COMPUTER-AIDED SOCIAL INQUIRY

Overview
Governance and public decision-making is said to take place in an increasingly complex world. Actors operating in governance systems deal with a multitude of interlocking variables and that renders considerable uncertainty regarding the possible outcomes of certain decisions. It is therefore pivotal to obtain a better understanding of the systemic properties of certain policy issues and one's own position in the face of this complexity.

An increase in computational power and accessible software means that we have tools at our disposal to gain insight in the systemic complexities of governance issues. In this course, we will focus on Soft Systems Methodology and will learn how to use these tools as a means of knowledge creation, organizational learning and strategic positioning within complex systems. It offers a mixture of research methods, modeling and simulation, and interpretative analysis. The students will work on a small research project since that is the best way of learning to work with these tools. The research project encompasses: (a) identification of a governance issue, (b) data collection, (c) modeling, and (d) simulations of certain scenarios. Along the research process, we will discuss persistent issues such as complex causality, subjectivism, factors that influence organizational learning and issues related to strategy. Note that modeling is an iterative process so we will move back and forth in the research cycle.

Learning goals:
- To identify causes and consequences in complex governance issues
- To collect data and model data influencing such issues
- To simulate various scenarios in order to explore possible consequences of decisions
- To develop strategic proposals.

Test:
Students will be required to carry out a small research project and to report on this project. The research project encompasses defining a research question, the selection of a case, the collection of data, the identification of the main factors, the modeling of the system and the simulation of outcomes. The results of this will have to be written up in a report. This report will be graded. The deadline for submitting the report is *July 22nd, 2015*.

Literature (mandatory):
E-reader, available online through Virtual Campus.

Notes:
The course will take place in the Rechenzentrum because students will have to work with Vensim simulation software. A detailed user guide and good tutorials can be found at http://www.vensim.com/documentation/ Also: the seminar will be taught in English.

Registration:
Registration will be done during the first lesson.

Speaking hours:
Thursday, 02:00-03:00 p.m.

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DETAILED PROGRAM AND READING GUIDE

April 17th: Why computer-aided inquiry
Today's session will introduce the main subjects of the course. We will look into the arguments in favor of systemic approaches and we will discuss how the systemic properties of governance issues can be investigated. We will have a closer look at the core concept of this subject, namely feedback. Subsequently, we will also take a closer look at the ways in which the research project should be carried out. It will challenge students to develop skills at these levels.

Learning goals:
▪ To get a better understanding of this course
▪ To understand feedback loops through practical examples
▪ To suggest possible case for research

Literature for this session: none

Task for next week: find a suitable case study for your research project.

April 24th: Casing
This session will focus on the question: what is a case? Since your research project will be case-based, it is essential that you develop a better understanding of what constitutes a case in social science research. What properties does it have? At what level do we find cases? How can cases be scaled? Today, we will look into the characteristics of the case using the research objects you would like to focus on.

Learning goals:
▪ To define the core characteristics of case studies
▪ To make a reasoned choice for a certain case
▪ To explain why this case is a suitable case study

Literature for this session:
▪ Yin, R. (1989). Introduction: the case study as a research strategy. In: *Case study research: design and methods.* London etc.: Sage Publications
▪ Yin, R. (1989). Designing single and multiple case studies. In: *Case study research: design and methods.* London etc.: Sage Publications
▪ Vennix, J. (1996). Individual and organizational problem construction. In: *Group Model Building: facilitating team learning using system dynamics.* Chichester: John Wiley

Task for next week: define the central problem of your case.

May 2nd: What is the problem?
Please note that this seminar is on Saturday
Today we will consider the nature of the problem and the complexity of creating a problem definition. What constitutes a problem in complex systems? How does one recognize a problem? How does one define a problem? Using our definitions and prior knowledge of feedback loops, we will try to get better at formulating problem definitions and relating them to the myriad of factors that influence or drive the problem.

Learning goals:
- To formulate a problem definition
- To understand problems in terms of feedback loops

Literature for this session:
- Checkland, P. (1981). The development of 'soft' systems thinking. In: *Systems thinking, systems practice*. Chichester: John Wiley
- Sterman, D. (2000). The modeling process. In: *Business dynamics. Systems thinking and modeling for a complex world.* New York etc.: Irwin McGraw-Hill

Task for next week: try mapping the causes and consequences of the problem.

May 8th: Introduction to Vensim
This course combines analysis of empirical cases with modeling attempts using simulation software. Now that you have gone through some basic considerations regarding case-based research, it is time to get a first overview of the software. Vensim is an easy-to-use software package that will help you in developing a systemic understanding of your case. The purpose of this meeting is to acquaint oneself with the basic functions of Vensim. We will use Vensim PLE, which is a free student version of the package. It is available on the computers of the Rechenzentrum and can also be downloaded individually from www.vensim.com

Learning goals:
- To get a first overview of Vensim using practical exercises
- To get an understanding of how Vensim can be used for your case analysis

Literature for this session:
- None, but it is highly recommended to get an idea of Vensim through the online documentation or to follow some examples on YouTube, e.g. the short tutorial by Juan M Martín García or the movies by the Research Innovation Station. Another useful online guide can be found here: https://www.shodor.org/tutorials/vensim/pre.php Examples with which you can play around can be found in Vensim and additional and useful examples can be found here: http://shodor.org/talks/ncsi/vensim/

Task for next week: establish the kind of data you would need for your research.

May 15th: Data
We will take a closer look at data, data collection and the challenges of dealing with qualitative and quantitative data, that is: how they can be combined in one research project. The purpose of the session is to have an in-depth discussion of what constitutes data and data measurement in order to get a better understanding of how to handle data of all kinds and shapes.

Learning goals:
- To get a better understanding of what it means to 'measure something'
- To get a better understanding of what data is
- To obtain a clear idea about the kind of data necessary for your research

Literature for this session:
▪ Byrne, D. (2002). Interpreting the real and describing the complex: why we have to measure. In: *Interpreting quantitative data.* London etc.: Sage Publications
▪ Byrne, D. (2002). The nature of measurement: what we measure and how we measure. In: *Interpreting quantitative data.* London etc.: Sage Publications

Task for next week: start collecting data for your research

May 22nd: The challenges of data collection

We will discuss your first experiences with collecting data. What went well and what could have gone better? What kind of information did you find? How will you put this information to good use for your research? What characterizes your dataset in terms of diversity and coverage? It is essential for this session that you bring your data with you. You will be invited to give a short overview of your findings so that the other members of the group can think along.

Learning goals:
▪ To structure and understand the data through second opinions of the group
▪ To obtain directions for continuous data collection.

Literature for this session: none.

May 29th: Looking good: the art of modeling

We will start building the simulation using your data. This session centers on the conversion of data into the simulation. This requires the students to have (some) data ready to be modelled. We will do this in the Rechenzentrum. Students are encouraged to present their ideas to each other in order to get feedback on the ways in which the model should develop.

Learning goals:
▪ To gain experience with the conversion of data into a model
▪ To improve the model using feedback from the group

Literature for this session: none.

June 12th: no seminar

No session due to absence of the instructor. However, the computers at the Rechenzentrum will be available and students are encouraged to work on their model in preparation for the final part of the seminar series.

June 18th: no seminar

No session due to absence of the instructor. However, the computers at the Rechenzentrum will be available and students are encouraged to work on their model in preparation for the final part of the seminar series.

Task for next week: prepare a preliminary model to demonstrate during the session

June 26th: Show your models
This session is again dedicated to your (preliminary) models. Students will be asked to show their preliminary model and to explain what they have done and why they have done this. What are your impressions of your subject? Which patterns have you identified? Where are your blind spots? Other students will be invited to ask question about the model and to suggest alterations.

Learning goals:
- To gain experience in building simulation models using real data
- To improve the model through feedback from other students

Literature for this session: none.

Task for next week: try to assess the extent to which your model corresponds with the reality of similar cases, i.e. whether it has external validity.

July 3rd: Scenario testing
We will now return to the subject of complex systems and the feedback loops. We will try to play around with your models and see what they can do in terms of thinking about scenario planning. What do they tell you? How can these models be made more robust? How can they be calibrated and validated?

Literature for this session:
- Morecroft, J. (2007). Model validity, mental models and learning. In: *Strategic modelling and business dynamics*. West Sussex: John Wily & Sons
- Epstein, J. (2008). Why Model?, *Journal of Artificial Societies and Social Simulation* 11(14), http://jasss.soc.surrey.ac.uk/11/4/12/12.pdf

July 10th: What does it mean?
The central theme for today is the extent to which models give us access to reality. In other words: what does it all mean? We will have round-table discussion about these topics.

Literature for this session:
- Pondy, L. (1976). Beyond open system models of organization. Reprinted in: Richardson, K. and Goldstein, J. (2010). *Classic complexity. From the abstract to the concrete.* Litchfield Park, AZ: Emergent Publications.
- Flood, R.L. and Jackson, M.C. (1991). The nature of systems thinking. Chichester: Wiley

Task for next week: finish your model and research

Juli 17th: Final feedback
The session of today is a final non-mandatory opportunity to solicit feedback from the instructor for your report. All kinds of questions can be asked.

July 22nd: Deadline for your report

Your report is expected on July 22nd. There won't be any extensions of this deadline.