ISO 9000, Business Modelling and Software Management

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1 Once more about the goal of the seminar

Systematic innovation methodologies such as TRIZ are essentially based on a better understanding of the development dynamics of corresponding (technical and non-technical) systems. The results are rooted in engineering experience from structured processes of planning, implementation and operation of technical systems. Increasingly, cooperative interdisciplinary collaboration matters rather than the one brilliant mind that commands thousand hands. The socio-technical character of contradictions is thereby intensified and opens up new dimensions of contradiction management.

Today, managers face similar challenges when it comes to placing decision-making processes on a systematic basis, aligning the processes under control with long term goals, and also achieving the targeted goal corridors. It turns out that many engineering experiences on structured procedures in contradictory requirement situations can be transferred to this area, which has been investigated within the topic "TRIZ and Business" for 20 years.

Nevertheless, experiences and approaches to theories of systematic management are based more broadly and also have much longer historical traditions. *In the seminar*, we want to study this field more closely, with special attention to cooperative approaches in interdisciplinary contexts.

2 Systematic Management Basics

"*Systematic management* is an approach to management that focuses on the management process rather than on the final outcome. The goals to this approach to management were:

- To create specific processes and procedures to be used in job task completion.
- To ensure that organizational operations were economical.
- To ensure that staffing was adequate for the needs of the organization.
- To maintain suitable inventory so that the demands of consumers could be met.
- To establish organizational controls." [1]

These points require a *planned* approach, which requires a *linguistically formulated picture* of the process landscape as a suitably explicit form of description.

This linguistically formulated image – the *plan* – is in *contradictory tension* with the processes actually taking place: On the one hand, it has a controlling effect on these practices, on the other hand, those practices partially resist this control.

This difference must be fed back to the planning process as an *evaluation of experienced results* in order to limit the divergence between plan and reality.

Relating planning and experience dimension is only possible on a linguistic level and requires a *system of notions* to accompany the practical real-world development by a discursive process (as *practice of thinking*).

This system of concepts is more stable than the real-world practices, but it is not static – it develops together with the practices.

These basic considerations are about *processes* and *procedures* within an *organization*.

3 Organizations

What is an organization? Wikipedia distinguises between formal aud informal organizations.

Formal organizations. "An organization that is established as a *means for achieving defined objectives* has been referred to as a formal organization. Its design specifies how *goals are subdivided and reflected* in subdivisions of the organization. Divisions, departments, sections, positions, jobs, and tasks make up this work structure. Thus, the formal organization is expected to *behave impersonally* in regard to relationships with clients or with its members. [...] A *bureaucratic structure* forms the basis for the appointment of heads or chiefs of administrative subdivisions in the organization and endows them with the authority attached to their position." (Wikipedia, my emphasis)

Informal organizations. "[...] The informal organization expresses the personal objectives and goals of the individual membership. Their objectives and goals may or may not coincide with those of the formal organization. [...]" (Wikipedia)

The further explanations in Wikipedia remain weak and contradictory. Structure-building processes and especially shared conceptual systems also develop in informal organisations, with exciting new structuring processes of co-operative action taking place that are of particular interest to us in the seminar. Wikipedia is a reflection of the weakness of the conceptual basis in this field.

Also ORG – the *organisation ontology of the W3C* [2] – considers `org:OrganizationalUnit`, `org:FormalOrganization` and `org:OrganizationalCollaboration` as subconcepts of the concept `org:Organization` but does not mention informal organisations. In their definition an organization

> represents a collection of people organized together into a community or other social, commercial or political structure. The group has some common purpose or reason for existence which goes beyond the set of people belonging to it and can act as an Agent. Organizations are often decomposable into hierarchical structures. [2]

While in the Wikipedia definition positions, jobs and tasks are mentioned, but beyond bureaucracy no people, in this definition an organisation is a "community of people". However, it has a goal that does not result from the set of goals of the people involved, but is an

emergent function of the organization – the whole is more than the sum of its parts in the sense that relational synergy effects are of special importance in such an organization.

This corresponds closely with the *system concept in TRIZ*:

> A system (lat. greek "system", "composed", a whole consisting of parts; connection) is a set of elements that are interconnected and interact with each other, forming a unified whole that possesses properties that are not already contained in the constituent elements considered individually. [3]
>
> A *system* is a set of elements that are in relationship and connection with each other and that constitute a well defined unity, an integrity. The necessity of the use of the term "system" occurs when it is required to emphasize that something is large, complex, immediately not wholly comprehensible, but at the same time a unified whole. Unlike the notions "set" or "aggregate", the concept of a system emphasizes the ordering, the integrity, the regularity of construction, functioning and development. [5]

Ian Sommerville [4] also starts with the concept of a system and moves from there to the concept of *organisation*.

> A system is a meaningful set of interconnected components that work together to achieve a specific goal. [4]

Right after that comes a distinction between technical and socio-technical systems:

Technical computer-based systems are systems that contain hardware and software components, but not procedures and processes. ... Individuals and organisations use technical systems for specific purposes, but knowledge of that purpose is not part of the system. For example, the word processor I use does not know that I am using it to write a book.

Socio-technical systems contain one or more technical systems, but beyond that – and this is crucial – the knowledge of how the system should be used to achieve a broader purpose. This means that these systems have *defined work processes*, *human operators* as integral part of the system, are *governed by organisational policies* and are *affected by external constraints* such as national laws and regulations.

Essential characteristics of socio-technical systems:

1. They have special properties that affect the system as a whole, and are not related to individual parts of the system. These special properties depend on the system components and the relationships between them. Because of this complexity, the system-specific properties can only be evaluated when the system is composed.
2. They are often not deterministic. The behaviour of the system depends on the human operators and on other people who do not always react in the same way. Also, the operation of the system can change the system itself.
3. The extent to which the system supports organisational goals depends not only on the system itself. It also depends on the *stability of the goals*, the relationships and *conflicts between organisational goals*, and how people in the organisation *interpret those goals*.

References

[1] Rebekiah Hill (2015). Systematic Management: Theory, Overview.
https://study.com/academy/lesson/systematic-management-theory-lesson-quiz.html

[2] The Organization Ontology (2014).
W3C Recommendation. https://www.w3.org/TR/vocab-org.

[3] Vladimir Petrov (2020). Laws and patterns of systems development (in Russian). ISBN 978-5-0051-5728-7.

[4] Ian Sommerville (2015). Software Engineering. Chapter 19 „Systems Engineering“.
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https://www.slideshare.net/software-engineering-book/ch19-systems-engineering

[5] The TRIZ Ontology Project. https://wumm-project.github.io/Ontology.html.