Concept for the Research Seminar "Sustainability, Environment, Management"

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Aim and methodology of the seminar

The concept of a *system* plays a prominent role in computer science when it comes to database systems, software systems, hardware systems, accounting systems, access systems, etc. In general, computer science is regarded by a majority as the "science of the *systematic* representation, storage, processing and transmission of information, especially their automatic processing using digital computers" (German Wikipedia). Also certain relevant professions such as the *system architect* are in high esteem by IT users.

However, the significance of the concept of system extends far beyond the field of computer science – it is fundamental for all engineering sciences and as *Systems Engineering* with the ISO/IEC/IEEE-15288 standard "Systems and Software Engineering", it is also the subject of international standardisation processes. Even more, the concept of systems also plays an important role in the description of complex natural and cultural processes – for instance in the concept of an *ecosystem*.

While classical TRIZ focuses strongly on instrumentally feasible engineering solutions, Systems Engineering "is an interdisciplinary field of engineering and engineering management that focuses on how to design, integrate, and manage complex systems over their life cycles. At its core, systems engineering utilizes systems thinking principles to organize this body of knowledge. The individual outcome of such efforts, an engineered system, can be defined as a combination of components that work in synergy to collectively perform a useful function." (English Wikipedia).

Earlier in this seminar, we had already studied more intensively different system concepts and, in particular, examined their application in complex socio-ecological, socio-economic and socio-technical contexts, see [1]. We observed that the central concepts of *transition management* and *activity management* addressed two different perspectives on structural change processes. In the transition management approach, the structural-transitional challenges are in the foreground, the activity management approach studies the implementation of structural changes via the actions and co-actions of actors and stakeholders.

In both approaches, however, the focus was on a holistic-structural and analytical view of a *decision preparation* rather than on practical procedural management approaches of *decision-making* and decision implementation in complex and contradictory real-world situations.

The WUMM project[1] aims at a better understanding of such management processes. Our starting point is TRIZ as a systematic innovation methodology derived from engineering experience in contradictory requirement situations. With the field of "Business TRIZ", which has been unfolding for about 20 years, a transfer of experience is being actively promoted, embedded in older management cultures and theories. A better understanding of such approaches to management issues and their connection to systemic concepts and approaches was in the focus of our seminar last summer semester.

In recent years, co-operative action by differently specialised experts has become increasingly important. In such interdisciplinary work contexts, the development of *common conceptual systems* of sufficient performance proves to be a difficult problem that can be supported by digital semantic technologies. Parallel to these challenges *agile approaches* play a major role, not only in the field of management, but also increasingly in the solution of socio-technical and engineering problems concerning ongoing co-operative actions in multi-stakeholder contexts – for example with the concept of *technical ecosystems*.

In the seminar, we want to learn more about such modern management appoaches in which *common conceptualisations* and *consensus-oriented decision-making processes* are central and of crucial importance for the success and ways of formation and consolidation of new systemic structures. We are particularly interested in the connection between the dialectical resolution of contradictory requirement situations in the sense of TRIZ methodology and the emergence of common conceptual and notational worlds as a result of the application of suitable semantic web technologies. A special emphasis will be put on the work of the *Methodological School of Management* and the Moscow Methodological Circle around G.P. Shchedrovitsky.

The seminar is a **research seminar** in which we jointly explore different aspects of co-operative action in different management concepts. With this seminar, we are approaching a topic that is new to us, which offers the opportunity to participate in a joint academic explorative process on a basis of equals. This bears opportunities, but also challenges. The students are expected to actively participate in the seminar through seminar discussions, presentations and last but not least by reading the relevant materials. For the successful completion of the seminar, a topic has to be presented as discussion leader and a handout of 2–3 pages on the topic has to be submitted in advance.

The seminar is accompanied by a **lecture** *Modelling Sustainable Systems and Semantic Web* (Thursdays 11-13 a.m.) in which important concepts of our interdisciplinary course programme such as

- technology as a whole of socially available procedural knowledge, institutionalised procedures and private procedural skills,
- sustainability requirements in systemic concepts,
- digital change and concepts of semantic web technologies,
- concept and knowledge formation processes,
- cooperative action, network economies and open culture

are developed in more detail. The lecture and the seminar are not directly related to each other, but conceptual frameworks developed in the lecture will be heavily present in the seminar. There is a slide stack [2] available from the lecture in the previous semester.

[1] WUMM stands in German for *Widersprüche und Managementmethoden* (Contradictions and Management Methods).

All materials and seminar reports that can be made publicly available, will be published in the github repo `https://github.com/wumm-project/Seminar-W21`.

Seminar Organisation

The seminar will be held weekly on Tuesdays 9-11 a.m. (Leipzig time) synchronously online. Prior to each appointment participants have to study the assigned reading to be in a position to discuss the problems in the seminar. The seminar is moderated by a *discussion leader*, who prepares a short workout of 2–3 pages and makes it available to the participants in advance *before the seminar* (by Sunday evening).

Students of Leipzig University find more about the seminar in the Saxonian e-learning platform OPAL[2]. The platform will be used for organisational purposes only. The **primary source for the seminar plan** is the (actual version of the) file `Seminarplan.md` in the github repository *Seminar-W21*.

Examination. Topics for Seminar Work

In order to be admitted to the examination, the seminar must be successfully completed, one of the seminars has to be moderated as discussion leader and for this seminar a short workout has to be prepared and made available to the participants.

Students who are enrolled in the 10-LP module "Semantic Web" must also successfully complete the TRIZ lab and then take an oral examination (30 minutes) in February 2022 about the acquired knowledge of concepts of systematic innovation methodologies and Semantic Web.

Students who are enrolled in the 5-LP seminar module "Applied Computer Science" have additionally to prepare a Seminar Work (about 20 pages) as examination. The work has to be completed until the end of the semester on March 31, 2022.

Privacy

We follow an Open Culture approach not only theoretically, but also practically and make course materials publicly available. This also applies to the course materials you have to produce (presentations, seminar papers) as well as to (annotated) chat sessions of the seminar discussions, in which your names are also mentioned. We assume your consent to this procedure if you do not explicitly object. The seminar discussions themselves are **not** recorded.

To simplify the further use of the materials and texts, the papers are asked to be compiled in English using LaTeX. Also the LaTeX source should be provided under the terms of the CC-BY[3] license in order to create a corresponding corpus of texts that can be used to accompany similar efforts in the OpenDiscovery project. Of course, this cannot be "decreed". **Please inform the seminar instructor if you do not wish to make your work available for exchange under these conditions**.

[2] `https://bildungsportal.sachsen.de/opal/` – Course W21.BIS.SIM.
[3] `https://creativecommons.org/licenses/by/4.0/`

Seminar plan

The seminar starts on October 12, 2021 with a kick-off meeting. The exact topics and themes will be published at the beginning of the seminar, when the number of participants can be estimated more precisely.

We assume that student participants will mainly prepare and present on different management topics. A non-exhaustive list of possible topics is compiled in the *Seminar Plan*.

References

[1] Hans-Gert Gräbe, Ken Pierre Kleemann (2020). Seminar Systemtheorie. Universität Leipzig. Wintersemester 2019/20 (in German). Rohrbacher Manuskripte, Heft 22. ISBN 9783752620023.

[2] Hans-Gert Gräbe (2021). Slide Stack to the Lecture. Leipzig University, Summer Term 2021.
`http://www.informatik.uni-leipzig.de/~graebe/skripte/S21-SW-Slides.pdf`