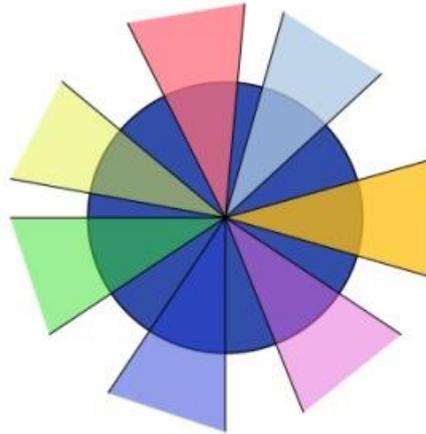


Book of Abstracts of the 27th EURO Conference of Operational Research
Glasgow 2015

Euro Working Group
Methodology of Societal Complexity (MSC)

Volume 30

Dorien DeTombe (Ed.)



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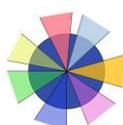
[The subject of Methodology of Societal Complexity \(MSC\)](#)

The Field of Methodology of Societal Complexity focuses on methodologies, methods and tools for analyzing, structuring, guiding and evaluating complex societal problems. Complex societal problems are often policy problems that can occur in many fields, like in the Agro-industry (Mad-Cow disease, BSE; Foot and Mouth disease; Fowl Plague), in the transportation sector, in healthcare (Malaria, HIV/Aids, Flu), in Water affairs and in economy (credit crisis). It focuses also on handling local safety problems like large city issues and natural disasters as flood and hurricanes and on global safety problems like war and terrorism. Although many of these issues have different causes, they have so much in common that they can be approached in the same way.

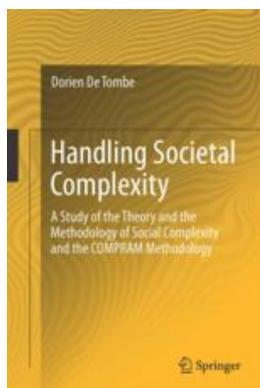
Complex societal problems are unstructured, dynamical, constantly changing and have a large impact on society on macro, meso and micro level. Handling complex societal problems needs a special multi-disciplinary approach. The content knowledge comes from content experts. The process knowledge comes from facilitators. The power is in the hand of actors. The attention of the research of Methodology of Societal Complexity is on the methods and tools facilitators need for guiding these kinds of problems. The facilitators use methodologies specially created for the field of societal problems combined with methods and insights derived from fields like medicine, law, economics, societal sciences, methodology, mathematics, computer sciences, technology, engineering sciences, socio-cybernetic, chaos theory and operational research combined with content knowledge. Often a combination of methods is needed.

The set of lectures presented on the 10th IFORS conference in Barcelona 2014 in the track of Methodology of Societal Complexity focuses on methodology of handling real life complexity with an emphasis on global safety, sustainable development, healthcare and economy.

Keywords: Methodology, Complex Societal Issues, Decisions, Sustainable Development, Healthcare, Economy



In the field of the International Research Society on Methodology of Societal Complexity a Handbook is published in 2015



Handling Societal Complexity: A Study of the Theory of the Methodology of Societal Complexity and the COMPRAM Methodology with Examples of Applications on Global Safety, by Dorien J. DeTombe is a handbook on the Theory of the Methodology of Societal Complexity. The book describes the theoretical development of the Field of the Methodology of Societal Complexity and provides the foundation for the application of the Compram Methodology, a methodology for policy making on handling complex societal problems.

Interesting for:

The book is meant for scientists, practitioners, politicians, master and PhD students in the field of Methodology, Social Sciences, Operational Research, Management and Political Sciences, as well as people who are professionally involved in handling complex societal problems. Complex societal problems are the problems on the front page of the quality newspapers. Complex societal problems have a huge impact on society, involve many phenomena and actors, and are therefore difficult to handle. The structured Compram Methodology gives guidelines to handle real life societal complex problems in a democratic, sustainable and transparent way based on a scientific methodology.

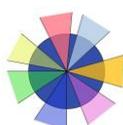
Examples of the use of the Compram Methodology are given in the domain of Global Safety on the subject of Healthcare, Economics, Climate Change, Terrorism, Large City Problems, Large Technological Projects and Floods.

Why a special methodology for handling societal complexity?

Understanding societal complexity is absolutely needed in order to develop a safer world. In the intertwined and global world of today there are many complex societal problems: world-wide and local problems; man-made and natural problems. Many every day real life problems are complex societal problems, which exceed the boundaries of the state.

How should complex societal problems be handled?

Complex societal problems should not be handled as domain specific problems, but as interdisciplinary societal problems. They must be treated as multi-disciplinary, multi-actor, multi-level and often as multi-continent issues.



These problems should be handled with a multi-disciplinary knowledge approach and a multi-actor power approach taken into account the emotional aspects of the problem and the problem handling process, including the micro, meso and macro level, using the methodology, methods, models and tools from the Field of the Methodology of Societal Complexity.

The Compram Methodology supports increasing the level of living

A good methodology like the Compram Methodology with its set of adequate methods, models and tools combined with an adequate training of policy makers improves the problem handling process and will increase the quality interventions and therefore the quality of life. Handling complex societal problems could save lives, trouble and money.

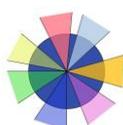
Handling complex societal problems remains complicated

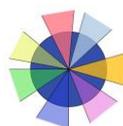
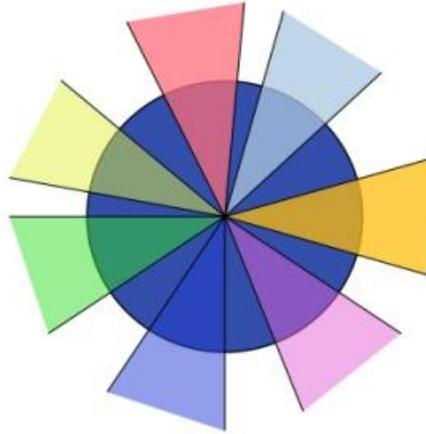
No matter how difficult, simple solutions are not the answer to these complex real life problems. The book explains why complex societal problems are so complicated and why a methodology like the Compram methodology should be used to analyze and guide these kinds of issues. The book indicates how to formulate policy on complex societal issues in order to generate sustainable interventions in a democratic way.

Content of the book

The theory is explained in chapters one to seven. Global safety is the central theme of the examples of how to use the Compram methodology in real life. The chapters eight to thirteen deal with different aspects of Global Safety: the HIV/Aids Problem, Sustainable Development, Climate Change, Credit Crisis, Large City Problems, Large Technical Projects and Floods. These chapters show how the Compram methodology can be used to analyze and handle Complex Societal Problems. Each chapter emphasizes different aspects of the Compram methodology.

Keywords: Complex Societal Problems, Compram, Methodology





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Chair Prof. Dorien DeTombe

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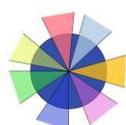
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I METHODOLOGY OF SOCIETAL COMPLEXITY AND ECONOMY

Chair Prof. Dorien DeTombe

I-1 Trap of Economics the World Has Fallen

Prof. Dr. Eizo Kinoshita
Urban Science Department, Meijo University, Japan
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Abstract

This paper is a survey of Kinoshita's Macro-Economic theory and new Macro-Economic paradigm. Throughout my study, I proclaim there are two economic phases: one is expressed primal problem, and another is expressed its dual problem. And I state that the two economic phases have duality relations. My theory reaches analysis of global trade, bubble economy and its crash. My main tools for the analysis are linear programming on operations research.

Keywords: Economic Modeling, Business Management

I-2 Societal Complexity and Legal Problem Solving

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Abstract

There are major real life problems in our society. Problems as poverty, violence against women and girls, war, terrorism, credit crisis, healthcare, sustainable development, cyber space and many more. Citizens, governments, legal practitioners and legal scientists overstate law as a means to handle these real life problems. What is the role of law in handling real life problems? In this paper we analyze legal problem solving, legal problems and legal solutions. We relate our findings to the theory of the methodology of societal complexity (DeTombe, 2015, 1994) to see what role law can play in handling real life problems.

Keywords: Societal Complexity, Legal Problem Solving



I-3 Taking Account of the Time in Economic Valuation Studies

Prof. Jerzy Sleszynski

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Abstract

Thanks to the new and very dynamic branch of environmental economics named economic valuation a lot of intriguing results was worked out and published enlarging our knowledge and understanding of non-market goods and services. Applying economic valuation methods, first of all direct valuation methods based upon questionnaire techniques, researchers measured consumers' willingness to pay for many goods which are not present on the regular markets and do not have price. This category includes also environmental goods and other benefits granted because of the biological production of small and large ecosystems. Unfortunately, time factor used to be intentionally marginalized in many valuation studies. This is why this article concentrates on a passive role and also on an active role played by time factor in economic valuation. The paper asks for a clear information about the date of implementation of valuation method and also for a more advanced representation of time in valuation research on natural capital. The paper proposes a brief analysis of time factor and discount rate applied to Cost-Benefit-Analysis. In addition, the paper enumerates facts and difficulties connected with adaptation of time factor to the assessment of benefits resulting from the functioning of ecosystems.

Keywords: Complex Societal Problems, Economic Valuation



II METHODOLOGY OF SOCIETAL COMPLEXITY AND HEALTHCARE

Chair Prof. Eizo Kinoshita & Prof. Cathal Brugha

II-1 Operations Research in Higher Education Complex Systems

Prof. Dr. Zilla Sinuany-Stern
Prof. Dr. Lea Friedman
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Abstract

We advocate the importance of using Operations Research (OR) methodologies in Higher Education (HE) for enhancing HE complex systems. Areas in HE where OR can be used include: facility planning and scheduling, faculty outputs and compensation, budgeting, quality assurance, international comparisons, ranking universities, students choice of institution, students admission. OR methodologies used for HE are: optimization models, scheduling, forecasting, simulation, Data Envelopment Analysis, game theory, multi-criteria decision analysis, etc. We will present a specific example of measuring the differentiability of faculty salaries in Israeli universities by rank, by institution, and by faculty outputs.

Keywords: Healthcare, DEA, Orthopedic Wards

II-2 Dependency on Computer Systems a Threat for Privacy and Safety

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Abstract

The last 25 years the world became increasingly dependent on computers. Electronic data exchange is imbedded in the world beyond excluding. Computers are a blessing and a threat. For many items the computer is very handy, but can also be a threat. People can easily be followed though their telephones, iPad and computers and data are collected by states.

Big brother is watching you is no longer Science Fiction. Social media enlarges the privacy vulnerability of men, women and children beyond control.

Next to this there is a huge dependency on computer systems for water and air supplies, hospitals, banking and military missions. The worldwide banking system is dependent on computer systems and we are dependent on these systems by manipulating the stocks by flash programs. These computer systems are easy targets for corruption, fraud and terrorism. Huge disaster scenarios are thinkable and possible.



We will address some issues of the vulnerability to computers in relation to safety and privacy by using the Compram methodology to analyze, define, and predict some of the (future) computer threats. In 2006 the Compram methodology, developed by DeTombe, is advised by the OECD to use as the methodology to handle global safety.

Keywords: Complex Societal Problems, Compram, Methodology

II-3 Exact Approaches for Patient Scheduling within a Private Surgery Department

Hejer Khelif Hachicha*

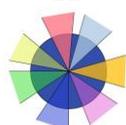
Farah Zeghal

*Industrial Engineering, Ecole Nationale d'Ingénieurs de Tunis, Université de Tunis El Manar, Tunisia, research member of UROASIS

Abstract

We study a patient scheduling problem arising in a private surgery department. It aims to optimize the resource utilization of the entire surgery process including pre-operative, per-operative and post-operative activities. The problem consists on scheduling surgery patients during one day period so as to minimize the completion date while considering hospital beds, operating rooms, recovery beds and surgeons preferences constraints. The problem is modeled as a hybrid flow shop scheduling with recirculation, dedicated machines, and simultaneous use of resources. We present two mixed integer linear programs. In the first one, the patients' assignment to resources and sequencing are expressed by a same decision variable whereas, in the second model, different variables are used for these two decisions. Both programs are solved using commercial optimization software CPLEX. Computational experiments are performed on real instances of a Tunisian private clinic: Clinique Ennasr and on randomly generated instances to evaluate and compare the effectiveness of the two proposed programs.

Keywords: Programming, Linear, Health Care Scheduling



III METHODOLOGY OF SOCIETAL COMPLEXITY AND HEALTHCARE

Chair Mr. Dr. Antoinette Muntjewerff

III-1 The complexity of Human Communication: order out of chaos

Prof. Cor VanDijkum
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Abstract

We developed a model for feedback loops in the exchange of information between two actors, for example a GP and his patient, or a teacher and a student. Feedback loops were constructed in that model, according to hypotheses about positive and negative feedback between the actors. For the actors themselves we supposed entangled ‘inner’ feedback loops between the information task and related psycho-social and control processes. Those processes were modeled with non-linear differential equations of logistic growth. In a number of simulation studies, using STELLA and Madonna, we proved at face value that this complex model fit patterns we found in video observations of the interaction between a patient and his GP as it was put in SPSS data (Dijkum et al 2008). To explore the model in a more methodological and fundamental way we reprogrammed the model in Matlab as an extension of a model that was explored earlier by Savi (2007). We did some experiments with the model in which we explored the interaction between the different components of the model, being in states of order and chaos (Dijkum & Lam 2010). The leading questions of the exploration for this paper are: (1) can a system of which the components are all in a state of chaos produce order; (2) how can this be interpreted for our model of human communication?

Keywords: Complex Societal Problems, Health Care Programming, Nonlinear

III-2 Contemporary Interdisciplinary Problems and COMPRAM Method

Prof. Nicolae Bulz
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Abstract

There is the knowledge nucleus: interdisciplinary links between the construction and praxis related to the sustainable development versus the construct sustainable survival and the profound possibilities of the Compram methodology. The construct sustainable survival belongs to the Contemporary Natural and Artificial Biodiversity set of problems – the Compram method belongs to the Professor Dr. Dorien DeTombe / <http://www.complexitycourse.org/doriendetombe.html> .

It is possible to detail the following steps of this research: The necessary and transferable university teaching experience regarding the Compram methodology. The affirmation on an



equivalence between: the concepts 'problem' and solve / solution across the Roman philosopher and mathematician Boetius' (ca. 480–524 or 525 A.D.) text of Consolation of Philosophy, and Methodology for Societal Complexity (COMPRAM). The interdisciplinary (open contributions) related to the understanding/explanation of the constructs: sustainable survival, Natural and Artificial Biodiversity, necessity and transferable university teaching and research experience.

Keywords: Complex Societal Problems, OR in Development, Expert Systems and Neural Networks

III-3 Optimization of an important moment in Compram method

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Abstract

Using Compram method often arise such a situation, when we need to pass the mentioned stage of investigation and go to the next one or change the decision inside the stage. I think it is important to determine the optimal moment such change so, that at the end the whole process optimally conduct the study.

Transition between stages of the studies, in Compram method, we call the set of information about the structure changing of the process, and the moment of time, when we should change the decision based on changes in the set of information, we call the structure change moment of decision-making process.

The task is the following: to manage set milestones and methods in Compram method and the entire process so, that each stage of the decision, overall, with the decision to be optimal and at the same time from one stage to the second stage of the transition moments are optimally be identified.

Keywords: Optimization, Stage of investigation, Decision change moment, Structure of decision, Transition moment.

III-4 Is the left-right alignment of parties outdated? The German case

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Abstract

The advocates of modern western democracy promote the viewpoint that the class division of the society is becoming outdated. We disprove this statement with an example of the German political space represented by 28 political parties who participated in the 2013 federal election. We consider the official party positions on 38 topical issues shortly before the election and locate the parties in this 38-dimensional political space. The statement in



question implies that parties (= party vectors) are scattered homogeneously, making a spherical cloud of `observations`. However, the prime component analysis reveals that the parties constitute a thin ellipsoid, whose first longest diameters, explaining 83.4% of the total variance, result in the party order which exactly corresponds to the left – right alignment. Basing on this empirical evidence for the left – right political spectrum with extreme and intermediate niches, we conclude that neither the left – right alignment of parties nor the class opposition is outdated.

Keywords: Complex Societal Problems, Economic Modeling, OR/MS and the Public Sector

