

# Lecture 3

# Qualitative approaches to research

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# What is qualitative research

- Qualitative approaches are used
  - To get an in-depth understanding of **human behaviour** and the reasons that govern such behaviour
    - Especially social and cultural phenomena
  - When **Why** and **how** are essential questions – in addition to **what, where, when** and **how many/how often**.
- Qualitative is often contrasted with **quantitative** as the opposite
  - Quantitative methods are used in natural sciences and also in social sciences (surveys, experiments, econometrics)
- Qualitative research methods are designed to help researchers understand people and the social and cultural contexts within which they live
  - Quantification often loses these contexts

# Alternative definition of qualitative research

Denzin & Lincoln, 2011

- Qualitative research is a situated activity that locates the observer in the world
- A set of interpretive, material practices that make the world visible
- These practices transform the world to series of representations, such as field notes, interviews, photographs, recordings, and memos
- An interpretive, naturalistic approach to the world
  - *Qualitative researchers study things in their natural settings*
    - Make sense or interpret phenomena in terms of the meanings people bring to them

# “Paradigms” of qualitative research (Orlikowski & Baroudi 1991)

Qualitative ≠ Interpretive

Researchers may have different kind of view on knowledge, i.e. epistemology

Orlikowski and Baroudi (1991) make a distinction between three different approaches in qualitative research

- Positivist
- Interpretive
- Critical

# Positivist qualitative

Reality is objectively given

- Can be described by measurable properties that are independent of the observer.

Theory testing and increasing the predictive understanding of phenomena

Formal propositions

Quantifiable measures of variables

Hypothesis testing

Drawing of inferences about a phenomenon from the sample to a stated population.

Very near to quantitative research

Generalization problem of case studies with a small sample

- Hypothesis testing does not prove anything (problem of induction)
- Not possible to generalize from the sample to the population.

# Interpretive qualitative

Access to reality is only through social constructions such as language, consciousness and shared meanings

The philosophical base in hermeneutics (text interpretation) and phenomenology (structures of experience and consciousness)

Attempt to understand phenomena through the meanings that people assign to them

Walsham (1993), interpretive methods in information systems produce

- Understanding of the context of the information system
- Understanding of the process how IS influences and is influenced by the context

No predefined dependent and independent variables as in quantitative

- Focuses on the full complexity of human sense making as the situation emerges (Kaplan and Maxwell, 1994)

# Critical qualitative

Critical researchers assume that social reality is

- historically constituted
- produced and reproduced by people.

The ability of people to change their social and economic circumstances is constrained by various forms of social, cultural and political domination.

The main task of critical research is social critique

- Revealing the restrictive and alienating conditions of the status quo

Focuses on the oppositions, conflicts and contradictions in contemporary society

Seeks emancipation, i.e. elimination of the causes of alienation and domination

Examples of related philosophers

- Habermas, Adorno, Marcuse, Lucács, etc.



# Qualitative data

For example

- Field notes
- Interviews
- Conversations
- Photographs and videos
- Documents and texts
- Direct observations
- Memos

Any observations of the world that can be stored and analyzed

# Qualitative methods

Myers (1997) lists the following qualitative methods that are essential in information systems field (and also in software engineering)

- Action research
- Case study research
- Ethnography
- Grounded theory

In addition, there is a multitude of other qualitative methods, for example

- Participant observation (related to ethnography)
- Focus groups
- Discourse analysis
- Historical analysis
- Content analysis
- Storytelling and narratology

# Grounded Theory

Developed by sociologists Anselm Strauss and Barney Glaser in 1960s

- Later two different paths: glaserian and straussian GT

Development of a theory that is grounded in data systematically gathered and analyzed

An inductive, theory discovery methodology grounded in empirical observations

- Inductive = theory is created from observations

A continuous interplay between data collection and analysis

- Data collection and analysis are not separate
- Data can be anything that is collected for the purpose

No *a priori* hypotheses, no review of existing research before analysis

- A priori = from the earlier – justification independent from observation
- A posteriori = from the later – justification dependent from observation

# Grounded theory concepts

## Theoretical sampling

- Different from the probabilistic sampling that aims at a representative capture of all possible variations
- Theoretical sampling aims to facilitate the development of the analytic frame and concepts, i.e. the theory
- Data is captured for the purpose of the theory, not for representativeness

## Theoretical sensitivity

- Ability to see what is essential in the data
- Creativity and professional experience is often needed

## Constant comparison

- All pieces of data is compared to other pieces: what is going on here - what is similar and what is different between the pieces?

# Grounded theory concepts (2)

## Codes, concepts and categories

- Data is coded: each meaningful piece of data is given a label
- The label/code is a theoretical generalization of individual piece of data
  - *Data is conceptualized*

## Memoing

- The process of creating the theory must be traceable
- All new inventions and decision of theories must be recorded
- These are called memos – free form descriptions of items in theoretical development

## Core category

- At later phases of analysis the core category is selected
- The resulting theory explains the core category
- All other categories are related to the core category

## Theoretical saturation

- The data collection can end when no new essential observations emerge any more
- Same observations occur again and again
- The theory seems to be fully developed

# Phases of a GT analysis

Strauss & Corbin (1991)

- Open Coding - "The process of breaking down, examining, comparing, conceptualizing, and categorizing data" (p. 61).
- Axial Coding - "A set of procedures whereby data are put back together in new ways after open coding, by making connections between categories. This is done by utilizing a coding paradigm involving conditions, context, action/interactional strategies and consequences" (p. 96).
- Selective Coding - "The process of selecting the core category, systematically relating it to other categories, validating those relationships, and filling in categories that need further refinement and development" (p. 116).

# Open coding

“Open coding”: the conceptualization and categorization of the data

During open coding data must be merged into new concepts, and eventually renamed and modified

- A very tedious process with lots of codes

The researcher goes back and forth while comparing data, constantly modifying, and sharpening the growing theory

...

Q: Do you mean that you can describe [architecture] better with PowerPoint?

A: You can do it much better with it. You can draw empty boxes with Rational Rose, but it isn't as visual.

Q: Is it a problem of looking good?

A: When you are presenting it to salesmen and customers, yes it is.

Q: Is it important that you show pretty pictures to customers?

A: Yes. Especially when you can tell with that picture what you have been thinking. In addition, many times when we are making requirements documents, the customer wants architecture documentation as a PowerPoint presentation. They present the architecture also to other possible suppliers and they do not want to redraw the pictures. It is little like giving a tool to the customer too.

...

Problem: tool constraints

Problem: visual appearance

Stakeholder: customer management & marketing

Stakeholder: customer

Problem: communicating meanings

Rationale: communicating

Stakeholder: customer

Stakeholder: other suppliers

# Axial coding

- Connections are made between the categories and the subcategories
- What influences the phenomena that are being studied.
  - conditions
  - context
  - action/interactional strategies
  - consequences.
- What conditions give rise to the category?
- What context was it embedded in?
- What strategies are people using to manage it?
- What are the consequences of those strategies?
- The researcher moves back and forth open and axial coding and possibly adds new data
- Use of figures, diagrams, tables etc.

Problem: making agreements about rules and objectives

~Problem: avoiding conflicts

Conflict: high-level vs. low-level decisions

Consequence: forced decisions

Solution: make decisions at low level

Solution: team building

~Problem: u

Problem: emergent architecture

Consequence: no "grand plan"

Conflict: different histories business units



# Selective coding

Selective coding is the process of:

- selecting the core category;
- systematically relating it to other categories;
- validating those relationships;
- filling in categories that require further refinement and development.

Produces a coherent "story" or explanation of the phenomenon (the core category) = theory

Example (Kasurinen & al. 2010)

**Table 5. Two stereotypical approaches for test case selection**

Category	Risk-based selection	Design-based selection
<b>Test designers</b>	Developers: programmers and testers	Managers: test and project managers
<b>Development approach</b>	Leans towards agile methods	Leans towards plan-driven methods
<b>Testing resources</b>	Limited	Sufficient
<b>Explorative testing</b>	Applied commonly	Applied rarely
<b>Effect of policies in decisions on testing.</b>	Small; most decisions done in project level.	Large; most decisions are based on company policies or customer requirements.
<b>Customer influence</b>	In the testing process	In the design process
<b>Limitations of the model</b>	Test case coverage may become limited.	Test process may become laborous to manage
<b>Design concept</b>	"What should be tested to ensure smallest losses if the product is faulty?"	"What should be tested to ensure that the product does what it is intended to do?"

# Glaserian vs. Straussian GT

Glaser and Strauss took different ways in 1980s

Glaser emphasizes more emergence

- The theory emerges from the data without a strict analysis process
- The researcher must tolerate confusion and be open to emerging evidence

Strauss (and Corbin) created a detailed analysis process for GT

- A structured approach for theory creation

Difference in naming

- Strauss & Corbin: Open – Axial – Selective coding
- Glaser: Open – Selective – Theoretical coding

# Ethnography

Origin in social and cultural anthropology

The process of recording and describing a culture of a specific people and their traits, patterns, and principles of coherent integration.

Ethnography is produced on the basis of firsthand field observation of the people who are being studied.

- An ethnographer is required to spend a significant amount of time in the field

Ethnographers immerse themselves in the lives of the people they study

- Seek to place the phenomena studied in their social and cultural context.

Used also in organizational studies and studies of technology management

An ethnography may also include collaboration between people in various fields, e.g. ethnographers, designers, IT professionals, engineers etc.

# Ethnography (2)

Characteristics of ethnographic research:

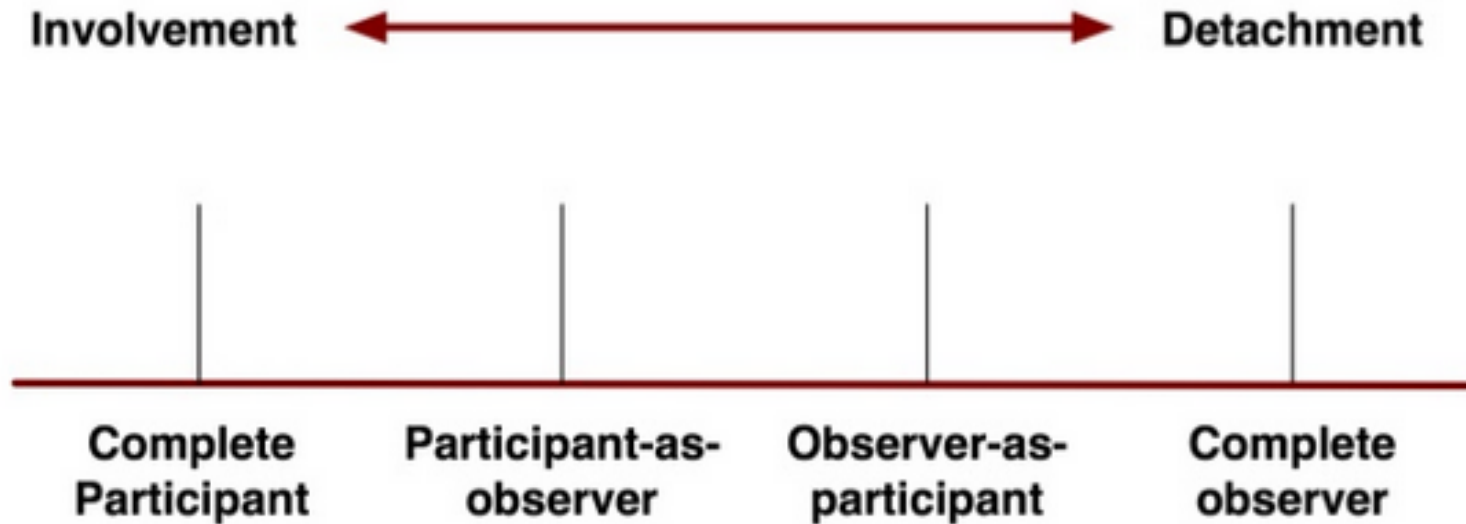
1. Takes place “in the field”
2. Observation is primary data collection technique
3. Interviews are used to clarify observations
4. Attention is paid to context and artifacts
5. Field notes coded and analyzed for themes and variables

Coding may use similar tools as Grounded Theory

The data should be as rich as possible

- Texts, interviews, field notes, videos, big data, public material, interviews, ...

# Field research spectrum



# Other important qualitative methods

These will be presented in other lectures

- Action research
- Case study

Short description follows

# Action research

Kurt Lewin (1946)

- Social research that combined generation of theory with changing the social system through the researcher acting on or in the social system.
- The act itself is presented as the means of both changing the system and generating critical knowledge about it.

Rapoport (1970) :

- “Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework.”

Action research can be viewed as a cyclical process with five phases: diagnosing, action planning, action taking, evaluating, and specifying learning

# Action research





# Case study

A commonly used strategy in many fields:

- Psychology, sociology, political science, business, management, etc.

Yin (2003)

- "An empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident"

Terminology is very vague

- Toy problems in laboratory as "case studies"
- Full-scale investigation of complex organizational problem in real-life contexts as case study

Is case study a research method?

- Many claim it is
- There are many ways of doing case studies
- A case study can be made with Grounded Theory or ethnography

# Grounded Theory example

## Heroes, Contracts, Cooperation and Processes: Collaboration Changes in a Large ERP Project

Kari Smolander, Matti Rossi, Samuli Pekkola

# Contents

Background: enterprise systems and their development

Research question and research process

Findings: four modes of collaboration

Implications and limitations

Based on:

**Smolander, K., Rossi, M. & Pekkola, S., 2016. Collaboration Change in Enterprise Software Development. In 9th International Workshop on Cooperative and Human Aspects of Software Engineering (CHASE 2016). Austin, Texas, USA, May 16, 2016.**

**Smolander, K., Rossi, M. & Pekkola, S., 2017. Heroes, Contracts, Cooperation and Processes: Collaboration Changes in a Large ERP Project. *submitted for publication*.**

# Enterprise systems/ software

- **Integrate information flows across the organization**
- **Aim to increase organization's competitiveness**
- **ERP, Enterprise Resource Planning as the most known example**
- **Enterprise systems may be implemented on a pre-made package, such as SAP, Microsoft Dynamics, etc.**
- **Enterprise system may be custom-made for the organization only**

# Enterprise systems develop- ment

- **Even with pre-made packages, the development of ES is a major challenge**
- **Many parties in development**
- Adopting organization, its different departments and sub-units, its IT function
- Development organization or integrator that has the technical expertise, skills and infrastructure for the development
- Developers of interfacing systems (many!)
- Subcontractors, consulting experts in special areas, etc.
- Product flagship organization, such as SAP
- **Over 90% of ERP implementations are unsuccessful to some degree (Momoh et al. 2010)**

## Collaboration in ES development

- **In ES development, a number of actors from several organizations work together to produce a system**
- Easy to disturb
- Possibility to many kinds of conflicts
- **Collaboration is often approached as a problem of procurement**
- The collaboration model is decided in the pre-study phase of the ES project, put into the project contract and then followed until the full adoption (this is the ideal)
- **It is questionable if this is really possible – Is it possible to decide the collaboration model beforehand?**

# Research question

- **How collaboration between a software vendor and a client has evolved over time?**
- A longitudinal case with over 20 years of history
- What kind of patterns of collaboration have existed over the lifecycle of the enterprise system
- How different kinds of triggers have influenced and changed collaboration?

## The system and the organizations in the study

<b>Factory</b>	Global manufacturer of materials and common goods. Turnover > 8 bn €
<b>Integrator</b>	A big systems integrator. A long history with Factory.
<b>Middle-ware consulting</b>	Provided architecture redesign and middleware technology in a crisis situation
<b>Birdie</b>	A fully customized sales and logistics system. Needed to replace several legacy systems from 1970s and to overcome year 2000 problem.



# Research approach

Study of human behavior, organizations and management in their real world context

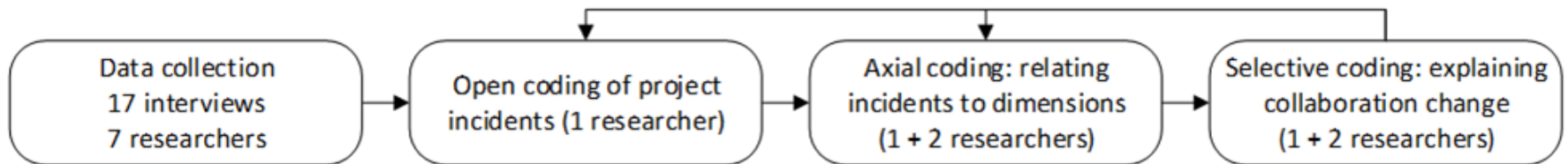
- Enterprise systems development includes both a technical and social component
- Understanding of stakeholders and their interactions, as well as the technical issues faced

A qualitative and inductive research approach with the Grounded Theory research method

- Creation of theoretical constructs from observations
- GT is a well known and structured method for inductive research based on collected data material

# Research process

- Data collection with open interviews (part of ENACT project, AoF)
- Strauss & Corbin Grounded Theory analysis phases (parallel)
  - Open coding – finding the concepts from the data
  - Axial coding – connecting the concepts together
  - Selective coding – selecting the target of explanation and explaining it with the concepts
- An inductive and interpretive process
  - No statistical generalization possible – only theoretical generalization



## Data collection

- **17 interviews from Factory, Integrator and Middleware Consulting**
- IT managers, project managers, developers, consultants
- Responsibilities from all periods of system history (1995-2016)
- Average length of an interview 45 minutes
- All interviews were recorded, transcribed as text and then coded with Atlas TI

## Birdie project description

- **Sales and logistics system**
- **Connections to most other operative systems in the company (even to automation systems)**
- **Essential for the business of Factory**
- **One of the biggest custom system projects in Finland**
- **A long and difficult project, with many crises**
  - Pre-study in the beginning of 1990s
  - Development 1995 – 2001
  - Maintenance 2001 –
- **Now often considered ultimately as a success**
- **Will be replaced by a SAP implementation soon**

# Main project incidents

Year	Incident
1995	Decision to build a custom system
1995	Decision to build a general product for the industry field
1996-1998	Project start and technological crisis
1998	Architecture reorganization
1998	Merger
2000-2004	Rollouts
2000	Abandonment of product development
2000-2002	Move to maintenance mode
2002, 2008	Change of technology
2006, 2010	Offshoring

## Modes of inter-organizational collaboration

- **We were able to identify how collaboration changed in and after the incidents**
- + identification of the factors that promoted and demoted each mode
- **The identified four modes of collaboration are**
- **Contractual** mode: Collaboration is defined by legal contracts between the parties
- **Cooperative** mode: Collaboration is based on mutual interests and voluntary cooperation.
- **Personified** mode: Collaboration happens between individuals. The incidents and their consequences are dealt with by the key persons.
- **Process** mode: Collaboration is a process that can be planned and designed.
- **Examples will follow**

# Contractual mode

The project started with the idea that the implementation will be done as specified in the project contract and the pre-study

- “The objective was that it becomes a kind of customer-supplier project and we order everything with invitations to tender and so – so we started to do it.” (Corporate IT Manager, Integrator)

Very soon the contracts were found as unrealistic, which demoted the contractual mode

- “[...] we were a little amateurish. I guess at Factory we trusted too much that Integrator knows what it’s doing. But they didn’t. They just counted on the same grounds as before but didn’t confirm the functioning. So this was maybe the most amateurish mistake in the very beginning of the project.” (IT Manager, Integrator)
- “Then it really hit the roof. I got an invitation to Integrator’s meeting. There was their whole management team. Then this project management and then Integrator’s CEO said plainly that if this does not work, the company will be bankrupt.” (Middleware consultant)

The awareness of a crisis caused a change to the collaboration mode

# Personified mode

In hard places heroic accomplishments and importance of individual expertise are emphasized

This happened when the architecture of Birdie had to be completely redesigned

- "... I had this personal relationship. I realized that we're going to ride for a fall. So I invited that guy here. He flew over here on a morning plane, we sat in [the local restaurant], and I told everything. I had all the documents and I told which is which. Then we had lunch. After this he said that we are really in trouble, but he is going to help us out there." (Corporate IT manager, Factory)
- "... but we had some common history. Me and [the project manager, Factory] had been working together [in an earlier project]. There we faced these issues in a smaller scale. He managed the project. I was the infra provider, a kind of safety. And we applied these experiences, and I argue that it was quite useful for both of us." (Infrastructure manager, Integrator)

We heard many war stories from many incidents. Common to all was the importance of individuals and their relationships at the decisive points.



# Cooperative mode

- “Let us say this. Usually the projects are saved by the fact that the customer and the vendor are equally deep in the [rude expression removed]. Then there is willingness to proceed and get the thing sorted out.” (Middleware consultant)

The customer took the lead and all work was organized under one project – instead of one in each organization

Common objectives, one project management, renegotiated contract, the spirit of “us”

- “The main element was that we couldn’t continue as earlier. That there were two separate projects: the customer having one and the vendor having another one, both with own agendas etc. So I decided to establish a joint project.” (Corporate IT Manager, Factory)

# Process mode

Both rollouts to sites (~50) and maintenance and its offshoring required clearly defined processes

After solving the crisis, the merger and redesign of the architecture, it was eventually possible to define clear processes for change management and testing

- “When I came in, I thought it was chaos. Nobody knew how many change requests there were, what kind and where they were. They were nowhere, they were in different places. Then we made it systematic. We made the whole testing model, the whole change management, how to make new releases, how many weeks can we use [Integrator] and where, how much do they do, where are the acceptance criteria, how many changes we may take in. If there are acute changes, when can they come, the last 20 percent. When each person tests it, and then we could develop the testing process as well. In the beginning, it felt that the stuff from [Integrator], it hadn't been tested at all. (Project manager 2, Factory)

# The four modes of collaboration summarized

	Is reaction to	Regularity	Emphasizes	Requires
<b>Contract mode</b>	Division of costs and responsibilities	Management-induced systems development	Plans and commitments	Clear contracts
<b>Cooperative mode</b>	Uncertainty in the context	Cooperative development of new solutions	Cooperative action, the spirit of “us”	Common goals
<b>Personified mode</b>	Imminent problem-solving needs	Improvised problem-solving actions	Individual achievements	Influential persons
<b>Process mode</b>	Constant planning needs	Planned development actions	Change and quality management practices	Defined and implemented processes

## Implications to research and practice

**The choice between the modes of collaboration was a reaction to an environmental condition**

- It is probably not possible to fully plan the collaboration beforehand
- Development processes and methods must be responsive to the changes in the environment
- Managers need to understand this and be able to change the mode in response to external or internal conditions

**The move from development to maintenance is clearly a mode change**

- More emphasis on contractual and process modes

## Limitations

- **A single descriptive case study cannot be generalized over a population**
- **The generalization is instead theoretical – abstraction from concrete events and actions to theoretical constructs**
- **The classification of four modes is probably complete**
- It should be evaluated by inspecting other real world cases

# Conclusions

Four modes of collaboration identified

- Each mode have been identified individually in previous literature
- None that we know have
  - *Provided all four modes together*
  - *Explained how the modes change and evolve*

The case is very revelatory and interesting

- A kind of suspense story that has a happy ending
- Provides very illustrative examples of the collaboration modes, their changes, and reasons for the change

Thank you!

Questions? Comments?