Theory Building

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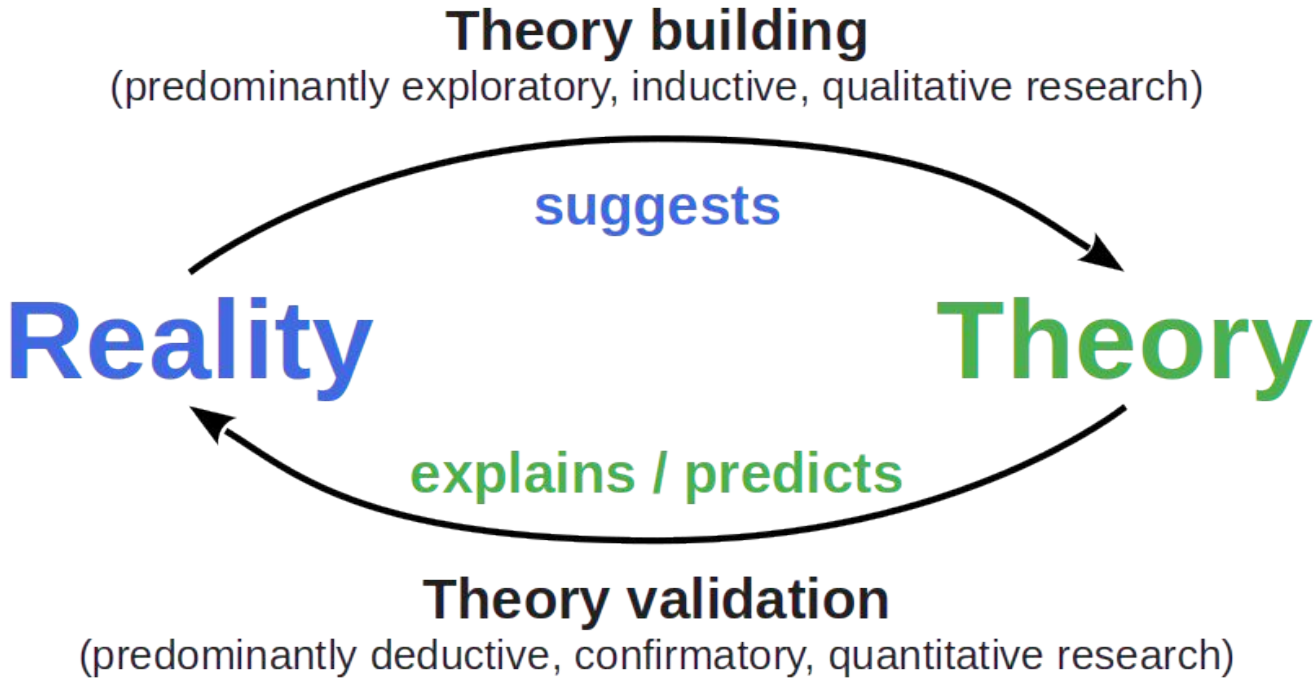
Agenda

1. Theory building
2. Qualitative research
3. Example methodologies
4. Multi-method research
5. Mixed-methods research
6. Quality assurance

1. Theory Building

The Logic and Process of Science (Recap)



Purpose of Theory Building

The purpose of scientific theory building is to

- Create, revise, and build out a theory that
  - Correctly explains and/or predicts reality
  - Can can be continuously tested
  - In a cost-efficient way

Theory Building Research

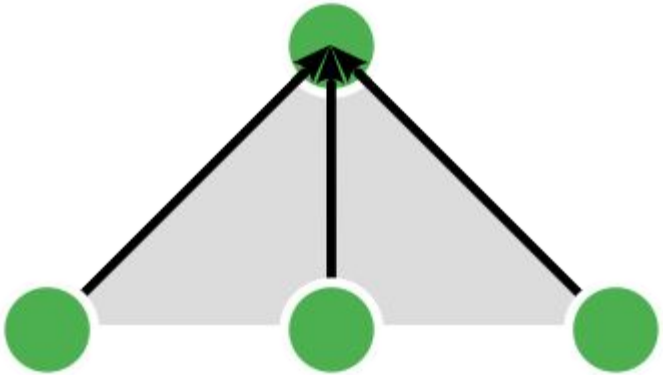
Theory building research is

- Exploratory
- Inductive
- Qualitative

Inductive Reasoning

Inductive research is based on **inductive reasoning** which is

- Abstracting from data by recognizing patterns and drawing conclusions

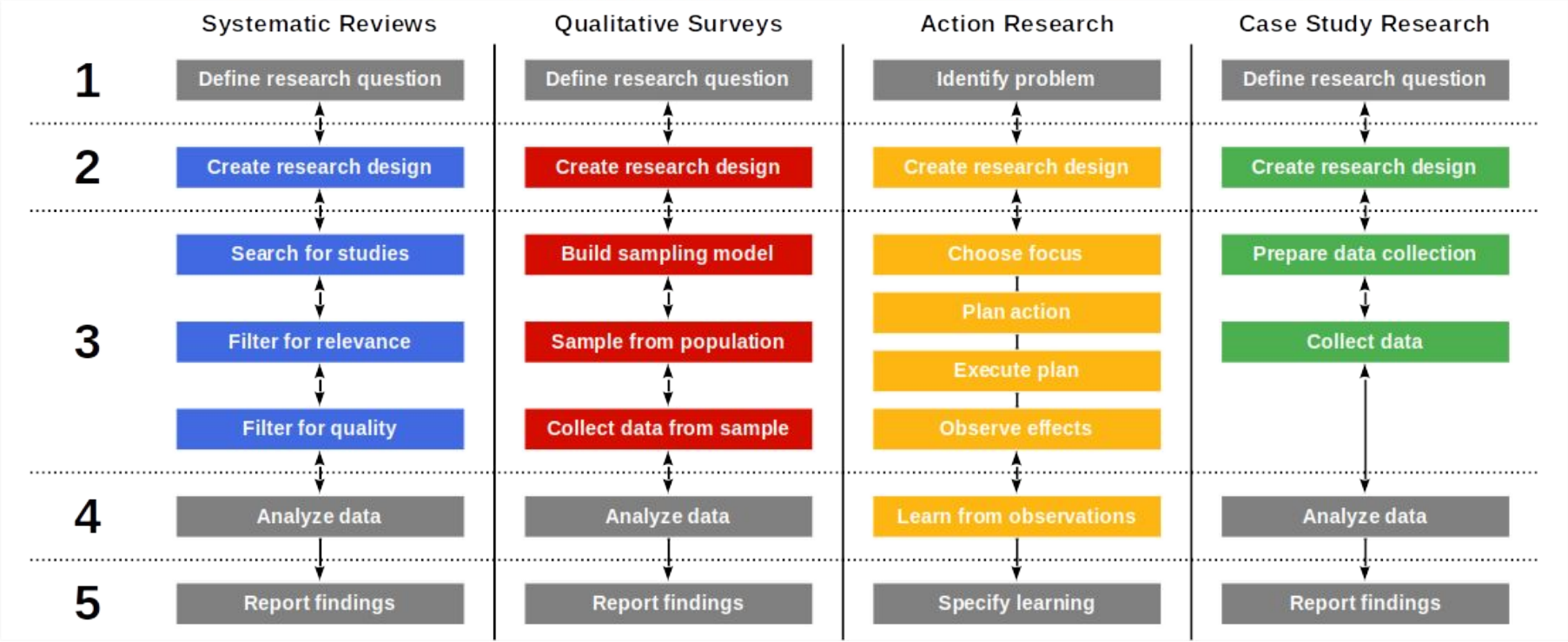


Theory Building Process

The **theory building process**

- Is iterative
- Is incremental
- Mitigates risk
- Never ends

Theory Building Processes by Methodology



2. Qualitative Research

Base Terminology (Recap)

Researchers use a research methodology

- Recap: A start-to-finish framework for performing theory building

To create a research design

- Recap: A process description for answering a research question

That utilizes research methods

- Recap: A method answering a type of research question

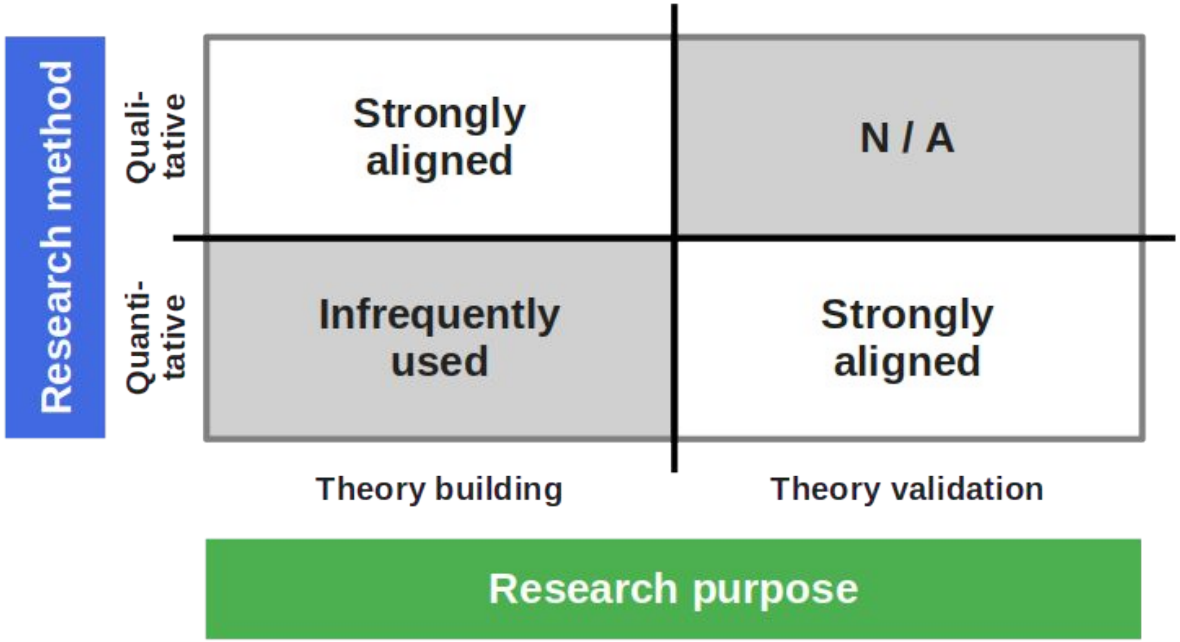
Which combine research practices

- Recap: A way of doing something with a defined outcome

What Makes a Research Design a Qualitative Design?

1. The **theory building** purpose
2. The use of **theoretical sampling** in data collection
3. The acquisition and use of **qualitative data**

Qualitative vs. Quantitative Research Methods (Recap)

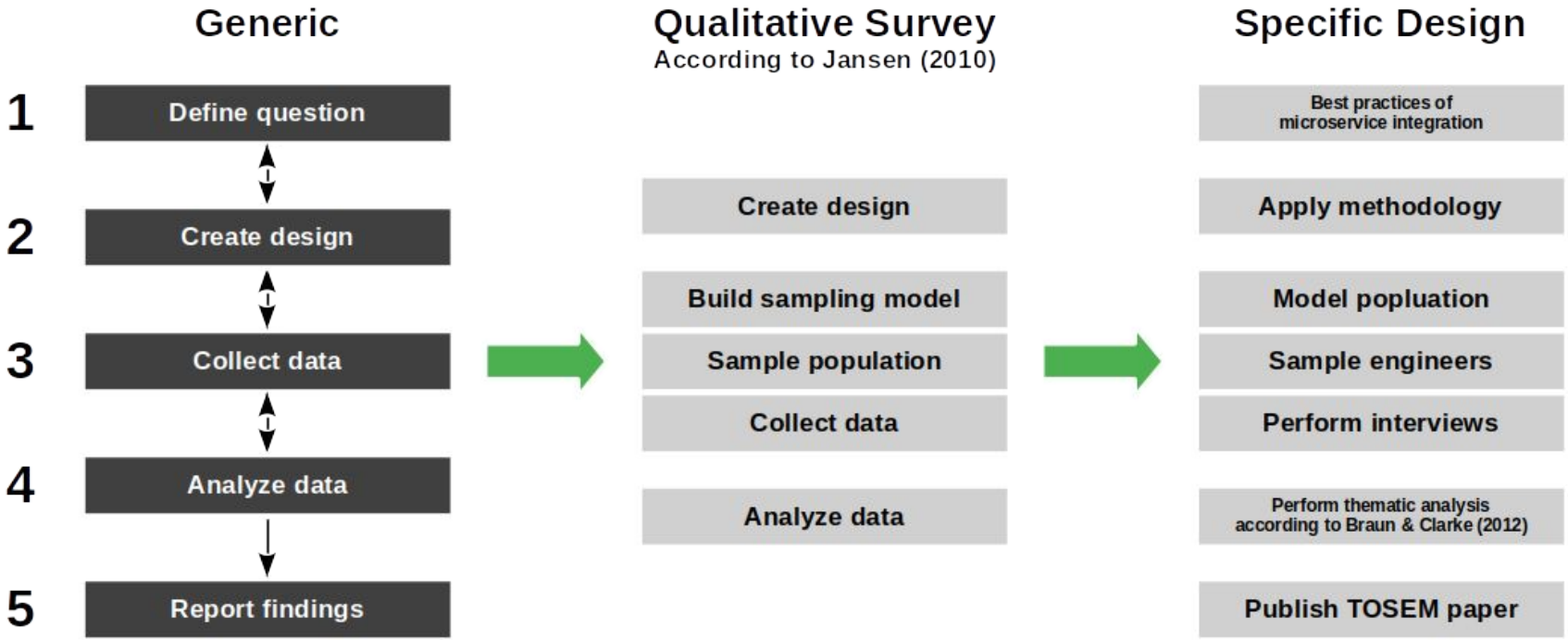


Example Qualitative Research Methodology (Recap)

The **qualitative survey** according to Jansen (2010)

1. Write research protocol
2. Build sampling model
3. Sample for theory building
4. Perform interviews
5. Analyze transcriptions
6. Determine saturation
7. Iterate or conclude

Example Research Design Refinement



3. Example Methodologies

Research Methodologies

Main categories

- **Systematic survey**
- **Qualitative survey**
- **Action research**
- **Case study research**
- Grounded theory
- Ethnographies

Not a methodology

- Introspection

Action Research

Action research is a research methodology in which the researcher

- Applies a theory being built to help create a desired outcome
- Evaluates the theory as to its trustworthiness

Participatory action research is action research in which the researcher

- Joins a case (organization) to work side-by-side with practitioners

Action Research Process

1. Identify problem
2. Iterate over action loop
    a. **Choose focus**
    b. **Plan action**
    c. **Execute plan**
    d. **Observe effects**
    e. **Learn from observations**
3. Specify learning

Example (Specific) Action Research Methodologies

- Action research according to Lewin (1946)
- Participatory action research according to McIntyre (2007)
- Critical participatory action research according to Kemmis et al. (2014)

Case Study Research

Case study research is a research methodology in which the researcher

- Investigates a (contemporary) phenomenon it its original context
- Where the boundaries between phenomenon and context are blurry

Case Study Research Process

1. Plan
2. Perform
    a. **Design** (case selection, units of analysis, propositions, questions, logic, criteria)
    b. **Prepare** (research protocol, ethics approval, conflicts of interest, pilot case)
    c. **Collect** (multiple data sources, case study database, chain of evidence)
    d. **Analyze** (qualitative data analysis, case description, rival explanations)
3. Report

Example (Specific) Case Study Research Methodologies

- Case study research according to Eisenhardt (1989)
- Case study research according to Yin (2009)
- Case study research in software engineering according to Runeson et al. (2012)

Research Paradigms

- Analytical research
  - Research is detached; goal is understanding
- Action research [1]
  - Research is involved; goal is improving
- Design science research
  - Research is applied; goal is innovation

[1] Using the same name for research paradigm and methodology category

4. Multi-Method Research

Multi-Method(ology) Research Designs

A **multi-method research design** is a research design that

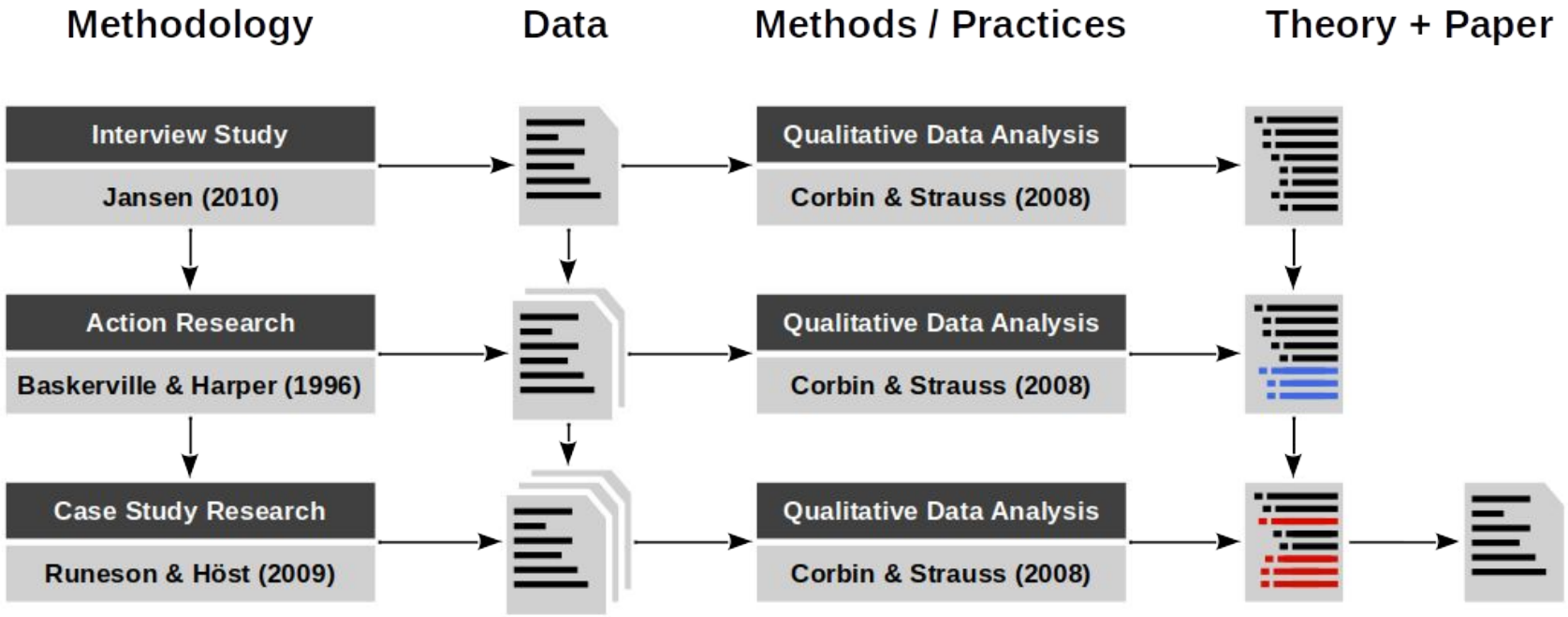
- Uses multiple methodologies and methods
- Within either theory building or validation research

Example Multi-Method Research Design

Best practices of microservices integration

1. Theory creation
    a. Qualitative survey using Jansen (2010)
2. Theory build-out
    a. Participatory action research using Baskerville & Harper (1996)
3. Theory evaluation
    a. Case study research using Runeson & Höst (2009)

Theory Build-out and Triangulation Using Multi-Method Research



5. Mixed-Methods Research

Mixed-Methods Research Design

A **mixed-methods research design** is a research design that

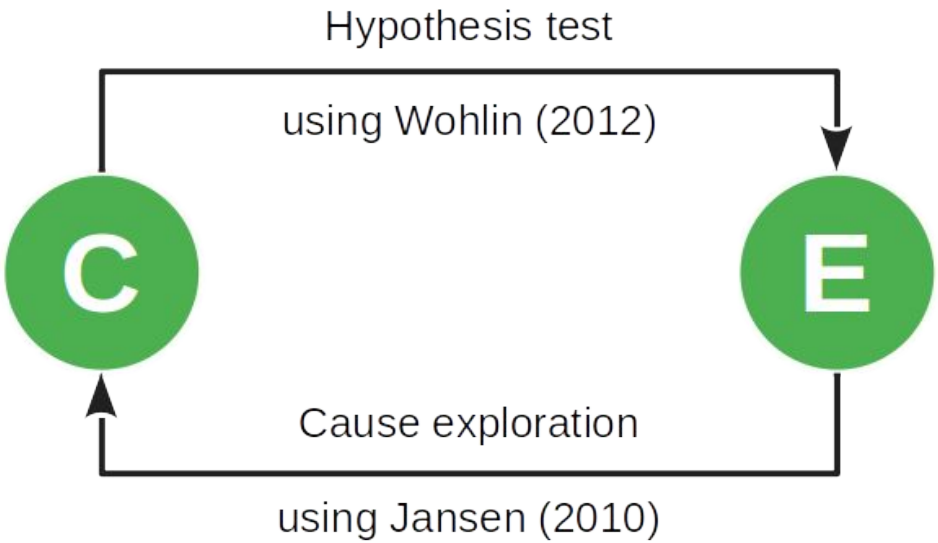
- Combines qualitative with quantitative research methods

Example Mixed-Method Research Design

Novel programming language feature

1. Hypothesis creation
    a. Qualitative survey using Jansen (2010)
2. Hypothesis test
    a. Controlled experiment using Ko et al. (2015)
3. Theory building
    a. Qualitative survey using Jansen (2010)

Causal Analysis / Correlation and Causation



6. Quality Assurance

Quality Criteria for Research Methods (Recap)

Intuition	Qualitative research	Quantitative research
Truth value	**Credibility**	Internal validity
Applicability	**Transferability**	External validity
Consistency	**Dependability**	Reliability
Neutrality	**Confirmability**	Objectivity

Trustworthiness

Credibility is

- The degree of confidence in the truth of the findings

Transferability is

- The degree to which findings can be transferred to another context

Dependability is

- The degree to which findings are stable over time

Confirmability is

- The degree to which the findings can be confirmed by other researchers

Establishing Quality (Not Assuring it)

Quality in qualitative research is “established”

- Quality is proactively baked into the methods

Practices for Establishing Quality [1]

Credibility

- Prolonged Engagement
- Persistent Observation
- (Different forms of) triangulation
- Peer debriefing
- Negative case analysis
- Referential adequacy
- Member-checking

Transferability

- Thick description

Dependability

- Inquiry audit

Confirmability

- Confirmability audit
- Audit trail
- Triangulation
- Reflexivity

[1] Derived from Guba & Lincoln (1982)

Summary

1. Theory building
2. Qualitative research
3. Example methodologies
4. Multi-method research
5. Mixed-methods research
6. Quality assurance

Thank you! Any questions?

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