

IN5140

Smart processes and agile methods in Software Engineering

Group session 6



Agenda

First hour:

- Quick project overview
- Repetition

Second hour:

- Previous exam questions

Project milestones throughout IN5140

What	Due date	% of total score
Deliverable 1 – Brochure	2nd of Oct, 23:59	passed/not passed
Deliverable 2 – Retrospectives and BPMN on project	23th of Oct, 23:59	passed/not passed
Deliverable 3 – Improved BPMN and SPI suggestions on project	13th of Nov, 23:59	passed/not passed
Project Presentations	Nov 14, 18, and 20 14:00-16:00	passed/not passed

- Submit deliverables here (PDF): <https://devilry.ifn.uio.no/>
- Feedback within 2-3 weeks

Repetition from the lecture

Repetition

- What are **empirical research methods**, and what are the **advantages and disadvantages** of each method?
 - Controlled experiments
 - Case studies
 - Surveys
 - Action research
- **Reliability, Validity**

What is Empirical Research Methods?

Evidence based

research based on
experiences

Methods that explores the
reality. It generates
knowledge based on
experience

Research methods based on
gained knowledge,
observation and
measurement

It's a reality based on
experience

Research on a real-life
phenomenon

What is empirical research methods?

- «Empirical research methods» is related to **the acquisition of knowledge**, which seeks to explore, describe, predict, and explain phenomena by using **evidence based on observation or experience**
- Empirical evidence
 - is the **data** on which a **conclusion or judgment** may be based
 - Interpreting and judging such evidence depends on the “eye of the observer”
 - Research often focuses on groups or populations, making it less applicable to individual cases
 - the contribution of empirical evidence is influenced by context, judgment, probability, and tolerance for uncertainty

What is Controlled Experiments? give an example

An experiment where experimenters have control over the variables. Typical an experiment that has dependent and independent variables.

You can measure the variables

experiments with a baseline, just changing a few factors at a time, keeping other factors the same

It can be done when having a control group checking the validity of the research

You want to try out an intervention and measure it

An experiments where the researcher controls the variables, e.g. RTC

Researching and solving a problem simultaneously.

Controlled Experiment

- is an experiment study in which an **intervention** is deliberately introduced to observe its effects:
 - The identification of **causal relations** provides an explanation of **why a phenomenon occurred**.
 - The identification of causal processes yields an account of **how a phenomenon occurred**
-
- **Randomized experiment**
 - An experiment in which units are assigned to receive the treatment or an alternative condition by a random process
 - **Quasi-experiment**
 - An experiment in which units are not assigned to conditions randomly

Controlled Experiment

– is an experiment is a study in which an **intervention** is deliberately introduced to observe its effects:

Advantages

- They are a well established strategy, seen by many as the 'scientific' and therefore most acceptable approach
- They are the only research strategy that can prove causal relationships
- Laboratory experiments permit high levels of precision in measuring outcomes and in analyzing data

Disadvantages

- Laboratory experiments (e.g., with students at the university) often create artificial situations, which are not comparable with real-world situations
- It is often difficult or impossible to control all the relevant variables
- It is often difficult to recruit a representative sample of participants
- It may be necessary to conceal from the participants the purpose of the research so they do not skew the results

What is a case study? give an example

Investigate a real life problem

Investigate a temporary phenomenon

Studying a phenomenon in a real world context

a case study can be done through interviews, collecting peoples experiences

Investigates a real life phenomenon within the context

A qualitative research method, where you go in depth of something specifically

to explore a problem through a case of it

Case Studies

Case study research is 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.

Case Studies

Case study research is 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.

Advantages

- It can deal with complex situations where it is difficult to study a single factor in isolation
- It is appropriate for situations where the researcher has little or no control over events
- It is suitable for both theory building and theory testing
- It allows the researcher to show complexities and to explore alternative meanings and explanations
- It produces data that is close to people's experience

Disadvantages

- It is sometimes seen as lacking rigor and leading to generalizations with poor credibility
- It can be difficult and time-consuming to negotiate access to the necessary settings, people and documents
- The presence of the researcher can affect how people behave
- There aren't really any rules to follow

What is a survey? give an example

On a scale from 0-10, how satisfied are you with this product

a questionnaire can be used to obtain information from a large sample of participants

Advantages: you can get much info in a short time

series of questions sent to people. Useful for gathering lots of data from different people for specific questions

A method data collects data from a larger pool of people, often with closed ended questions, so that the answers can yield quantitative data

a method of gathering information about a sample of people to understand a population as a whole

Useful for studying a large number of variables using a large sample size and rigorous statistical analysis

A methodology where you combine being involved/doing something (action) and study

Surveys

- A survey is useful for studying a large number of variables using a large sample size and rigorous statistical analysis.
- **Cross-sectional surveys** are used to gather information on a population at a single point in time.
- **Longitudinal surveys** gather data over a period of time. The researcher may then analyze changes in the population and attempt to describe and/or explain them.

Surveys

Advantages

- They provide a wide and inclusive coverage of people or events
- They can be administered from remote locations using mail, email or telephone
- They can provide a lot of data in a short time at a reasonable cost
- They lend themselves to quantitative analysis
- They can be replicated
- Usually, high reliability is easy to obtain

Disadvantages

- They lack depth
- They tend to focus on what can be counted or measured
- They do not establish cause and effect
- They cannot judge the accuracy or honesty of people's responses by observing their body language

What is action research? give an example

When you actively step in
and try to make a change in
your own study

engage into the field and
try to solve a real life
problem

you try to research a real
world problem while also
finding a solution and
studying how this solution
affects the problem

the researcher tries to study a
problem through actively
trying to change it

Research where the
researcher steps into the
research situation

research while taking
some action, analysis,
conclude

Action Research

- Simultaneously contribute to the **practical concerns** in a concrete situation and to the **goals of science**.
- **Dual commitment** to study a system and concurrently to collaborate with members of the system in changing it.
- **Active collaboration** between researchers and practitioners underlines the importance of **co-learning** as a primary aspect of the research process.

Action Research

Action Research attempts to provide

practical value

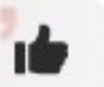
to the client organization while simultaneously contributing

to the acquisition of

new theoretical knowledge

Criticisms of Action Research

- Action Research has been criticized for:
 - its lack of methodological rigor
 - its lack of distinction from consulting, and
 - its tendency to produce either

‘research with little action or action with little research’ 

What is reliability and validity?

Reliability is that what is measured stays stable over time, validity is whether what is measured measures what it actually is supposed to measure or not

Reliability: Can the study can be repeated and yield the same results?

reliability relates to how much you can trust that the data is trustworthy validity relates to the data's possibility to get the same data again

How reliable something is, does it always provide something useful. How valid something is, is it correct and factual within reason, or is it something totally different?

Reliability, Validity

Reliability and validity of empirical studies

- **Reliability**

- Can the study can be repeated (i.e., by other researchers) and yield the same results?

- **Statistical conclusion validity**

- Is the statistical inference valid?

- **Internal validity**

- Does the observed covariation between *A* (the presumed treatment) and *B* (the presumed outcome) reflects a causal relationship from *A* to *B*?

- **Construct validity**

- Do the measures in the study represent the (abstract, possibly theoretical) constructs they are intended to measure?

- **External validity**

- Does the cause–effect relationship hold over variations in persons, settings, treatment variables, and measurement variables?

15 minute  break

Previous exam questions

2024

2.1 Empirical research methods

From the list below, select all the empirical research methods.
(2 points if **all** the correct ones are chosen, 0 points if not).

Select the correct alternatives:

Action research

Case studies

Controlled experiments

Surveys

Maks poeng: 2



List all the empirical research methods (from the course) *a)action research, b)case studies, c)controlled experiments, d)surveys*

None of the options are correct!

2022

3.3 Empirical studies

Briefly explain the difference between reliability and validity of empirical studies. (4p)

Briefly explain between reliability and validity of empirical studies

reliability = can you measure the data again
validity = are you measuring what you want to measure

Reliable if your study can be replicated, valid if measures what it is supposed to measure

To reproduce the result
To know that You measure what You intended

Reliability will you get the same answer every time.
Validity, valid within what context? group of people. Is it correct?

Reliability is about consistent and stability in the result. Validity is about the measurements really are measuring what it's supposed to measure

reliability - able to reproduce the study.
validity - The measure of accuracy of what you wanted

reliability: if the study can be replicated
Validity: if you are measuring what you are supposed to measure

If a study is reliability then others will get the same result, if it is validity then is accepted by many

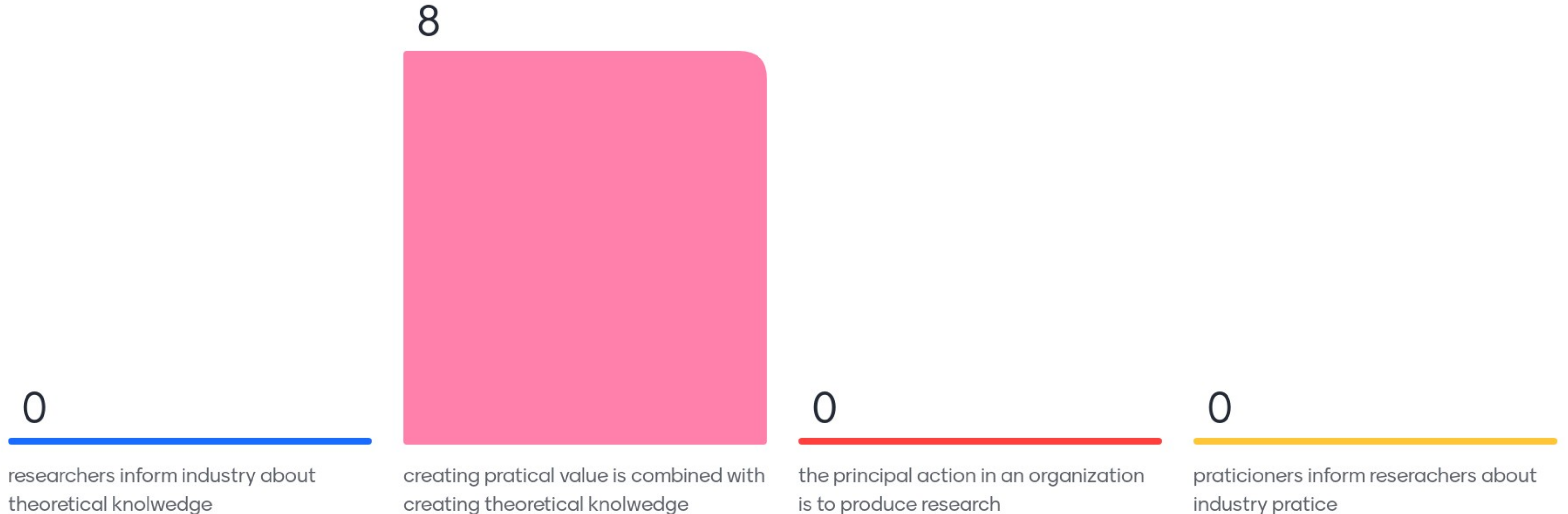
2019

1.1 IN5140-H19 Exam Task 1.1

Action research is a research method where:

- ☐ researchers inform industry about theoretical knowledge
- ☐ creating practical value is combined with creating theoretical knowledge
- ☐ the principal action in an organization is to produce research
- ☐ practitioners inform researchers about industry practice

Action research is a reserach method where



2019

2.1 IN5140 H19 Exam Task 2.1

What is construct validity?

Fill in your answer here

What is construct validity?

Do the measures in the study represent the constructs they are intended to measure?

How well a set of indicators represents the construct we want to explore

Is the possibility to measure the right construct

Do the measurement construct what they are supposed to

Construct validity is when the study represent the constructs they are intended to measure

If the construct of the phenomenom you want to study is really measuring the abstract concept

strength:
generalizables
shortcomin
gs: not depth answers

2019

2.5 **IN5140 H19 Exam Task 2.5**

Describe two empirical research methods, and mention at least two advantages and two disadvantages of each of them.

Fill in your answer here

2016

Describe strengths and shortcomings of an **survey** in research?

Describe strength and shortcomings of an survey

strenght = get qualitative data
weakness = dont get enough knowledge about the reasoning

You can get a large sample of information.
They can lack depth

Strengths:- Many people can participate- not too time consuming - Shortcoming:- Not in depth

Pros: Repeatable, easy to complete and send to a lot of different people, simple questions and answers are obtainable. Cons: Not in depth, cannot tell if people are telling truth

Strength: can get much data in little time. Inexpensive. Can generate statistical data.
Weaknesses: little external validity, difficult to get enough people to answer, cant see body language

Strength:- a large sample - collecting lots of data in a short time
Shortcomings:- lack of dept- close-ended questions

investigate a real life phenomenon

Is a study that researches a phenomenon in its real setting

Describe strengths and shortcomings of a survey in research?

Strengths:

- Survey is a powerful tool which can provide insight on phenomenon(s), but lacks details and does not allow to drill into observed data
- Can reach a lot of people

Shortcomings:

- Does not reveal meanings, and the important details behind each answer
- Participants might rush through

2016

Describe strengths and shortcomings of an **experiment** in research?

Describe strengths and shortcomings of an experiment in research?

- Experiments enable researchers to observe phenomenon in isolated, controlled environments.
- Experiments can eliminate variables which are not relevant and can set a focus on the subject of the research.
- On the other hand, experiments might not reflect reality due to their artificial nature (e.g. if it is representative outside of the controlled environment).

Describe strength and shortcomings of an Experiment

2016

What is a case study?

What is case study?

Investigate a contemporary phenomenon within a context

A methodology that study a phenomenon in a real life setting

Study of real life situation, of specific groups

An in depth study of an event/situation.

Studying a phenomenon in a real world context

What is a case study?

- Case studies are often used in qualitative research
- Case study is a research method which goes deeply into **one** phenomenon in the context of the real world

Thank you for today!

Next Week:

**Large-Scale Agile and
Agile Architecture**