

TDDDD89

Lecture 3. Study methods

What is a scientific method?

- Design, implement, test?
- Acquire data, aggregate, visualise?

Method

- Study design, data selection
- What is achievable, what is necessary, what is best?

Different types of methods

- Qualitative methods: establish concepts, describe a phenomenon, find a vocabulary, create a model
- Quantitative methods: make statistical analyses, quantify correlations, ..

Human-Centered methods

- Surveys
- Interviews
- Observations
- Think-aloud sessions
- Competitor analysis
- Usability evaluation
- ...

Method choice?

- What do you want to find more about?
- Identify the stakeholders (users, costumers, and purchaser)
- Identify their needs

Interviews

- Structured or unstructured?
 - Group interviews (focus groups) or individual interviews?
 - Telephone interviews

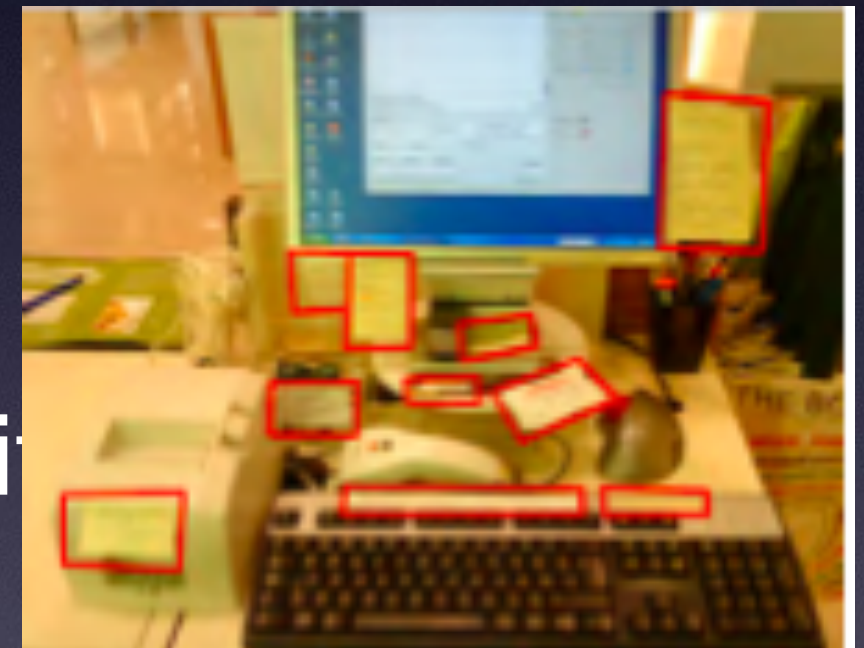
- Use open-ended questions, ex.:
 - Do you like your job?
 - What do you think about your job?
- Active listening
- Record the interview
- Plan and schedule for that!

Interview analysis

- Transcribe or not?
- Categorize what has been said (encode)

Observations

- Understand the context
- Write down what you see, hear, and feel
- Take pictures
- Combine with interview
- Ask users to use systems in



Usability evaluation

- System usability scale (SUS)
- Post-Study System Usability Questionnaire (PSSUQ)
- Heuristic evaluations
- Eye tracking
- First click Testing
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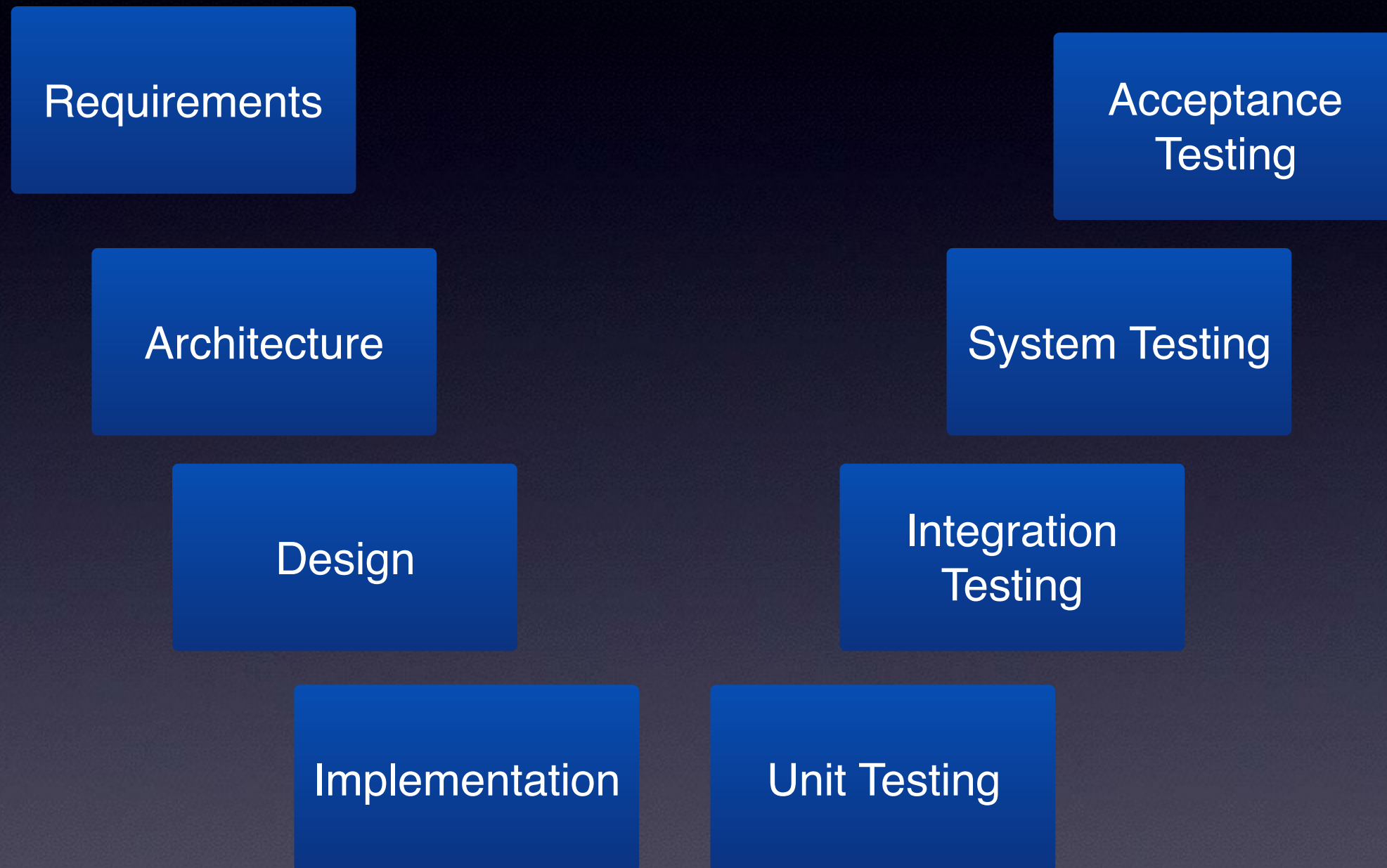
System usability scale (SUS)

		Strongly Disagree				Strongly Agree
1.	I think that I would like to use this website frequently.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	I found this website unnecessarily complex.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	I thought this website was easy to use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	I think that I would need assistance to be able to use this website.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	I found the various functions in this website were well integrated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	I thought there was too much inconsistency in this website.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	I would imagine that most people would learn to use this website very quickly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	I found this website very cumbersome/awkward to use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	I felt very confident using this website.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	I needed to learn a lot of things before I could get going with this website.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

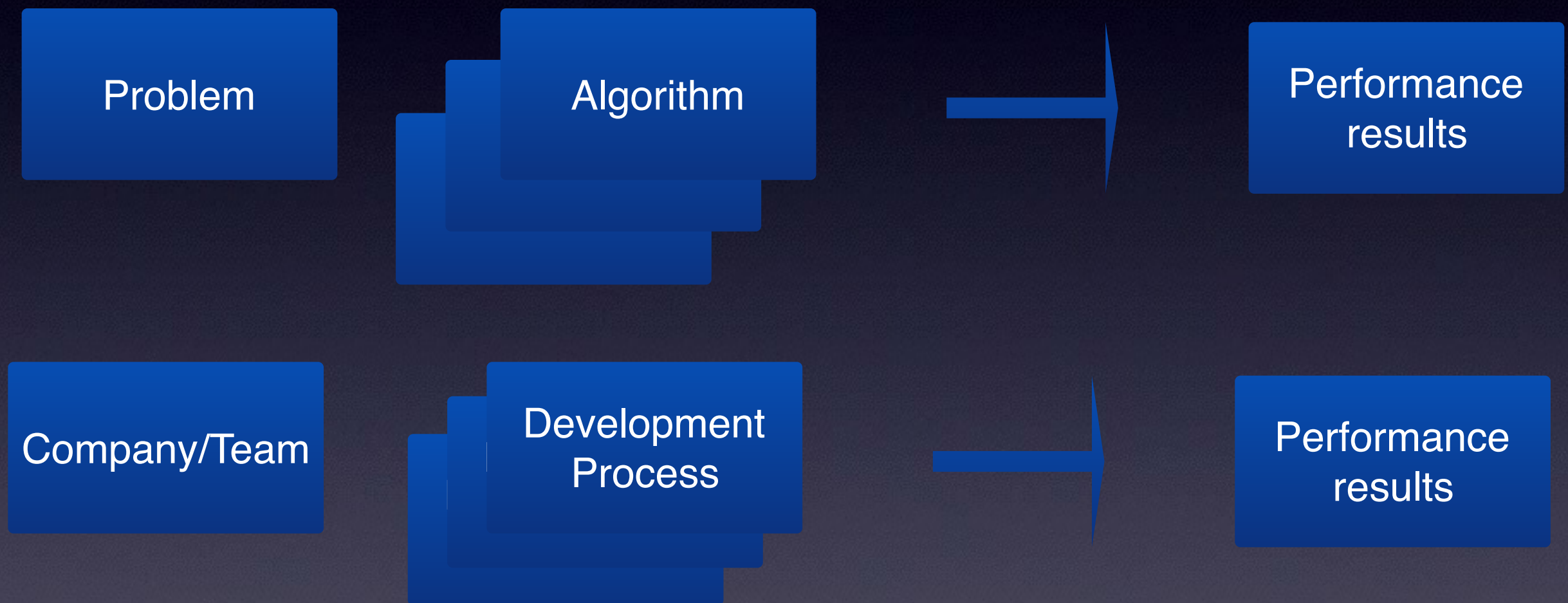
Usability performance measurement

- Task success
- Time (time/task)
- Effectiveness (errors/task)
- Efficiency (operations/task)
- Learnability (performance change)

Software Engineering



Other types of theses



Products

Study techniques

Requirements

Interviews

Surveys

Focus Groups

Architecture

Design

Experiments

Implementation

Proofs

Processes

Planning

Development

Testing

Integration

Deployment

Maintenance

Study techniques

Surveys

Interviews

Focus Groups

Case Studies

Describing a method

Don't write a
diary:

- "To implement a Flux controller, I first needed to learn about Flux"

Write that which convinces
someone you have done a good
job

- "The Flux controller was evaluated using the Flux controller evaluation protocol [1]"

Engineering method vs scientific method

Method questions	Engineering aspect	Scientific aspect
Can I trust your work?	Have you used techniques & methods intended for the task?	Is it clear that the evaluation will provide the kind of answers we seek?
Can I build on your work?	Are all techniques and methods employed described in sufficient detail?	Can I replicate the study?

Case Study

- Investigates a phenomenon in a context,
- with multiple sources of information,
- where the boundary between context and phenomenon may be unclear
- Uses predominantly qualitative methods to study a phenomenon

Quantitative studies

- Uses statistical analyses of some empirical data
- Randomization of subjects
- Blocking (grouping) subjects based on confounding *factors*

Factors

- That which may correlate with (and possibly cause) an effect
 - "How does *SCRUM* affect product quality as measured by the number of bugs?"
 - "How is code quality affected by the choice of *programming language*?"
 - "How understandable is a design document when creating procedural and OO design, based on *good/bad requirements*?"

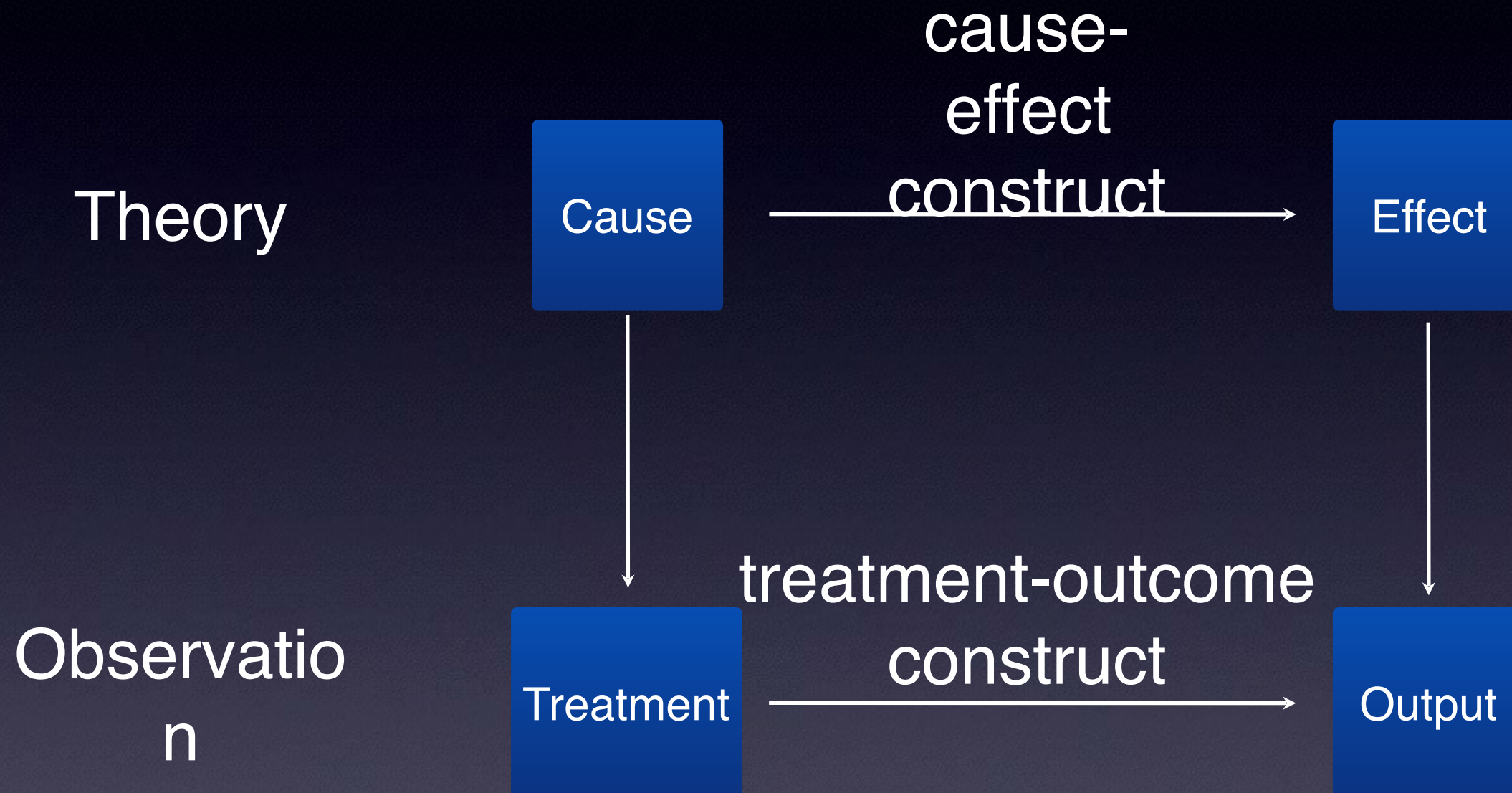
Analysis

- There must be a *null hypothesis* which we can test our data against
- One factor, two treatments: t-test, Mann-Whitney
- One factor, several treatments: ANOVA
- Two factors: ANOVA

Statistics

- There are separate statistics courses, but..
- Separate correlation and causality
- Unless $\geq 95\%$ confidence, there is no correlation
- Confidence only part of statistical *power* (confidence + effect size + sample size)

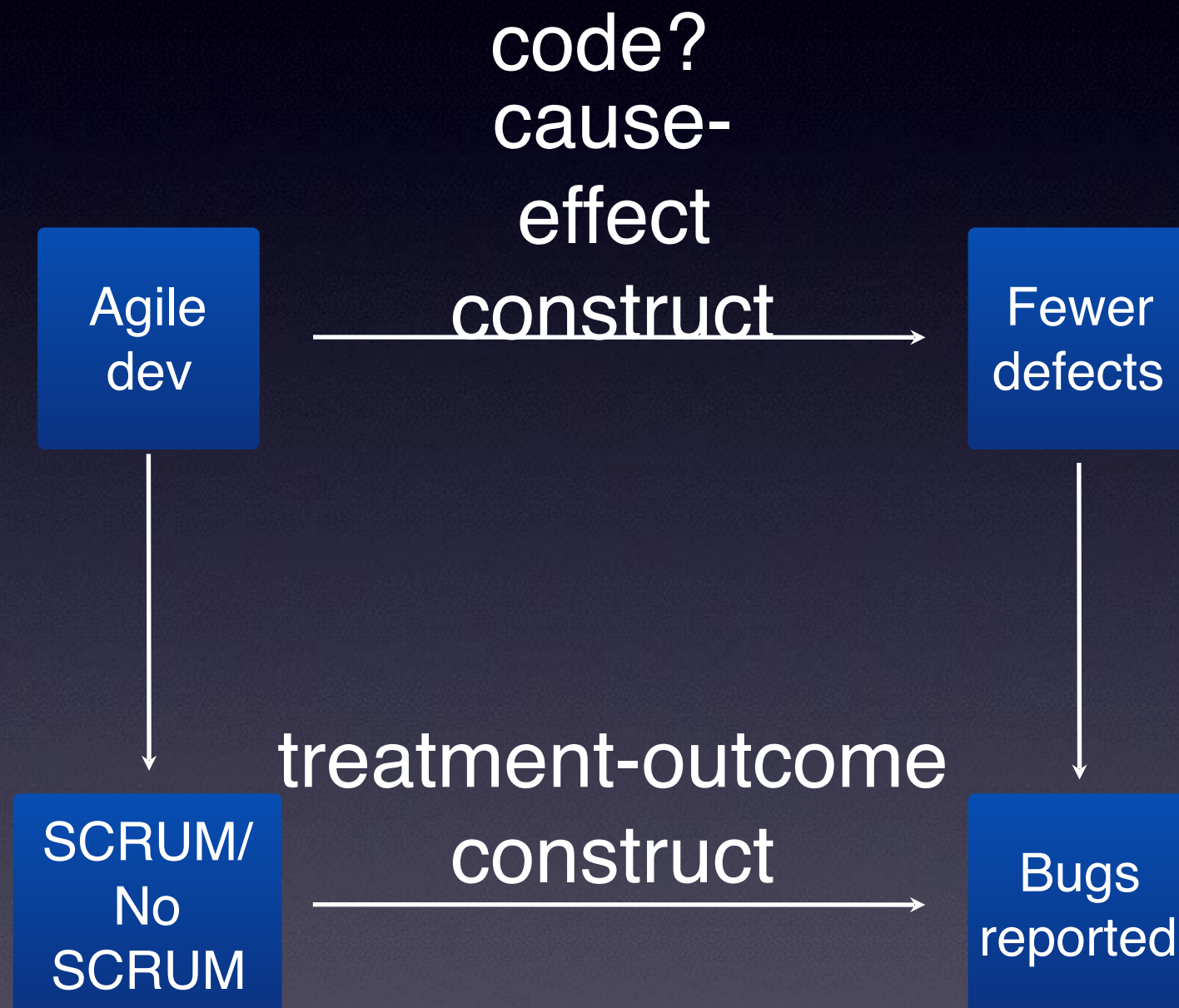
Discussion



”Do all arrows
exist?”

Discussion, example

Does agile development lead to higher quality code?



Examples

- Evaluation
 - ...
- Design
 - ...
- Improvement
 - ...

Work in a context

- Are the authors aware of how this work will affect others?
- "The commits with lowest code quality will be listed on the team review board"
- "More classification data will improve analysis of user behaviour"