**LEHRSTUHL FÜR STEUERUNG
INNOVATIVER UND KOMPLEXER
TECHNISCHER SYSTEME
STEFAN VERWEIJ, M.SC.**

Education Program SS 2015

Seminar: **Qualitative Comparative Analysis**

> **Room:**   F21/03.01
> **Time:**   Monday, 16-18 h
> **Start:**   13th of April 2015

Description:
As students of the governance of complex systems, we often use case study methods to analyze and understand our objects of study. This is for good reasons: it allows us to dig into the in-depth, unique details that explain their (in)effective governance. For instance, a case study of a public-private partnership in developing a road or rail system allows us to understand the unique complexities and difficulties of actors trying to cooperate across public-private boundaries in the project, and how these actors try to deal with the dynamic and uncertain sociopolitical contexts with which they are confronted. Although insightful, the problem of case studies is that they lack generalizability. This makes it difficult to use the case study insights to improve the governance of other (future) cases: what can an in-depth study of a unique road or rail project tell us about how we can improve the governance of another (future) project? On the other side of the spectrum are quantitative, large-n approaches. These are useful for generalization, but often ill-suited for analyzing and understanding the unique complexities of our cases.

A method in the social sciences that is becoming increasingly popular is qualitative comparative analysis, abbreviated as QCA. This method strikes a balance between the advantages of case studies and those of quantitative, large-n studies. This makes it very suitable for analyzing the governance of complex systems. In this hands-on seminar series, we will delve into the relationships between complexity and QCA, understanding why and to what extent QCA is an appropriate method for studying the governance of complex systems, and learn to apply QCA in a concrete research project.

This seminar series also bears relevance for students beyond those who are interested in the study of the Governance of Innovative and Complex Technological Systems. As QCA is rapidly establishing itself as a major method in the political science and public administration playing fields,[1] this course is of great value for students who consider doing case study projects for other purposes (e.g., Bachelor- and Master-program projects) as well. This course will familiarize us with the basics of the whole QCA process.

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1 Rihoux et al. (2013). From niche to mainstream method? A comprehensive mapping of QCA applications in journal articles from 1984 to 2011. *Political Research Quarterly 66 (1), 175-184.*

Course Objectives

There are various types of learning objectives, which are hierarchically structured in six levels:[2] remembering (level 1), understanding (level 2), applying (level 3), analyzing (level 4), evaluating (level 5), and creating (level 6). This course covers the variety thereof.

Level	Objective
2. Understanding	Explaining the basic properties of the governance of complex systems and the methodological challenges associated with this.
3. Applying	Conducting a QCA research project.
4. Analyzing	Identifying and interpreting necessary and/or sufficient (combinations of) conditions for the (in)effective governance of the projects.
5. Evaluating	Appraising the advantages and limits of QCA for studying the governance of complex systems.
6. Creating	Designing a QCA research project.

Mandatory Course Materials

- Schneider and Wagemann (2012). Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis. Cambridge: Cambridge University Press. The book is available on the publisher's website or at online booksellers.
- Academic articles, which will be made available through Virtual Campus.
- QCA software, available through www.compasss.org.

Please note that it is important that you have read the prescribed literature prior to the classes.

Estimated Workload

Workload:	6 ECTS, 180 hours, 14 lectures
Calculation:	Course attendance (14x2h) approx. 30 hours
	Literature study (14x3h) approx. 40 hours
	Research project approx. 110 hours

Contact Details

Email:	stefan.verweij@uni-bamberg.de
Web:	www.stefanverweij.eu
Office:	Feldkirchenstraβe 21, Room F21/03.69
Speaking Hours:	Tuesday, 10:00h-11:00h
Virtual Campus:	Qualitative Comparative Analysis

The syllabus may be subject to changes by the instructor

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2 See e.g., Kallenberg et al. (2014). Leren (en) doceren in het hoger onderwijs. Den Haag: Boom Lemma Uitgevers.

Research Project and Grading

To successfully conclude the course, you are asked to actively participate, to read the prescribed literature prior to each class, and to pass the final exam in the form of a report, written in proper English, about your research project. The report will be graded.

In the research project, we will learn the basics of creating a QCA study, and of applying QCA for the study of the governance of complex systems, focusing on complex infrastructure projects as a specific case of such systems. The comparative analysis of the cases allows us to identify necessary and/or sufficient (combinations of) conditions for explaining the effective or ineffective governance of the projects. Based on our acquired hands-on experience with the approach, and based on our reading of literature, we will be able to evaluate the pros and cons of (various) QCA (types and techniques), and understand how and to what extent QCA is an appropriate method for the study of complex systems.

Substance of the research project: large infrastructure projects

In the project, we will focus on a specific kind of complex system: infrastructure projects. These projects often cost large sums of public money, take a long time to be completed, require many public and private organizations with different interests to cooperate, and have significant economic, social, and environmental impacts that go beyond the boundaries of the project itself. For instance, the Øresund Link between Denmark and Sweden cost over € 4 billion, took 15 years from initiation to completion, and led to fierce public debates about the environmental impacts of the project.[3] The project does not only have a significant impact on the context; the context also influences the project. For instance, as people and organizations are affected by the project, they may try to block it, or otherwise try to influence its development.[4] The complex combination of all these factors makes the effective planning, organization and management of these projects a daunting task.[5] By comparing multiple projects, we will explore which (combinations) of such project and context factors may be necessary and/or sufficient for (in)effective governance.[6]

Some ideas and starting points for cases and case data can be found e.g., here:
- The OMEGA project at the Bartlett School of Planning.
- The European Union Cost Action on Megaprojects.
- The NETLIPSE program.

Content of the research report

The research report contains at least, but is not necessarily limited to, the following four elements:
- The introduction to the research project. This contains the research objective(s) and question(s) of the study.

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3 Dimitriou (2014). What constitutes a 'successful' mega transport project? Planning Theory and Practice 15 (1), 389-392. See also: Khan, Petterson, and Holmberg (2014). Constructive conflicts in the case of the Öresund Link. Planning Theory and Practice 15 (1), 418-423.

4 E.g., Verweij (2015). Achieving satisfaction when implementing PPP transportation infrastructure projects: A qualitative comparative analysis of the A15 highway DBFM project. International Journal of Project Management 33 (1), 189-200.

5 Dimitriou (2014). What constitutes a 'successful' mega transport project? Planning Theory and Practice 15 (1), 389-392.

6 E.g., Verweij et al. (2013). What makes governance networks work? A fuzzy set qualitative comparative analysis of 14 Dutch spatial planning projects. Public Administration 91 (4), 1035-1055.

- The research design. This concerns a description and substantiation of (a) the theories or concepts that have been used, (b) the case selection, (c) the casing (selection of conditions and outcome that constitute a case), and (d) the approach, methods and techniques (including software) that have been used for data-collection and -analysis.
- The case analysis. This concerns a description and substantiation of the various choices in the QCA process, concerning at least (a) calibration (and recalibration), (b) truth table analysis (and reanalysis), and (c) the interpretation of the results.
- Discussion and conclusions. This is based on the course literature and on your experience in the research project. It contains at least (a) the conclusions and limitations of the research, (b) a reflection as to how and to what extent QCA is suitable for studying the governance of complex systems, and (c) a reflection on the advantages and limits of the (specific) QCA approaches and techniques.

Organization and planning
- You will have ample freedom to pursue your own interests: you will formulate your own research questions, and select your own cases and conditions (see the above suggestions for cases and case data).
- To keep the project manageable, I advise you to keep the number of cases and conditions limited. Conditions can include a mix of project and context factors.
- The deadline for the final report is **July 19th 2015**. We will have plenary discussions about the progress of your research projects at two moments.
  - Week 6, May 18th. Send me your work no later than **May 14th**.
  - Week 13, July 6th. Send me your work no later than **July 2nd.**

You can of course always contact me by email or during the speaking hours if you have additional questions or need help with the research project

Program and Reading Guide

This program and reading guide briefly describes the content of each class. It also states the objectives for each class, and to which of the five course objectives (see above) these sub-objectives relate.

Please note that you are expected to have read the below prescribed literature prior to the classes.

1. April 13th   Introduction: the challenge of studying the governance of complex systems

What makes the governance of complex systems, such as large public infrastructure projects, so challenging? In this first class, we will delve into this question. We will discuss features of complexity, and aim to comprehend why QCA is suitable to study the governance of complex systems. I will also introduce the research project, and course organization and planning.

Class objectives:

Level	Objective
1.	Describing the basic properties of the governance of complex systems.
2.	Explaining the methodological challenges resulting from the properties.
1.	Describing the basic features of QCA.
2/5.	Explaining how and to what extent QCA answers to the methodological challenges.

Related course objectives: understanding (level 2), and evaluating (level 5).

Literature: Befani (2013). Between complexity and generalization: Addressing evaluation challenges with QCA. Evaluation 19 (3), 269-283.
Verweij and Gerrits (2013). Understanding and researching complexity with qualitative comparative analysis: Evaluating transportation infrastructure projects. Evaluation 19 (1), 40-55.

2. April 20th   QCA research approach: the process of doing a qualitative comparative analysis

QCA is first and foremost a research approach. It involves a research cycle of multiple, iterative steps that lead to increasing knowledge of the governance of complex systems. We will discuss two examples of QCA studies (the two articles below) in order to get a first hold on the basic steps in a QCA process.

Class objectives:

Level	Objective
1.	Describing the basic steps involved in a QCA research process.
2.	Explaining how the steps in the QCA research process help the study of the governance of complex systems.
2.	Identifying the design requirements for the QCA research project associated with the steps in the QCA process.

Related course objectives: applying (level 3), evaluating (level 5), and creating (level 6).

| Literature: | Delhi, Mahalingam, and Palukuri (2012). Governance issues in BOT based PPP infrastructure projects in India. Built Environment Project and Asset Management 2 (2), 234-249.
Verweij and Gerrits (2015). How satisfaction is achieved in the implementation phase of large transportation infrastructure projects: A qualitative comparative analysis into the A2 tunnel project. Public Works Management & Policy 20 (1), 5-28. |
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3. April 27th   QCA research approach: set-theory

In the previous class we gained an idea of the basic process of QCA. In this class, we will start to delve into the underlying theoretical ideas of QCA: set-theory, and Boolean and fuzzy algebra. We will talk about what sets are, how our cases have membership in sets, calibration, and the notations of and operations between sets.

Class objectives:
Level	Objective
2.	Explaining what sets are, how cases have membership in sets, and how set membership is calibrated.
2.	,Explaining the notations and operations in set theory.

Related course objectives: applying (level 3), and creating (level 6).

| Literature: | Schneider and Wagemann (2012). Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis. Cambridge: Cambridge University Press.
Parts: Introduction, Chapter 1, Chapter 2 |
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4. May 4th   QCA research approach: complex causality

Now that we know that QCA is a set-theoretic approach, we come to one of the most interesting features of set-theory for the study of complex systems: it allows us to study complex causality. In this class we will learn what complex causality is, and how it is fundamentally different from correlations.

Class objectives:
Level	Objective
2.	Explaining and identifying sufficient conditions.
2.	Explaining and identifying necessary conditions.
2.	Explaining and identifying complex causality.

Related course objectives: applying (level 3), analyzing (level 4), evaluating (level 5), and creating (level 6).

| Literature: | Schneider and Wagemann (2012). Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis. Cambridge: Cambridge University Press.
Parts: Chapter 3 Last Updated: March 25th 2015 |
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5. May 11th   QCA: truth tables 1

In this class, we will further familiarize ourselves with one of the core concepts in QCA, the point at which 'QCA as an approach' (classes 2 to 4) meets 'QCA as a technique': the truth table. From the previous class

we learned what complex causality is, and now we will learn how it can be analyzed across cases.

Class objectives:	Level	Objective
	2.	Explaining what a truth table is.
	3.	Constructing a truth table.
	3/4.	Analyzing a truth table.

Related course objectives: applying (level 3), analyzing (level 4), and creating (level 6).

Literature: Schneider and Wagemann (2012). Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis. Cambridge: Cambridge University Press. Parts: Chapter 4

6. May 18th   Research project: presentations and discussion

In the first five classes we learned about the basic aspects of the QCA research approach, and how QCA might aid our study of the governance of complex systems. In this class, you will present your plans (the first two elements of the **Content of the research report**) for your QCA research project into infrastructure projects, which we will discuss with each other. Your concept reports will be distributed amongst the class members on **May 14th.**

Class objectives:	Level	Objective
	6.	Composing a QCA research question.
	6.	Composing a QCA research design.
	5.	Evaluating the quality of QCA research questions and designs.

Related course objectives: applying (level 3), and creating (level 6).

Literature: Schneider and Wagemann (2012). Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis. Cambridge: Cambridge University Press. Parts: Section 11.1 up to and including 11.1.4, Section 11.3 up to and including 11.3.2

7. May 25th   Research project: no class

Because of Pentecost, there is no class this week. You can work on your research projects: refining the research objective(s), question(s) and design discussed in the previous class, continuing your data collection, and -analysis, and continuing the casing. I will be available for questions by email.

8. June 1st   QCA: truth tables 2

When we analyze truth tables, we often run into problems because truth table rows are covered by cases that have contradictory outcomes (logical contradictions), or because they are not covered by (enough) cases (limited diversity). Utilizing an example, in this class we will learn to identify and deal with the first problem: logical contradictions.

Class objectives:	Level	Objective
	2.	Explaining and identifying logical contradictions.
	2.	Explaining consistency and coverage.
	3.	Calculating consistency and coverage.
	3.	Dealing with logical contradictions.

Related course objectives: applying (level 3), and analyzing (level 4).

Literature:	Schneider and Wagemann (2012). Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis. Cambridge: Cambridge University Press. Parts: Section 5.1 up to and including 5.3, Section 5.6 Verweij, Klijn, Edelenbos, and Van Buuren (2013). What makes governance networks work? A fuzzy set qualitative comparative analysis of 14 Dutch spatial planning projects. Public Administration 91 (4), 1035-1055.

9. June 8th   QCA: truth tables 3

In the previous class we discussed the issue of logical contradictions in analyzing a truth table. Today, utilizing an example, we will delve into the issue of limited diversity.

Class objectives:	Level	Objective
	2.	Explaining and identifying limited diversity.
	2.	Explaining and identifying the sources of limited diversity.
	3.	Dealing with limited diversity.

Related course objectives: applying (level 3), and analyzing (level 4).

Literature:	Schneider and Wagemann (2012). Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis. Cambridge: Cambridge University Press. Parts: Chapter 6 Gross and Garvin (2011). Structuring PPP toll-road contracts to achieve public pricing objectives. Engineering Project Organization Journal 1 (2), 143-156.

10. June 15th   QCA software: Tosmana

Up to this point, we have dealt with all the basic steps and elements of the QCA research process. Today, we will go through the technical parts of the process (i.e., from data matrix to solution formula; Chapter 7 in Schneider and Wagemann's book) with the Tosmana software, one of the available QCA software packages, by reproducing the analysis by Verweij (2015).
<u>Note:</u> download the Tosmana software on your laptop and bring it with you to class.

Class objectives:	Level	Objective
	3.	Constructing a truth table with Tosmana.
	3/4.	Analyzing a truth table with Tosmana.
	3.	Discussing the pros and cons of the Tosmana software.
	4.	

Related course objectives: applying (level 3), and analyzing (level 4).

Literature: Schneider and Wagemann (2012). Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis. Cambridge: Cambridge University Press. Parts: Chapter 7

Verweij (2015). Achieving satisfaction when implementing PPP transportation infrastructure projects: A qualitative comparative analysis of the A15 highway DBFM project. International Journal of Project Management 33 (1), 189-200.

11. June 22nd   *QCA software: Fs/QCA*

Today, we will familiarize us with the fs/QCA software, the most used program by QCA researchers. Fs/QCA can be used for crisp-set and fuzzy-set analyses. Today, we attempt to reproduce the fsQCA research by Verweij et al. (2013).

Notes: it is important that you have looked through the fs/QCA User's Guide prior to class, and that you have downloaded the fs/QCA software on your laptop and bring it with you to class.

Class objectives: Level   Objective
                  3.   Constructing a truth table with fs/QCA.
                  3/4.   Analyzing a truth table with fs/QCA.
                  2.   Discussing the pros and cons of the fs/QCA software.

Related course objectives: applying (level 3), and analyzing (level 4).

Literature: Ragin and Davey (2008). User's guide to fuzzy-set qualitative comparative analysis. Available on: http://www.socsci.uci.edu/~cragin/fsQCA/.

Verweij, Klijn, Edelenbos, and Van Buuren (2013). What makes governance networks work? A fuzzy set qualitative comparative analysis of 14 Dutch spatial planning projects. Public Administration 91 (4), 1035-1055.

12. June 29th   *Research project: analyzing the truth table*

By now, you have been exposed to all the ingredients that you need to know of to perform a basic QCA study. Today, you will bring your own calibrated data with you (in the format of a data matrix) and try to analyze it in class. I will assist you in the process where necessary. The analysis is likely to indicate various issues that need to be solved. These can be discussed in class.

Class objectives: Level   Objective
                  3/4.   Analyzing a truth table.

Related course objectives: applying (level 3), and analyzing (level 4).

13. July 6th   *Research project: presentations and discussion*

Today, you will present about your research projects so far. On **July 2nd**, your concept research reports will be distributed amongst the class members. Your concepts reports and presentations will be reviewed by your colleague students, by assessing the QCA research projects against the standards of good practice in QCA.

Class objectives:	Level	Objective
	5.	Evaluating the quality of a QCA research project.
	5.	Evaluating the strengths and weaknesses of QCA for the study of the governance of complex systems.

Related course objectives: applying (level 3), evaluating (level 5), and creating (level 6).

Literature: Schneider and Wagemann (2012). Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis. Cambridge: Cambridge University Press. Parts: Chapter 11 up to and including Section 11.3
Schneider and Wagemann (2010). Standards of good practice in qualitative comparative analysis (QCA) and fuzzy-sets. Comparative Sociology 9, 397-418.

14. July 13th Wrapping up

In today's meeting, we will wrap things up and we address any remaining issues towards the completion of the research projects. The deadline for submitting your research reports is **July 19th 2015**.

Note:
This seminar series is taught in English. To successfully conclude the course, students will be asked to participate and to pass the final exam in the form of a written research report.

Registration:
Registration will be done during the first lesson.

Speaking hours:
Tuesday 10:00-11:00 a.m.