Research Paradigms

Christopher Frauenberger

User-Research Methods VU 2017

FAKULTÄT
FÜR !NFORMATIK
Faculty of Informatics

Discuss

What is a paradigm?

Why is it important to understand paradigms?

What does it have to do with user research methods?

Learning Outcomes

Appreciate that there are different basic stances / **philosophical paradigms** around research methods

Understand their critical role in **shaping how you think** about research problem and how you conduct research

Be aware of the **implications** for of operating within a paradigm (justification, expectations, validity)

Position your own work research

Definition

»A loose collection of logically related **assumptions**, **concepts**, or **propositions** that orient thinking and research«

Bogdan, R., & Biklen, S. K. (1998). Qualitative Research for Education: An Introduction to Theory and Methods. Allyn and Bacon.

Definition

»Basic **belief system**/world view that guides investigator«

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, UK: Sage Publications, Inc.

- Guides choice of method
- Entails ontological and epistemological positions
- Points to criteria for evaluating »good research«

What's this?

Definition

»**Choice** of paradigm … sets down the intent, motivation, and expectations for research«

Mackenzie, N. & Knipe, S. (2006), Research dilemmas: Paradigms, methods, methodology

- Philosophical intent
- Underlying theoretical framework
- Influences way knowledge is studied and interpreted

Terminology

Ontological: what is the form and nature of reality and what can be known about it

Epistemological: what is nature of relationship between the »knower« and what can be known?

Meta-physics: what exists and what can be known?

Methodological: How can inquirer go about finding out what can be known?

Terminology

Methodology vs Method

Methodology: overall approach to research linked to the paradigm or theoretical framework

Method: systematic modes, procedures or tools used for collection and analysis of data

Optional?

»Without nominating a paradigm as the **first step,** there is no basis for subsequent choices regarding

- methodology,
- methods,
- literature or
- research design«

Mackenzie, N. & Knipe, S. (2006), Research dilemmas: Paradigms, methods, methodology

Typically discussed »Chapter 3« of thesis …

Rationalist

CS is basically a branch of maths and we can proof correctness of solutions by some form of logic reasoning.

Technocratic

CS is an engineering discipline and we can test how reliably and efficiently systems work.

Scientific

CS is a natural, empirical science and we can conduct experiments and apply logic to generate knowledge.

Each comes with different methodological, ontological, epistemological commitments

Three modes of Computer Science

TABLE 6.1 Basic Beliefs (Metaphysics) of Alternative Inquiry Paradigms

Item	*Positivism*	*Postpositivism*	*Critical Theory et al.*	*Constructivism*
Ontology	naive realism—"real" reality but apprehendable	critical realism—"real" reality but only imperfectly and probabilistically apprehendable	historical realism—virtual reality shaped by social, political, cultural, economic, ethnic, and gender values; crystallized over time	relativism—local and specific constructed realities
Epistemology	dualist/objectivist; findings true	modified dualist/objectivist; critical tradition/community; findings probably true	transactional/subjectivist; value-mediated findings	transactional/subjectivist; created findings
Methodology	experimental/manipulative; verification of hypotheses; chiefly quantitative methods	modified experimental/manipulative; critical multiplism; falsification of hypotheses; may include qualitative methods	dialogic/dialectical	hermeneutical/dialectical

Competing paradigms [Guba & Lincoln, 1994]

Item	*Positivism*	*Postpositivism*	*Critical Theory et al.*	*Constructivism*
Ontology	naive realism—"real" reality but apprehendable	critical realism—"real" reality but only imperfectly and probabilistically apprehendable	historical realism—virtual reality shaped by social, political, cultural, economic, ethnic, and gender values; crystallized over time	relativism—local and specific constructed realities
Epistemology	dualist/objectivist; findings true	modified dualist/objectivist; critical tradition/community; findings probably true	transactional/subjectivist; value-mediated findings	transactional/subjectivist; created findings
Methodology	experimental/manipulative; verification of hypotheses; chiefly quantitative methods	modified experimental/manipulative; critical multiplism; falsification of hypotheses; may include qualitative methods	dialogic/dialectical	hermeneutical/dialectical

Good research!

Rigour

(Post-)Positivism

Internal validity (correct answer), Reliability (same answer), Objectivity (everyone else too), External validity (generalisability)

Critical theory / Transformative

Historical situatedness, erosion of ignorance, action stimulus

Constructivism / Interpretivism

Relevance, Trustworthiness: credibility, transferability, dependability, confirmability, Authenticity

Paradigms suggest what you ask

FAKULTÄT
FÜR !NFORMATIK

Faculty of Informatics

Paradigms suggest what you ask

(Post-)Positivism

Is the software correct? Can pilots do their tasks efficiently?

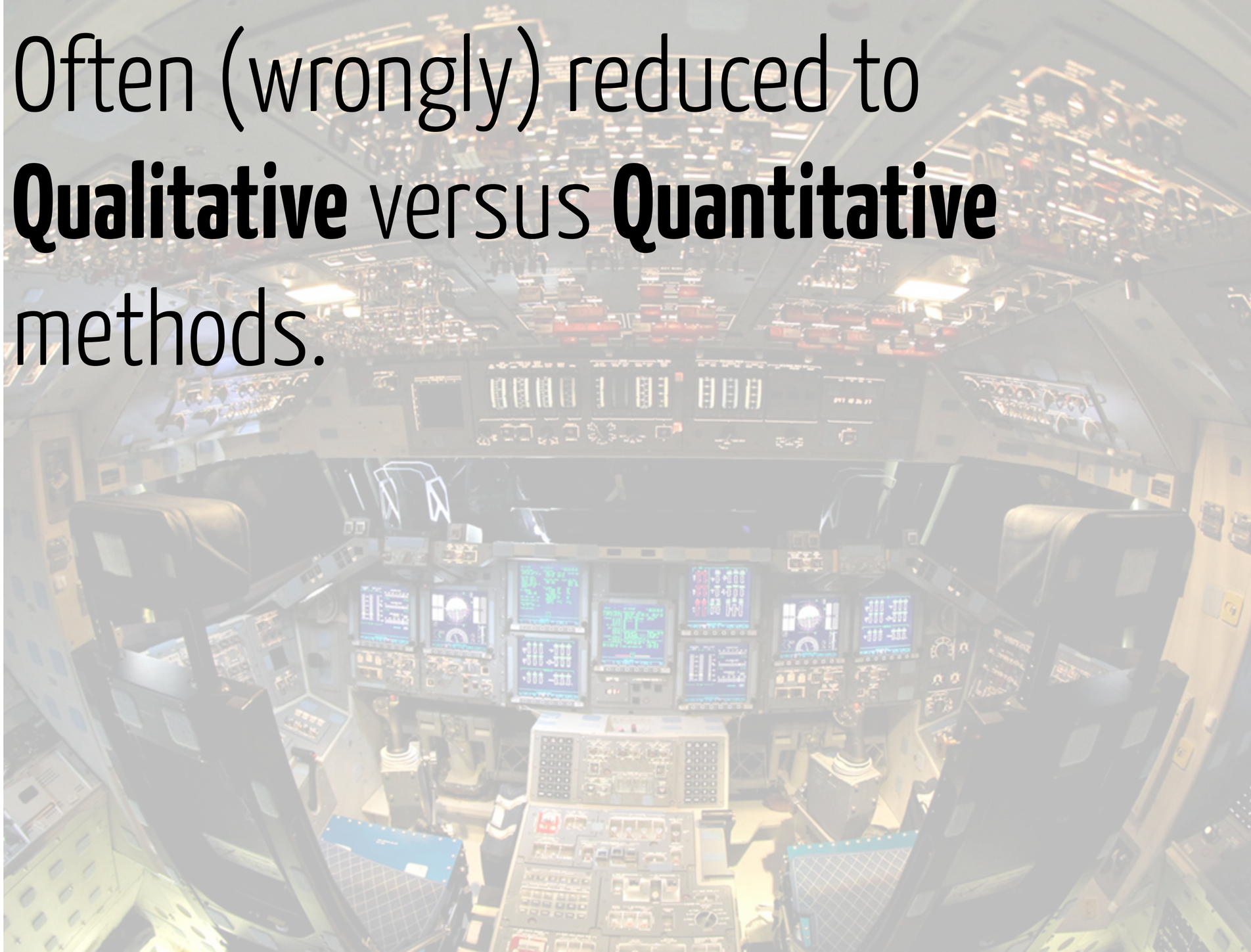
Critical theory / Transformative

Why do cockpits look like this? What would ideal cockpits look like?

Constructivism / Interpretivism

What do people do in cockpits? Are their differences in working cultures? Do pilots feel supported or overwhelmed?

Often (wrongly) reduced to **Qualitative** versus **Quantitative** methods.



FAKULTÄT
FÜR !NFORMATIK
Faculty of Informatics

Qualitative vs Quantitative

What do you know about their

- Focus
- Key Issue
- Approach
- Examples

Qualitative vs Quantitative

Quantitative		Qualitative
Numbers, frequencies, percentages, precision	**Focus**	Meaning & experience from participants' perspectives
Rigor How many / much? Statistically significant	**Key Issue**	Why & How? In-depth, rich description
Scientific & experimental Experiments, Questionnaires, Tests	**Approach**	Exploratory, open-ended, interpretive Interviews, Observations, Case Studies, Focus Groups ...

Qualitative vs Quantitative

Quantitative		Qualitative
Numbers, frequencies, percentages, precision	**Focus**	Meaning & experience from participants' perspectives
Rigor How many / much? Statistically significant	**Key Issue**	Why & How? In-depth, rich description
Scientific & experimental Experiments, Questionnaires, Tests	**Approach**	Exploratory, open-ended, interpretive Interviews, Observations, Case Studies, Focus Groups ...

HARD Science

SOFT Science

Empirical Epistemologies Applied to Human-Centered Computing Research

Leysia Palen, *University of Colorado Boulder, November 16 2014*

EMPIRICAL FORMS OF INQUIRY

Positivist	Interpretivist
Empirical Goals: hypothesis testing proving knowledge	**Empirical Goals:** thesis formation building knowledge
Related Terms **(but not necessarily synonymous):** hypothesis-driven scientific method experimental design deductive "quantitative research" **Warning:** All research, including positivist research, requires interpretation of results.	**Related Terms** **(but not necessarily synonymous):** data-driven ethnographic inductive "qualitative research" **Warning:** The "qualitative research" term is misleading. Data-driven research can be highly numerical.
Positivist/Summative **Example**: *How many people* affected by a disaster turn to social media during the warning period of a hurricane?	**Interpretivist/Summative** **Example**: *How do people* make use of social media during the warning period of a hurricane?
Positivist/Formative **Example**: Did the intervention to improve warning messages *change the number of users* by comparing 2 regional samples?	**Interpretivist/Formative** **Example**: *Are there ways to improve* information access during the warning period of hurricane disasters through social media?

RESEARCH DESIGN COMPONENTS

Research Objective

Are the broad aims to prove something within an existing area or set of knowledge, or to create a new area or set of knowledge? Which parts of this will be reported on formally? These choices determine whether the empirical research program is positivist or interpretivist.

Research Questions (RQs)

Depending on the size of the research program, there may be multiple sub-research questions under the governance of the meta-research question or objective. Individual sub-research questions might be positivist or interpretivist, and summative or formative in nature. Often interpretivist inquiry will precede positivist inquiry.

Units of Analysis

Do the bounds of observation match the scope of concern? The bounds of observation are the "units of analysis." In interpretivist research, units of analysis can be large, but are still bounded. Do RQs, procedures, methods & participant selection match units of analysis appropriately at each stage?

Procedures

Positivist research will require an experimental apparatus that controls for variables using within- or between-subjects design and so on. Interpretivist research will require careful selection of participants in ways that match objectives, units of analysis, and methods. Procedures may vary for each sub-component of a larger research program.

Participants

Do participants need to be selected to be representative of a larger sample (this matter can be asked in both positivist or interpretivist inquiries)? Do they need to be selected to deliberately pursue understanding of a new behavior (this is more common in interpretivist/formative research)? Are they co-designers (participatory design; usually interpretivist/formative), or co-researchers (action research, which can be either positivist or interpretivist), or more classically treated as "subjects"?

Methods

The applications of methods and the use of their results can vary greatly and so therefore on their own cannot be inherently positivist or interpretivist. Methods can include: Interviews, Surveys, Participant or Non-Participant Observation, Diary Studies, Experiential Sampling Method, Eye Tracking, Field Deployments, Social Graph Analysis, Data Mining & Modeling and so on...

Summative Research whose purpose is to explain something that is preexisting or has already occurred, without deliberate intervention (other than what the research might incur on its own simply by being conducted, as in ethnographic research)	**HCC-ORIENTED GOALS**
Formative Research whose purpose is to inform something subsequent, including design of artifacts, policies, procedures or more refined RQs. The aim of formative research is what drives Human-Computer Interaction commitments to iteration	

FAKULTÄT FÜR !NFORMATIK
Faculty of Informatics

Leysia Palen, *University of Colorado*

EMPIRICAL FORMS OF INQUIRY

Positivist	Interpretivist
Empirical Goals: hypothesis testing proving knowledge	**Empirical Goals:** thesis formation building knowledge
Related Terms **(but not necessarily synonymous):** hypothesis-driven scientific method experimental design deductive "quantitative research" **Warning:** All research, including positivist research, requires interpretation of results.	**Related Terms** **(but not necessarily synonymous):** data-driven ethnographic inductive "qualitative research" **Warning:** The "qualitative research" term is misleading. Data-driven research can be highly numerical.

RI

Are the broad aims t
new area or set of kn
determine whether t

Depending on the siz
the governance of th
be positivist or interp
precede positivist ind

Do the bounds of ob
of analysis." In inter
procedures, method

Positivist research w
between-subjects de
participants in ways
each sub-componen

Do participants need
in both positivist or i
understanding of a r
co-designers (partici
research, which can

The applications of r
own cannot be inher
Participant or Non-P
Tracking, Field Deplo

FAKULTÄT
FÜR !NFORMATIK
Faculty of Informatics

is misleading. Data-
en research can be
ighly numerical.

Methods

The applications of methods and the use of their results can vary greatly and so therefore on their own cannot be inherently positivist or interpretivist. Methods can include: Interviews, Surveys, Participant or Non-Participant Observation, Diary Studies, Experiential Sampling Method, Eye Tracking, Field Deployments, Social Graph Analysis, Data Mining & Modeling and so on...

retivist/Summative **ple**: *How do people* make f social media during the ng period of a hurricane?	**Summative** Research whose purpose is to explain something that is preexisting or has already occurred, without deliberate intervention (other than what the research might incur on its own simply by being conducted, as in ethnographic research)	**HCC-ORIENTED GOALS**
pretivist/Formative **mple**: *Are there ways to* information access during rning period of hurricane ers through social media?	**Formative** Research whose purpose is to inform something subsequent, including design of artifacts, policies, procedures or more refined RQs. The aim of formative research is what drives Human-Computer Interaction commitments to iteration	

requires interpretation of results.	driven research can be highly numerical.	*own Part Trac*
Positivist/Summative **Example**: *How many people* affected by a disaster turn to social media during the warning period of a hurricane?	**Interpretivist/Summative** **Example**: *How do people* make use of social media during the warning period of a hurricane?	Re alread might
Positivist/Formative **Example**: Did the intervention to improve warning messages *change the number of users* by comparing 2 regional samples?	**Interpretivist/Formative** **Example**: *Are there ways to improve* information access during the warning period of hurricane disasters through social media?	Rese of a resear

Table 2: Paradigms, methods and tools

Paradigm	Methods (primarily)	Data collection tools (examples)
Positivist/ Postpositivist	Quantitative. "Although qualitative methods can be used within this paradigm, quantitative methods tend to be predominant . . ." (Mertens, 2005, p. 12)	Experiments Quasi-experiments Tests Scales
Interpretivist/ Constructivist	Qualitative methods predominate although quantitative methods may also be utilised.	Interviews Observations Document reviews Visual data analysis
Transformative	Qualitative methods with quantitative and mixed methods. *Contextual and historical factors described, especially as they relate to oppression* (Mertens, 2005, p. 9)	Diverse range of tools - particular need to avoid discrimination. Eg: sexism, racism, and homophobia.
Pragmatic	Qualitative and/or quantitative methods may be employed. Methods are matched to the specific questions and purpose of the research.	May include tools from both positivist and interpretivist paradigms. Eg Interviews, observations and testing and experiments.

Methods & Tools [MacKenzie & Knipe 2006]

Mixing Methods

Triangulation

- Using two or more qual methods (or mix of qual/quant)
- Think layers, dimensions, perspectives etc
- A form of comparison
- To check if they lead to same/similar results; minimise bias
- Denzin's triangulation typology [1970]:
- Data (time, space, person), investigator, theory, method (within, between)

Mixing Methods

Bricoleur

Researcher as ‘bricoleur’ (Denzin & Lincoln 1994)

Crystallisation (Richardson 2000)

Central image should be crystal not triangle

Postmodern take

always partial understanding

knowledge always fragmentary, situated, subjective

Mixed Methods

Mixed methods research/study – what is it?

Conceptualisation by Greene 2008:

MM research is an inquiry which invites **multiple mental models** into the same inquiry space for purposes of respectful conversation, dialoque, and learning one from the other, toward a collective generation of better understanding of the phenomena being studied. MM is a practice of active engagement with difference – in good MM study, difference is constitutive and generative. What is mixed and defines MM inquiry goes well beyond methods for data gathering and analysis to include myriad other strands entangled in inquirers' mental models (i.e inquirer's philosophical assumptions, theoretical commitments, political beliefs, personal wisdom, and professional experience)

TALLINN UNIVERSITY

Mixed Methods

Mixed Methods Research (MMR)

concerns all methodological aspects of empirical studies

- **Theoretical framework / Mental model / Paradigm**
- **Research problem** (question, hypothesis, purpose, ...)
- **Strategy**
  (case study, survey, experiment, grounded theory, action research, ethnography, phenomenography, narrative research, ...)
- **Sampling**
  (random sample, one case, purposefully chosen cases, ...)
- **Data collection**
  (structured questionnaire, unstructured/open interview, ...)
- **Data analysis**
  (statistical methods, open coding, discourse analysis,...)
- **Interpretation and conclusions** (descriptions, empirical generalisations, ...)

TALLINN UNIVERSITY

NB! Main principle for doing (good) MMR:
Informed creativity

FAKULTÄT FÜR !NFORMATIK
Faculty of Informatics

Mixed Methods

Ways of thinking about mixed methods approaches

- **Paradigms** same or different epistemological framework?
- **Methods** how similar or different wrt form, assumptions, strengths, limitations, biases etc?
- **Phenomena** degree to which methods assess different or same phenomena?
- **Independence / integration** to what extent possible?
- **Status/Weight** relative to research objectives?
- **Timing** concurrent or sequential?

Take Home

Be **aware**, **reflective** and **critical** about your choices

Reflective About…

Paradigm basic belief system/world view

Choice of **method**(s)

Entailed **ontological** and **epistemological** positions

Buy into a **single** paradigmatic position or embrace more of a continuum or a **mixed method** approach

Good questions

- What phenomena are you interested in?
- What questions do you want to ask?
- What do assume/believe about the world?
- How will you evaluate »research«?

Which ones?

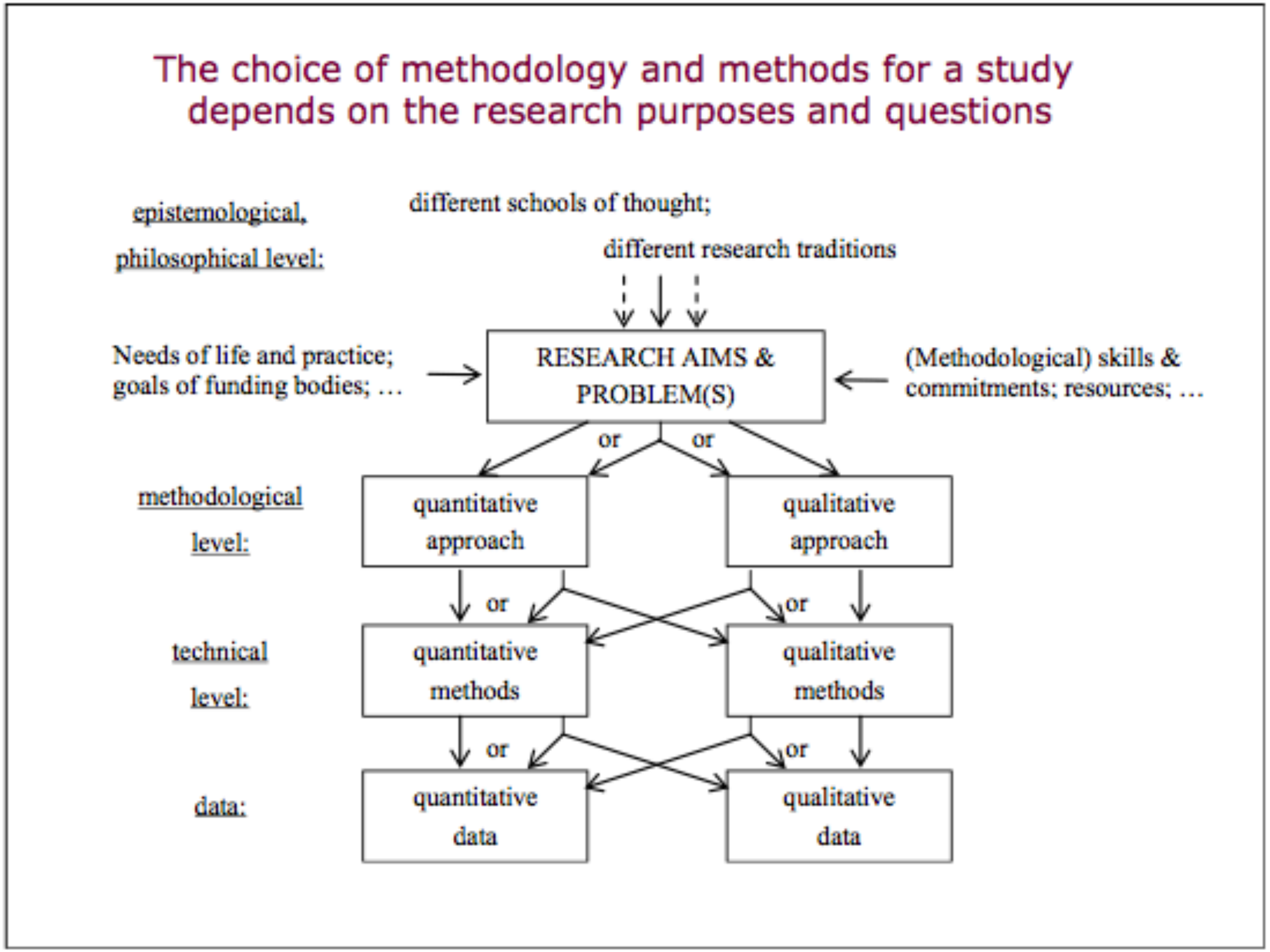
Right tool for the right job

Which ones?

Research for the purposes of design / evaluation

- What questions do you want to ask?
- What do you want to do with it?
- Within constraints of time, budget, resources etc
- Within constraints of setting/context & your skills?
- How does the paradigm orient?
- Balancing trade-offs, understanding trade-offs

Which ones?



FAKULTÄT FÜR !NFORMATIK

Faculty of Informatics

Blumenfeld Chart

ICER ebook

RQ	Data	Methods	Hyp
Why quit or not?	-Feedback -Interview	Why quit or not?	
	-Log file	- Small segs? What do?	
What was learned?	SM data		
How do teachers & students	Log file data		

https://medium.com/@markguzdial/defining-a-proposal-in-one-table-how-to-write-a-blumenfeld-chart-927a4dcf5dcb