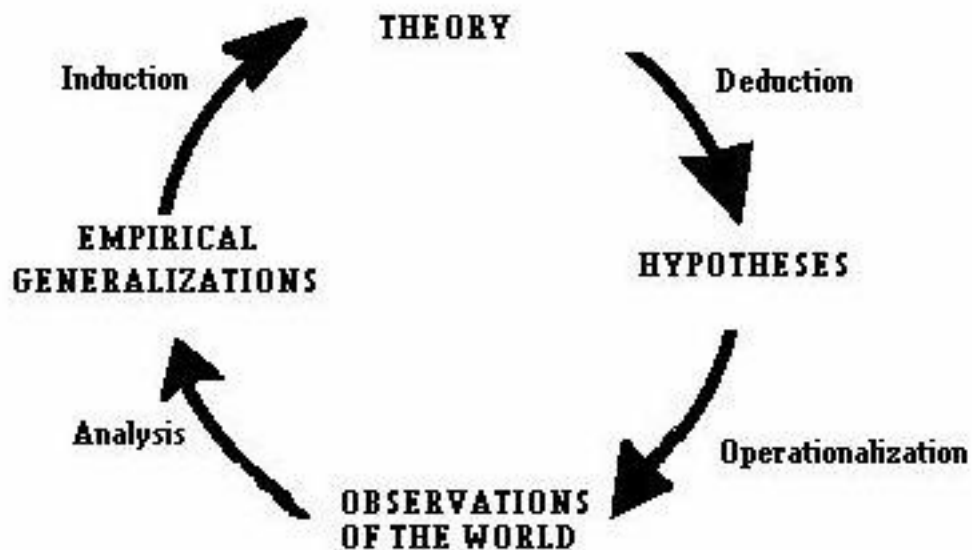


Newton

Theories and Reality: Induction and deduction

FIGURE 2.1

THE RELATIONSHIP BETWEEN THEORIES AND "REALITY"



Scientific models in Informatics

Scientific origins	Aim	Examples
Natural science	Discover laws of nature (and mathematics)	Algorithm testing and verification
Social science	Discover laws/patterns of human behaviour	Survey
Design science	Creating and assessing artifacts	Participatory design

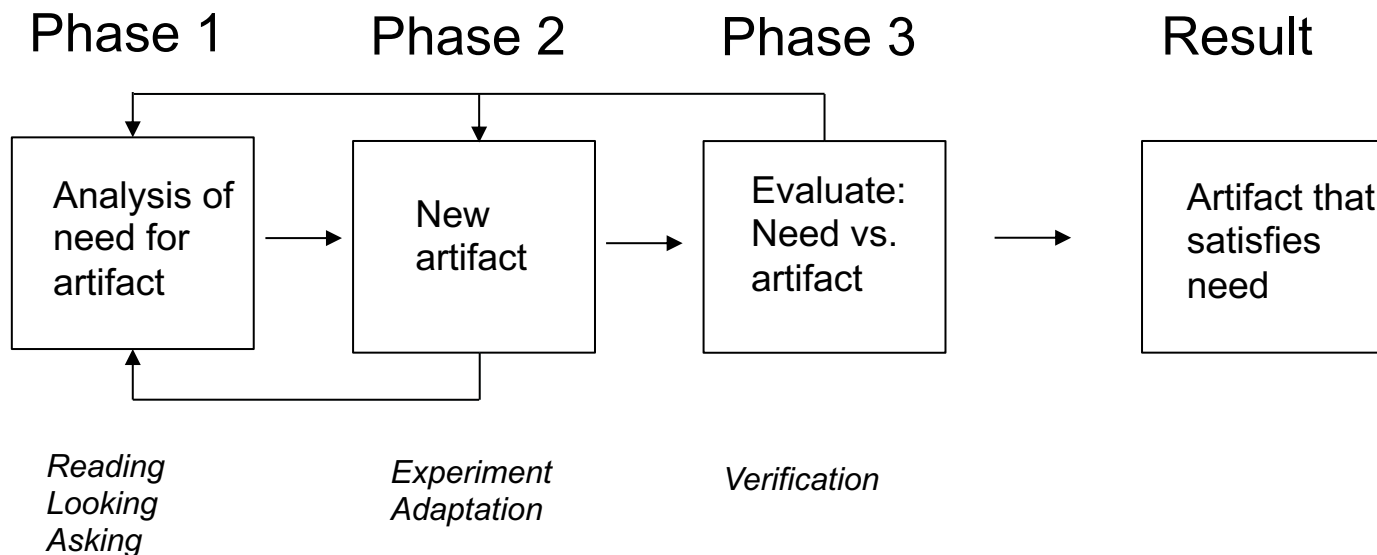
Methods Pluralism in Informatics

Mode of inquiry/	1. Investigation	2. Intervention	3. Construction
			

Methods Pluralism in Informatics

Mode of inquiry Scientific model	1. Investigation	2. Intervention	3. Construction
Discover laws of nature (and mathematics)	Hypothesis testing Verification Simulation	Experiment	HW design Software engineering
Discover laws and patterns of human behaviour	Case study Survey Ethnography	Action research	Socio-technical design, HCI
Creating and assessing artifacts	IS evaluation	Participatory design/Action design research	Software engineering Design research "Technology science"

Technology Science



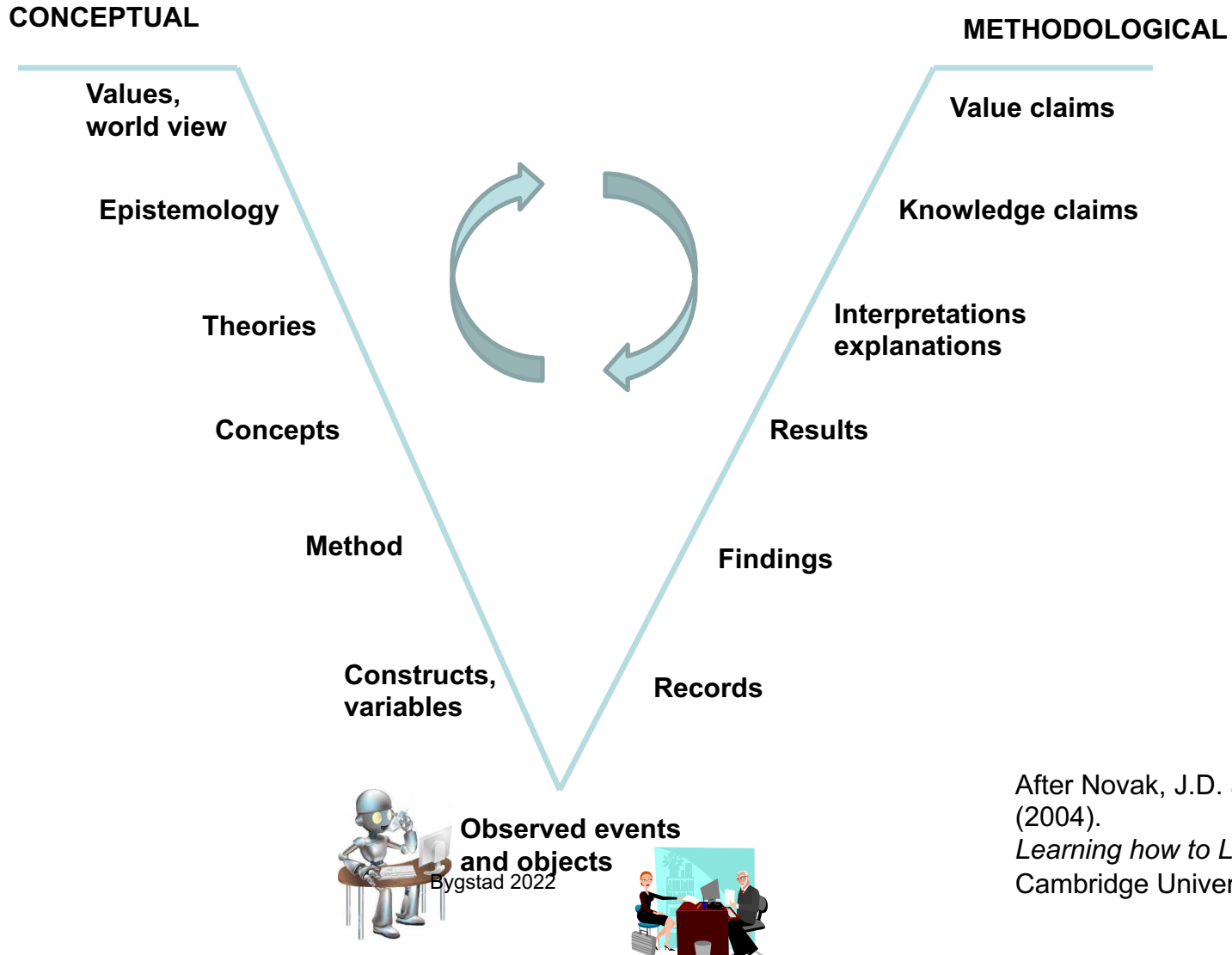
Research groups and methods

Group	Methods	Methods support
Design	Qualitative methods	IN5000 - qualitative
Entrepreneurship	Case study	Yin: Case Study Research
Digital Innovation Research	Case study	Myers: Intro to qualitative
Regenerative tech	Qualitative, interviews	Bødker S, Grønbæk K (1991), Brandt et al (2012)
Information Systems	Case, study, action research	IN5000 - qualitative
Programming Tech	Experiments, verification	
Software engineering	Case study	Yin: Case Study Research
Teaching IT (ITU)	Case study	Yin: Case Study Research
Analytical (ASR)	Experiments, verification	
Reliable systems	Formal modelling, verification	
Language tech	Experimental design	IN4080 –experimental design
Robotics, AI	Experiment, simulation	How to write a Master thesis, Tørresen, 2020
Networks, DS	Experiments, simulation	
Digital security	Design science research	

Some recent Master projects (2021)

Title	Method
Integrating contact tracing into Norway's complex health information ecosystem (COVID-19)	Case study
Wireless Streaming in Dense Places	Experiment
Design for opplevelser på togreiser	Brukersentrert design og deltakende design
A Cryptographic Requirement to the Police ICT Services	SW Engineering Evaluation
Direct-Drive Gripper (Robotics)	Experiment

The research process

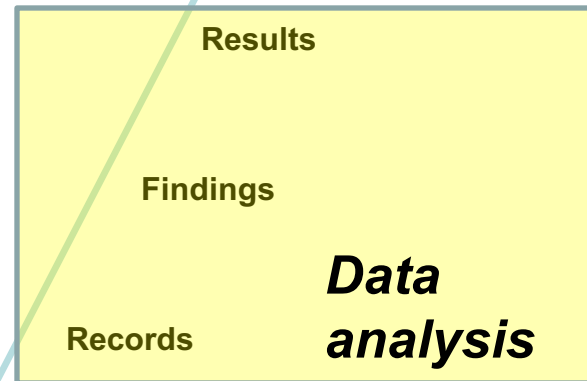
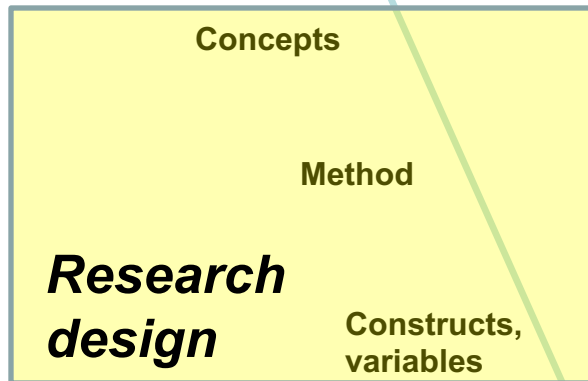
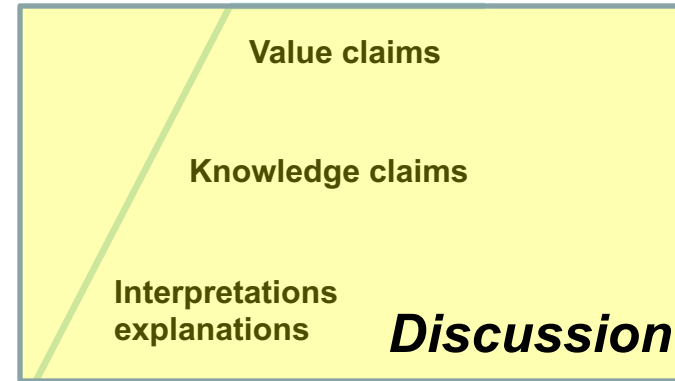
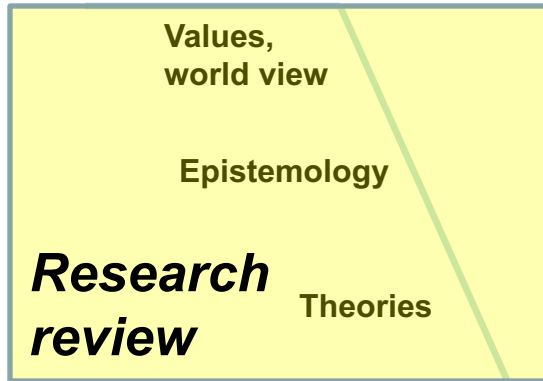


After Novak, J.D. and Gowin, D.B. (2004). *Learning how to Learn*. Cambridge University Press.

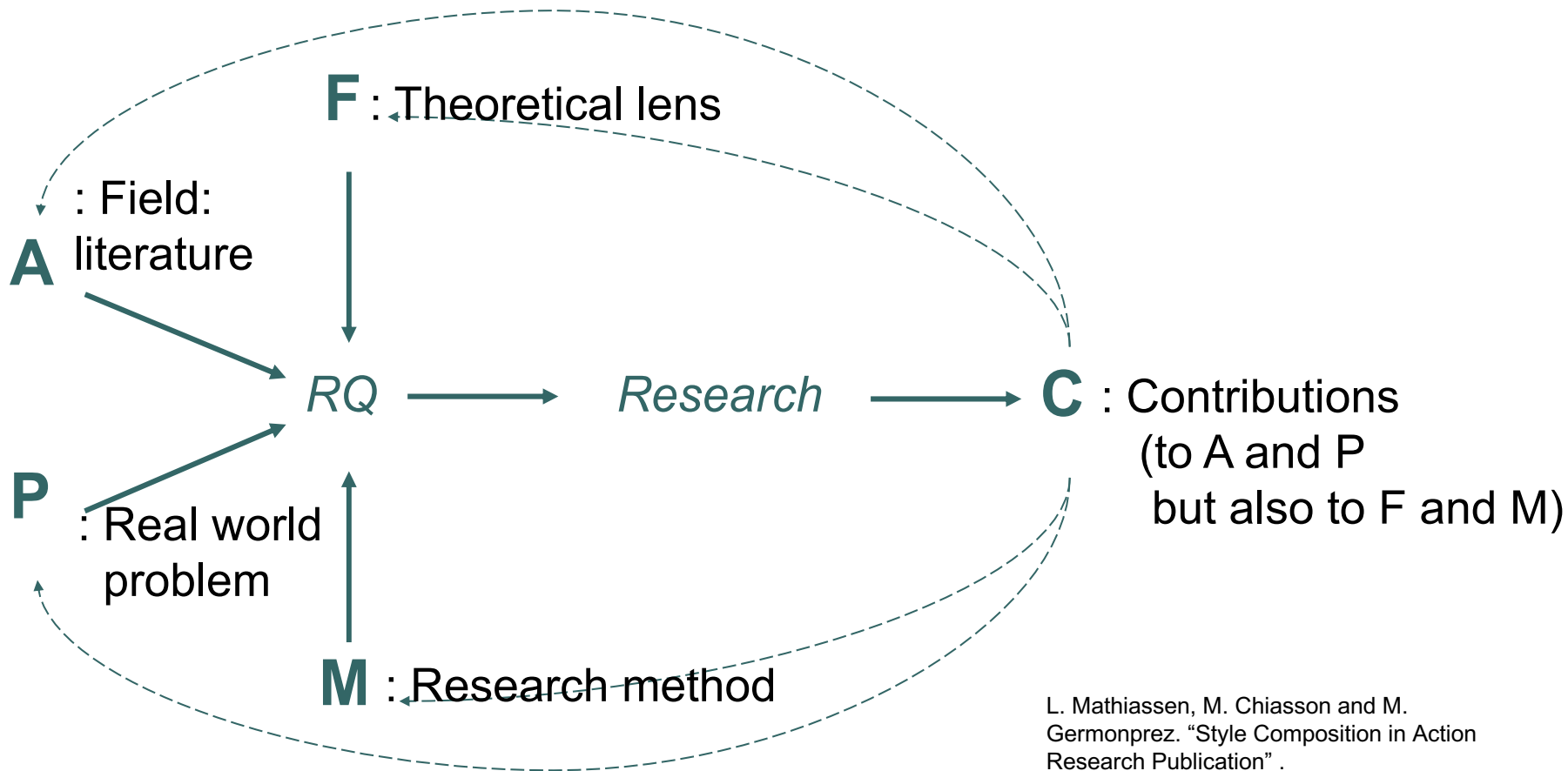
The research process: Deliverables

CONCEPTUAL

METHODOLOGICAL



Research design



L. Mathiassen, M. Chiasson and M. Germonprez. "Style Composition in Action Research Publication" . *MIS Quarterly*, Vol. 32, No. 2, 347-363, 2012.

Choosing my research method

1. Identify your research field (and real-world problem)

A research field is a body of knowledge that grows accumulatively in a research community (sometimes defined formally, sometimes not).

Examples: Machine learning, interaction design, platform ecosystems

2. Formulate your research question, in co-operation with your supervisor

3. Assess which methods are candidates for your research question

Read research papers and earlier Master dissertations

4. Choose your research method, in co-operation with your supervisor

Good luck with your Master project!