

Case Study Method

About this Document:

- This document deals with the basics dealing with the case study method.
- The primary work which has been used for this document is the book called “The Case Study Method” by Robert K. Yin.

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2 The Case Study

This note is based on the first chapter in Robert K. Yin's book "The Case Study Method".

A case study can be both a single case or multiple cases. The case study can make use of both a quantitative and the qualitative method. The methods are not mutually exclusive (Yin 2009 pp. 19-20)

There to this chapter will deal with the definition of what a case study is and when and how it should be applied.

2.1 When to Chose the Case Study Method

The case study method is a good method to work with situations that uncovers a phenomenon, testing a theory and creating causal links.

It is of great concern that the case study method is chosen when the research design is under these conditions (Yin 2009, p. 8):

- 1) When the research questions starts with "who" or "why".
- 2) That there isn't a need for control of behavioral control.
- 3) There is a need to focus on a contemporary event or events.

The definition of a case study will be discussed in section 1.2.

2.2 Definition of the Case Study Method

The case study method is based on that the researcher has to investigate how a phenomenon, theory applies in practice and to explain or explore conditions.

In general there are two forms of cases. The first one is a study case and the second one is the case for research; however there are two fundamentally different perspectives that are applied for the two types of cases (Yin 2009, p. 18).

"A case study is an empirical inquiry that investigates a contemporary phenomenon in depth and with in its real-life context, especially when the boundaries between phenomenon and context is not clearly evident."

"The case study inquiry copes with the technical distinctive situation in which there be many more variables of interest than the data points, and as one result relies on

multiple sources of evidence, with data needing to converge in triangulating fashion, and another result benefits from the prior development of theoretical propositions to guide data collection and analysis.”

2.2.1 A Case for Teaching

The teaching case doesn't need to stay objective when it comes to the data that has been collected.

2.2.2 A Case for Research

The research case has to stay objective when it comes to the data and interpretation of the collected data.

2.3 The Two Methods

In this section the two methods will be discussed. There are various tools associated with each method.

2.3.1 The Qualitative Method

This approach is based on the ideas on making use of interviews that aren't structured. This means that the interviewer and the subject can interact e.g., the interviewer talks with the subject regarding an issue and the subject answers the question. The answer uncovers situations which needs to be dealt with by asking another question.

However there are also situations where it is a necessity that the interviewer has to construct a manuscript to stick to while he or she is interviewing. That type of interview is known as a semi-structured interview.

2.3.2 The Quantitative Method

This deals with studying statics, papers, documentation, reports or conducting a structured interview.

This means that the data which the researcher has collected can't interact with the researcher and it is often the reason for their studies can't be utilized to identify and investigate new problems.

2.4 Characteristics of The Single Case Study

There are various reasons to chose the single case method but it leads to a context problem.

2.5 Characteristics of The Multi Case Study

There are various reasons to chose the multi case method but it leads to a problem with scaling the results.

3 Designing the Case Study

This note is based on the second chapter in the book by Robert K. Yin.

3.1 The Research Design

Yin identifies the research design as “guiding the investigator (in our case an architect) in the process of collecting, analyzing, and interpreting observations. It is a logical model of proof that allows the researcher to draw inferences concerning causal relations among the variables under investigation” (Yin 2009, p. 26).

3.2 Preparation

For each case study there is a need for preparation. The preparation consist of many different elements that needs to be dealt with in one way or the other. Yin recommends that the architect has to find the proper contacts so he or she can get a foothold in the case organization or case organizations. However the architect should also focus on the theory development; never the less the primary focus should be on the establishment of relations to the case organization (or organizations).

3.2.1 Theory Development

The theory development has to be dealt with early in the design of the case study (Yin 2009, p. 35) which is needed to design and test a hypothesis.

3.2.2 Theory vs. contacts

As above mentioned number one priority is to handle the contacts to the case organization (or case organizations) but it is also a necessity that the architect is aware of the theory of what he or she is going to work with so the proper organizations are contacted.

From a practical point of view then it is a necessity to have more than one contact person in an organization e.g., two or three and these should with some probability not be working in the same department.

3.2.3 The Choice of Organizations

When the architect has identified a case organization (or multiple case organizations) then he has to contact them e.g., by sending a letter containing a presentation of him and what kind of study he is about to do so those who are supposed to receive the information is able to understand what the

study is about and who they will be dealing with.

3.3 Types of Case Studies

Yin identifies four types of case studies. These will be dealt with below:

3.3.1 The Explorative Case Study

To explorer and thereby investigate if a hypothesis is sound or can be proven. Yin makes use of an example that involves Christopher Columbus's exploration of the sea routes to India (which resulted to the exploration of the North American continent).

3.3.2 The Explanatory Case Study

The explanatory case study is defined as a way to uncover situations or phenomena. Yin talks about a case study titled “Middle Town” from 1929 that dealt the development of a city in the middle of the United States of America. The case study was about explaining how the governance of the many cities in the mid-west was dealt with and how the various laws was developed and implemented.

3.3.3 The Causal Case Study

Deals with finding what actions that caused the organization to be what it is today or how it became e.g., an important organization. E.g., how did Wal-mart become a winning organization?

3.4 The Single Case Study

There are various reasons to chose the single case method but it leads to a context problem. The context problem is that the case study might be hard to generalize and it might prove to be hard to reproduce a result by using the same techniques.

3.4.1 Theory

The architect can apply the single case study when he or she wants to test a “well – formulated” and diffused theory or when the architect can apply the single case theory is when a case seems to be unique or extreme (Yin 2009, p. 47).

3.4.2 Context

In the context of the single case situation is that the case of what the case study is supposed to be used for. What reality is studied and might there be multiple situations in each case study that has to be used for. In the case of a Coherency Management related situation then it is individual if the

architect has to study problems that are related to Enterprise Architecture or situations that prevent the implementation of the Coherency Management related issues.

3.5 The Multi Case Study

There are various reasons to chose the multi case method which in theory should solve the problem situation with generalizing the findings of the case study.

3.5.1 Theory

When the architect works with multiple case organizations then it is assumed that the findings have to be generalized so a “rule” or “tendency” can be verified and applied in other organizations.

3.5.2 Context

The context for multiple cases are that these cases have to be either similar in some point e.g., be in the same field (market or geographic region) or similar in the way the state of management, culture, technological implementation and maturity level.

3.6 The Design of a Case Study

When the architect is about to design his or her case study then it is a necessity to work with what kind of subject the architect is supposed to understand and is supposed to apply to uncover the information.

In general there are two different categories of concentration:

3.6.1 More Concrete subjects

These elements are identified as very concrete:

1. Organizations: The organization is defined as a social system that has particular goals that the systems tries to reach. An organization can both be a non-profit and profit organization.
2. Individuals are defined as humans or subjects that can't be divided and function.
3. Small groups are a group of humans that in some way or the other collaborate or interact with one or another to achieve something.
4. Partnerships are defined as contracts between two organizations or among multiple organizations to give the network (the collection of organizations) a competitive advantage.

3.6.2 Lesser Concrete

These elements are identified as lesser concrete:

1. **Projects:** These can be individual projects or these can be a part of a program a case organization has developed and initiated.
2. **Communities:** These communities might be in relation to communities within the organization.
3. **Decisions:** What decisions have the top management taken during the time the organization has been operational. The decisions have a great impact on the organization and its performance.
4. **Relationships:** What relationships dominates the organization and how do these relationships impact the way the organizations work.

3.6.3 The Overall View

The architect has to be able to understand, investigate and uncover all of the above mentioned categories because these have an impact on how the layers of an organization is constructed and therefore should the architect think on how to focus the sources needed.

When the architect conducts his or her investigation of a particular organization, small ground, partnership or any of the other elements then he or she should focus on how it interacts with the the various layers in the case organization as according to Zachman's framework.

3.7 Judging Research Designs

There are several elements which needs to be taken into consideration before a case study method is initiated. First I will deal with the how a Case Study Method can be handled in a science context.

3.7.1 Case Studies in Science Context

There are some basic steps the research design should focus on. The following walk through is based on Yin's perception of case study methods (Yin 2009, pp. 41 – 45):

1. **Construct Validity** deals with identifying the right operational measures for the concepts that are being studied. In the case of science then case studies have been associated difficulty when it deals with operationalize the measure and the measure often are biased since the findings are based on personal judgement.

2. Internal Validity deals with establishing casual relationships where certain conditions are believed to lead to other relationships than spurious¹ relationships. Please note that this particular approach is only for explanatory and casual studies and can't be applied for other kinds of case studies.
3. External Validity deals with identifying how the domain (the findings of the case study) can be generalized. This means how can the findings be applied in other organizations than the case study.
4. Reliability deals with how the findings can be replicated in other studies. The major concern is that the findings are airtight and aren't flawed and the findings therefore are biased or non-scientific.

Tests	Case Study Tactic	Phase of Research of Which Tactic Occurs
Construct Validity	Use multiple sources of evidence. Establish the chain of evidence. Have key informants review draft case study report.	Data collection. Data collection. Composition.
Internal Validity	Do pattern matching. Do explanation building. Address rival explanations. Use logic models.	Data analysis. Data analysis. Data analysis Data analysis.
External Validity	Use theory in single-case studies. Use replication logic in multiple-case studies.	Research design. Research design.
Reliability	Use case study protocol. Develop case study database.	Data collection. Data collection.

Table 1: The Research Methods (based on Yin)

3.7.2 The Case Study Method From a Coherency Management Point of View

When it comes to a Coherency Management then the case study can be focused on the case organization but it will be in the interest of both the case organization and the Coherency Architect since the findings are based on standards that are accepted by the scientific community. Thereto these standards are thought to students enrolled at Business Schools and Universities.

Therefore it can be an idea that the coherency architect make use of scientific methods to investigate the case organization.

¹ Defined as not to have a purpose.

4 Preparing to Collect Case Study Evidence

This chapter is based on the third chapter in Robert K. Yin's book.

According to Yin there are six sources that the architect can make use of when he or she is collecting data from the case study. These sources will be dealt with in this chapter where I will emphasize on the usage of interviews; however the architect can (and should) make use of other sources to seek further understanding of the case organization and to identify supportive elements.

4.1 Case Study Protocol

Before the data sources are treated then the case study protocol will be handled. The architect has to avoid bias.

A Case Study Protocol is designed to keep the architect on track. This means that the architect has to incorporate the case study protocol in the way the architect will investigate.

4.1.1 Introduction to the Case Study and Purpose of Protocol

This section includes the case study question, hypothesis, and propositions. Thereto should the theoretical framework for the case study which is needed to reproduce the logical model. Role of protocol is guiding the architect.

4.1.2 Data Collection Procedures

- Names of sites to be visited, including contact persons that are needed.
- Data collection plan.
- Expected preparation prior site visit.

4.1.3 Outline of Case Study Report

This section includes the outline of the report. This means the headings for which will be included in the section.

4.1.4 Case Study Questions

This includes the questions which will be made use of in the case study. Typically good questions needs to be articulated by using mindmap techniques etc.

4.1.5 Evaluation

The case study has to be evaluated. The questions below can assist the architect with the evaluation phase.

- Who will be evaluating the practice?
- What part of the evaluation will be implemented?
- What outcome measure have been used? And what outcome has been identified?

Then we proceed to the case study questions.

4.2 Case Study Questions

There are several levels of questions which can be made use of when the case study takes place. The questions are based on Yin (Yin 2009, p. 87):

1. Level 1: Questions asked specific interviewees.
2. Level 2: Questions asked for the individual case.
3. Level 3: Questions asked for pattern findings across multiple cases.
4. Level 4: Questions asked to the entire study.
5. Level 5: Normative questions about policy recommendations and conclusions.

According to Yin it is the level two questions that are mostly used. The level two questions have to be emphasized in the Case Study protocol.

4.3 Screening the cases

The architect has to screen the cases he or she has access to. It is vital to choose the right case for the right study and therefore should the architect focus on identifying and controlling the cases at hand. For this a pilot case study can be a tool which can be applied and the findings of the pilot study can then become the ground for further case studies.

5 Collecting the Data

This chapter is based on Yin's chapter four. The chapter deals with how to collect data from the case organization. According to Yin there are six sources where the investigator (in this case the architect) can collect data.

There are two dominating forms to collect data. The first one is the quality approach and the second one is the quantitative approach.

5.1 *The Qualitative Approach*

This approach deals with that the sources are oral and there are fewer candidates since the data rather rich then it takes longer time for the investigator (architect) to get any meaningful data out of it. Qualitative data are typically interviews that are recorded, video filmed or collected by note writing at the interview. There are fewer candidates but the analytical resources needed to handle this form of data is harder.

5.2 *The Quantitative Approach*

This form of data handling is often done by surveys, structured interviews and questionnaires. These data are rarely rich on information however with enough candidates (subjects) then the data can be analyzed statistically. This form of data analysis is easier than with the qualitative approach; however it is often harder to create any form of meaning by using this approach.

The architect can make use of both approaches for a case study; never the less when it comes to a single case organization then it might be better to make use of the qualitative approach and if it is an analysis of multiple cases then the quantitative approach have its advantages.

5.3 *The Six Sources*

Yin identifies six sources which the architect can make use of. The sources are dealt with below. The six sources are based on Yin's definition (Yin 2009, p. 102).:

5.3.1 *Interviews*

The first data source is the interview. The interview is normally considered a qualitative form of data. This means that the architect has to make use of a certain amount of time to organize and analyze the data.

There are several interview forms that can be made use of when the architect is about to collect data

from a case study:

- Open interviews.
- Semi structured interviews.
- Structured interviews.

When choosing this source then the architect should be aware of the advantages and disadvantages. The advantage by using this source of data are the case questions. This leads to the advantage on finding causal actions and references. The disadvantages by using this source of data are that the data might be biased due to badly articulated questions and it might become a situation where the architect might get the data the architect wants to hear.

5.3.2 Documentation

Documentation can be reports, documents, diagrams (flowcharts), network documentation, contracts, cash flow reports, memos etc.

This data source have advantages and disadvantages. First I will deal with the advantages. The advantage the architect can gain by using this source of data are that the source is rarely created for the sake of the case study, the data source can most likely give the architect an overview of the situation in the case organization. There are however also some disadvantages by using the data source. The disadvantages are that the relevant documents, reports can be hard to find and if the architect has an incomplete archive then it might lead to an unfortunate bias.

5.3.3 Records from archives

The archives don't have to be within the organization but it can be from the local library or from the media. The records from the archives suffer from the same advantages and the disadvantages as the documentation.

5.3.4 Direct observations

Direct observation is based on that the architect is out in the case organization and observe what happens and use his or her judgement to capture what is necessary to continue the study.

This leads to that the collected data might become biased as result of the personal judgement.

5.3.5 Physical artifacts

Might show how the case organization operates and might prove to become insightful into how the

organization operates. There are however some disadvantages which needs to be taken into consideration. The are two disadvantages that are relevant 1) availability and 2) selectivity.

5.4 From a Coherency Management Point of View

Since Coherency Management is based on the concept of Enterprise Architecture and that leads to the idea that Zachman proposed regarding layers of an organization.

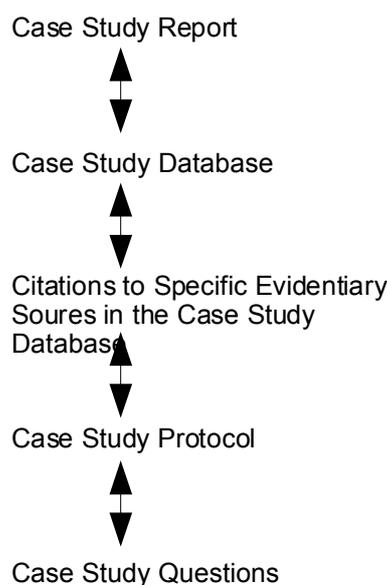
Therefore should the architect focus on what data sources that are usable for his or her case study e.g., documentation should give the architect a good idea on how the information layer and the technical layer works. The interview forms give the architect the possibility to uncover problems and mismatch among the layers.

The records from the archives give the architect a good idea on how the organization has developed over time.

That should give the architect a usable overview of how the organization has been able to construct its layers and what the individuals in the organization have contributed with.

5.5 The Chain of Evidence

The chain of evidence has to support the conclusions. Therefore should the architect make sure that the chain of evidence be established and maintained during the case study (please see drawing 1).



*Drawing 1: The Chain of Evidence
According to Yin*

To establish the chain of evidence then a database has to be created to contain the case study data.

5.6 *The Case Study Database*

A case study database is the collection of evidence the investigator (the architect) has collected during his or her research.

The database doesn't need to be electronic but it has to contain the documents, data and other evidence which has been collected by the architect.

6 Analyzing the Collected Data

This chapter has been based on Yin's fifth chapter.

I will in this chapter focus mainly on the four general strategies which Yin presents and then handle the analytical techniques.

6.1 *The Four General Strategies*

Yin presents four general strategies for how to approach and handle the evidence (data) collected by the Architect. The four strategies are handled below.

6.1.1 **The Theoretical Propositions Strategy**

This is the most common used strategy. The strategy deals with using the techniques, tools and world view the theory the architect has made use of in design his or her questions of which were made use of while the architect collected his data

6.1.2 **Developing a Case Description**

If the architect experience problems with applying the first mentioned strategy then the development of a case description might be preferable. This strategy is an alternative to the theoretical propositions strategy and when applied it is often considered as evidence for that the initial case questions weren't based on theory.

6.1.3 **Applying Quantitative and Qualitative Data**

This strategy can prove to become an advantage for the architect if he or she is experienced with the case study technique. Yin is of the opinion that the quantitative data if the quantitative data has to cover behavior or events that the case study is trying to explain and second the data has to cover an embedded unit that can be related to the analysis.

6.1.4 **Examining Rival Explanations**

The fourth and last strategy deals with examining other explanations or theories of how the evidence in the case is related and interlinked. When the rival explanations are examined then it can uncover flaws in the evidence or uncover new relations.

This moves us on to the analytical techniques.

6.2 *The Analytical Techniques*

Yin proposes five techniques that can be used to analyze the data the architect has collected.

6.2.1 Pattern Matching

The pattern matching approach deals with identifying patterns in the evidence (data) the architect has collect through his study of a phenomenon, organization or other. Yin are pf the opinion that simple patterns can also be uncovered and applied.

6.2.2 Explanation Building

This form of analysis deals with creating causal links among the various forms of evidence and by that explaining what happened and why.

6.2.3 Time - Series Analysis

According to Yin there are there two different approaches to time series analysis. The simple time series analysis and the complex time series analysis.

The simple time share analysis is based how the case organization has developed over time. Normally the simple share analysis is like applying the pattern matching.

6.2.4 Logic Models

Establishing a logical model explaining how the evidence is linked (the chain of evidence). The logical model has to explain the evidence and create casual links.

6.2.5 Cross Case Synthesis

This form of data analysis is suitable for studies that contain more than one case organization.

6.3 *The Coherency Management Point of View*

The coherency architect will most likely focus on the pattern matching for his or her study of the case organization never the less focus on how the data can be analyzed and patterns and meanings can be found.

7 Appendix

Yin, R.K., 2008. *Case Study Research: Design and Methods* Fourth Edition., SAGE Publications Inc.