ISO 9000, Business Modelling and Business TRIZ

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1 Dimensions of a Systemic Approach

The subject of our seminar are aspects of systematic management of planned cooperative action, especially in the form of entrepreneurial organisations.

We had approached the topic in the last seminar and identified as a meaningful starting point the concept of a **system**

- as a *whole* composed of *parts*
- with a *specific purpose* (a *main useful function* – MUF),
- which results from the *interaction* of the functionalities of the parts as an *emergent function*.

Systems thus have a structural, a functional and an operational dimension.

The **structural dimension** (structural organisation) is especially important for understanding the system as a white box (i.e. its implementation).

The **functional dimension** is a specific, complexity-reducing form of both the description and the real-world organisation of complex functional processes (procedural organisation) using the principle of encapsulation, which is also widespread in computer science.

Finally, in the **operational dimension**, the functions are linked with the resources required for their functioning and thus functions are transferred from a pure potentiality into a (potential) reality.

Operationality means that not only the MUF of the system is constituted from the functionalities of the parts in the way described in the procedural organisation, but that the system also creates the operational conditions for the functioning of its parts.

In this sense, the *world of technical systems* (lecture) is itself again a system, although structural and procedural organisation at the system level are largely unknown in terms of description. This system is a "self-moving automaton" in the sense of Marx's statement

> [. . .] set in motion by an automaton, a moving power that moves itself; this automaton consists of numerous mechanical and intellectual organs, so that the workers themselves are cast merely as its conscious linkages." (MEW 42, ch. 13)

This system functions "by itself" because the parts mutually produce their respective necessary operational throughput conditions. That system has **no external standpoint of planning** for this, but it does draw on external material and energetic resources.

2 Shchedrovitsky [1] on Organisations

What is an organisation? Shchedrovitsky [1, p. 30 ff] distinguishes three dimensions of that notion

- Organisational work
- Organisation as the result and means of organisational work
- Organisation as a form of life of the collective

Organisational work. When we organise we collect something. Let us take a look at design. We need some structural elements, so there is a designer with a set of elements. We must collect these elements in a particular way, and we must establish some kind of connection and relations between them. When we are doing this sort of work we must impose some organisational form on these elements. [...]

And when we have done such work on the integration of the elements and the establishment between them of certain relations and connections, we stop this work, and then the whole, which we have organised, can begin to operate according to its laws. But its action according to its laws no longer belongs to organisational work.

Organisers deal with a particular set of elements, collect elements of a certain type and form in particular quantities, combine them and set certain relations and connections between them. When they have done this and have thus created the structure of the organisation – and the structure is defined by the location of the elements and the type of connections and relations – they recede into the background, and this thing either remains dead or begins to operate according to its laws.

Organisation as the result and means of organisational work. Organisation as the result of organisational work can be regarded as both an **artificial entity** and as **naturally living thing**.

Who takes an artificial view of organisations? Organisers themselves. And those who design and create organisations always looks at them as their own creations. The organiser makes it, and in this sense organisations can be of any kind depending on the goals and objectives of the organiser. The main question is: why does the organiser create a particular organisation? [...]

The organisation acts here as an **artificial entity**. It has a purpose and can be considered, as can any structure, in terms of the functions that it, the organisation, must provide. So we are talking about the functions of the organisation, about the purpose of the organisation. These are all characteristics that are seen from an artificial point of view.

As a tool, as a means, **as an artificial entity, the organisation does not and cannot have goals**. Organisers can have goals. But for their goals, in relation to their goals, the organisations they create are a means, a means for them to achieve their goals.

Organisation as a form of life of the collective. The organisation has been created. And the organiser – a pure organiser, not a manager – has gone. The organisation has been created, and it has begun to live its own life. And then it turns out that, from a natural

point of view, other goals may appear in this organisation – the goals of the collective, which was organised. Generally, something quite different begins, inasmuch as this **organisation begins to live its own life**. Then we [. . .] must seek forms, methods, laws of the life of the groups and the collectives within organisations.

When the organisation is seen from a natural viewpoint, it is not yet the means, but the **form**, the **condition** of the life of the collective (the people) who work in it.

And it is even possible to see the organisation in the same way as we see the sunrise and sunset: the people working in it completely forget that the organisation was created by some other person to resolve particular objectives, achieve particular goals, for a particular purpose. It, this organisation, will be perceived by them like the movement of the heavenly bodies, as a natural condition of life.

3 Shchedrovitsky [1] on Management and Leadership in Organisations

Management. [. . .] Now a more complex case – a car. Here stands the car, you have not yet pressed the accelerator – can you manage it? You cannot. And when does it become possible to manage the car? When it has started moving.

Management is only possible in relation to objects that have self-propulsion.

Imagine a situation when you can control the flight of a chair. Imagine yourself in a brawl from The Three Musketeers: someone throws a chair, and instead of defending yourself from it, you send it flying the other way. You have performed a one-off, momentary act of management – you changed the direction of the flight of the chair. In this sense, you performed **management of this process**. But what were you managing? You were managing the flight of the chair, but not the chair.

Leadership. Leadership is only possible within an organisation, within the framework of special organisational connections. The essence of leadership is the **setting of goals and objectives for other elements**. But in order for you to set goals and objectives for other elements – in other words, people – they have to reject their own goals and objectives and undertake to accept your goals and objectives. And that is precisely what happens in the framework of the organisation.

The organisation of people always happens like this. The person who **occupies a certain position** gives up their own goals and objectives, their own self-propulsion (by the fact of occupying that position), and is obliged to move only in accordance with this position and with the goals and objectives that will be assigned to them through the channels of the organisation by higher authorities.

But since people are not always aware that they must surrender their own goals and objectives in carrying out their duties, and in addition, because people who have surrendered their own goals and objectives are usually not much useful for anything, the reality is that they only reject them within certain limits. Such is the game. They pretend that they are ready to give up some of their goals and accept other people's goals and objectives, and what they really mean to do is another question. They may temporarily conceal their own goals, but they may

use the performance of their official tasks to achieve their own goals.

When self-propulsion begins, leadership either becomes impossible or can only be carried out within a very narrow range, and the need for management appears. Leaders not only lead, but also need to manage, because their subordinates do not always entirely surrender their own goals, their self-propulsion. But when self-propulsion begins, it will not be possible to lead them. We have to use a different technique – the technique of management.

4 Systematic Management in Organisations

The subject of *systematic management* are socio-technical and especially socio-economic systems. The latter consist of economic units (companies, the state, ... – shortly **organisations**) that are interconnected in a market-like manner. The *world of economic units* has a systemic structure similar to the world of technical systems.

In the understanding developed above, **management** therefore means to *control* the processes taking place in the (living) organisation with the *goal* to implement the *purposes* of the organisation in an efficient way.

This is necessary to be operated on several spatio-temporal levels (micro and macro processes), whereby short term goals and long term goals are in contradictory tension. Therefore, management is usually divided into several relatively autonomous levels

- Strategic management
- Middle management
- Operational management
- Infrastructure management and support

which are themselves in systemic system-subsystem interrelations and thus in a co-evolutionary relationship which is best processed via a control loop designed as a feedback loop.

4.1 Systematic Management and ISO 9000

Systematic management requires a descriptive approach to this control loop as part of the organisation's process model, such as given in the modified process model of ISO 9000:2008.
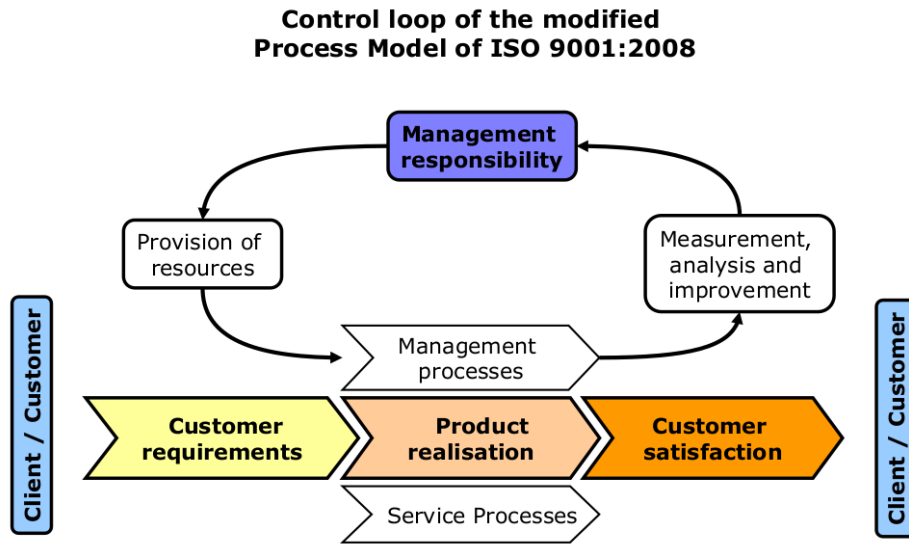
Control loop of the modified
Process Model of ISO 9001:2008

Fig. 1: Control Loop in the Modified Process Model of ISO 9000

ISO 9000 is a set of general quality assurance standards to **assess** the process quality of enterprises. It is a descriptive standard and not directed towards improvement of process quality (although can be used for such an improvement in combination with other tools).

- It is mainly a European standard.
- It is used mainly to assess the process quality of suppliers that demonstrate with a ISO 9000 certificate their ability to produce in a negotiated frame of time, costs and performance.
- Set of standards for the proof of process quality for the creation as of material so also of intangible products and services.
- Framework with a lot of leeway for corporate strategy and concrete management goals. Minimum requirements for a QM system according to ISO 9000: complete, documented, known, verifiable, evolutionary

ISO 9000 contains minimum requirements for the structural and procedural organization, so that quality is not a coincidence, but the result of a controlled process.

Note that the process model shown in fig. 1 is a *standard model* at a higher language level (**meta-model**) than the respective process models of the individual organisations, but unlike the process model of a real-world organisation, it has no real-world instantiation. Such a phenomenon is well known in computer science in connection with abstract classes.

Fig. 2 shows the relation between the ISO norm, quality management documents and real-world process quality at three different levels within a company.
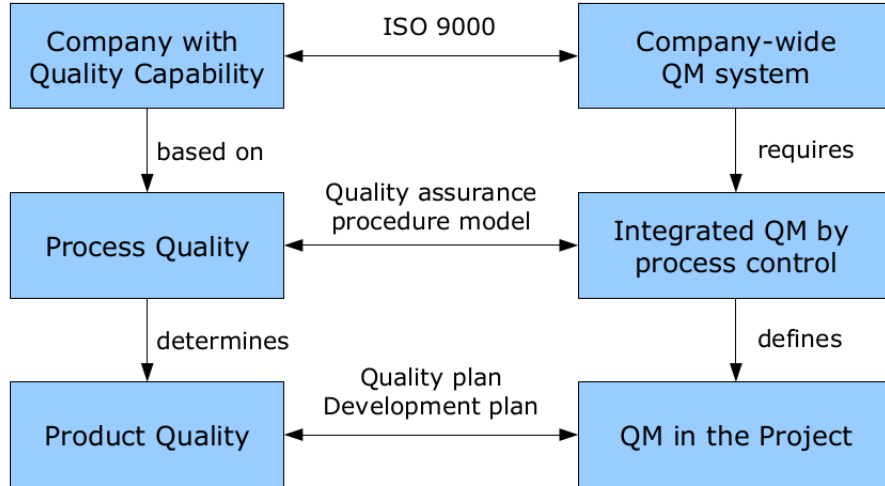
Quality Assurance according to ISO 9000

Fig. 2: The relation between model, meta-model and meta-meta-model in quality assurance

4.2 Managing Organisational Development and CMMI

Management is only possible in the context of a clear understanding of the structural and procedural organisation of the organisation. In order to capture this in descriptive terms, a **separation of functions and resources** is necessary. In particular, "human resources" are removed from the description and replaced by the term **role**.

In this way, a *functional decoupling from the resources* is achieved at design time – only at runtime this position must be connected "just in time" with a qualified resource that was produced beyond the horizon of the concrete planning processes.

Only with such a decoupling (and only at the level of such a decoupling) it is possible as management to take an external standpoint on its own activities. Only in this way is **structurally driven organisational development** possible. There are other culturally driven approaches such as TQM, which will be discussed separately (the Toyota model).

Systematic management through structurally driven organisational development means above all the creation and improvement of conditions for the management of well-structured processes.

CMMI (Capability Maturity Model and its predecessor CMM) is such a process model for organisations such as software companies that are project-driven and do not have a continuous production process. The model is a **maturity model** and supports such companies to introduce and improve a company-wide, uniformly structured project management

- from the structuring of individual projects into *process activities and milestones*
- through the definition of *company-wide uniform or specifically adaptable process modules*
- and the *uniform quantitative measurement* of such building blocks
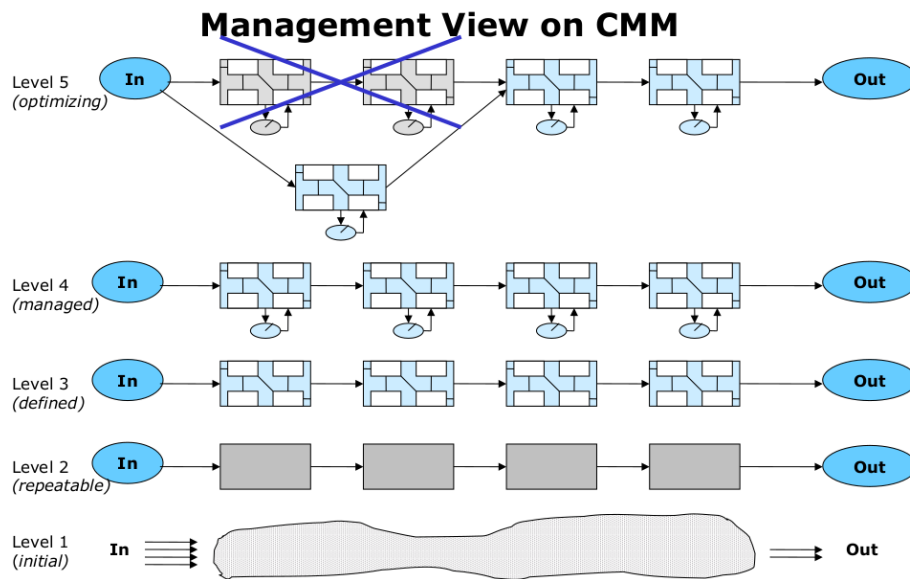- to the introduction of *qualified error and change management*.

Fig. 3: Increasing maturity of structured project management within CMM(I)

These four transitions are assigned five maturity levels. The transitions are supported by concentrating on predefined *key process areas* and *key practices*.

4.3 Optional: CMMI in more detail

4.3.1 The Maturity Levels

The five maturity levels according to which processes of an organization are evaluated.

Initial Process

- Process exists only informally
- Low adherence to deadlines and costs, high risk
- Chaos, "heroism", fire-fighting operations

Repeatable Process (CMMI: Managed)

- There are defined and structured requirements for the process
- "Learn from similar projects" (requirements management, project management and quality management)

Defined Process

- Procedures and individual process activities are clearly defined
- The organization is in the learning focus
- Process definition, training programs, team coordination

Managed Process (CMMI: Quantitatively Managed)

- Central control that systematically collects process measures
- Process and product development are quantitatively analyzed and rated
- Information is used as support for decision-making

Optimizing Process

- "Self-dynamically optimizing process"
- Process measures are systematically used for dynamic process control and monitoring
- Process change management
- Technology change management

4.3.2 Expectations

The higher the level of maturity,

- the more precisely goals are achieved.
- the less is the difference between the target and actual results.
    - Level 1 companies miss their deadlines at large.
- The fluctuation range of the actual values around the target specifications is lower.
    - Similar projects are completed within a narrower time frame.
- Costs and development time decrease, productivity and quality increase.
    - Higher process efficiency, low rework rate.
- Expectations are more likely fulfilled in standard projects.
- But: New techniques and applications are reducing the process capability due to higher variability.

4.3.3 Determination of the Maturity Level according to CMM

For each stage a number of **Key Process Areas** are defined in which an organization of this level has to reposition itself implementing appropriate given **Key Practices**.

Level 1: Initial Process

- No criteria and specifications
- Project and quality management may or may not exist but are not consistently applied.
- Projects are managed at short notice, adaptively and reactively.

Level 2: Repeatable (CMMI: managed) Process

Goal: Introduction of a basic project monitoring and management, planning and control.

Focus: Leadership principles, structure and management of projects.

Key Process Areas and Key Practices:

- **Requirements management**
  - Establish a common understanding between customer and project team about the requirements.
- **Project planning, tracking and monitoring**
  - Transparent presentation of the development progress in order to be able to initiate correction measures at early stage.
- **Sub-order management**
  - Select, control and monitor qualified sub-suppliers.
- **Quality management** on process and product level, configuration management
  - Ensure integrity of the products throughout their entire life cycle.

Result:

- Processes as a sequence of "black boxes" with milestones as checkpoints.
- Stable project management.
- Processes can be predicted within limits through constant monitoring.
- Cross-project experience can be quantified.

Level 3: Defined Process

Goal: Definition and introduction of an organization-wide valid unified software process; internal structure of the phases is defined and understanding of roles is visible.

Prerequisite: Projects are planned, managed and monitored (level 2) as a sequence of processes according to uniform principles.

Focus: Process descriptions.

Key Process Areas and Key Practices: Focus on process organization

- **Definition** of processes
  - Development and maintenance of a useful set of process values.
- **Training program**
  - An independent unit is responsible for employees' training.
- **Coordination** between project teams (exchange of experience)
- **Integrated SW Management**
  - Development and management are integrated into one over the entire life cycle defined process.
  - Standard processes can be tailored to projects.
- **SW Product engineering**
  - Process integrates all technical activities to ensure to produce correct, consistent products effectively and efficiently.

CMMI further subdivides some of the main process areas

- **Coordination**
  - Integrated team building
  - Integrated sub-order management
  - Decision analysis
  - Integration organization infrastructure

- **Integrated SW Management**
  - Integrated project management
  - Risk management

- **SW Product Engineering**
  - Requirements analysis
  - Technical solution
  - Product integration
  - Verification
  - Validation

Result: Improved, describable quality; institutionalised process prototypes that are maintained and further developed.

Level 4: Managed (CMMI: Quantitatively Managed) Process

Objective: Quantitative measurement of the quality of products and the productivity of processes through an organisation-wide metrics programme as an objective basis for decision making.

Prerequisite: Uniform understanding across the organisation about projects and process models (level 3) and active project management (level 2).

Focus: Process measurement.

Key Process Areas and Key Practices:

- **Quantitative process management**
  - Quantitatively control and monitor process performance.

- **Quantitative quality managament**
  - Develop quantitative understanding of product quality.

CMMI clarifies as follows:

- Quantitative project management
- Performance of organisational processes

Result: Time, cost and quality become fairly predictable.

Level 5: Optimising Process

Objective: Introduction of a continuous and measurable process for improvement of software development.

Prerequisite: Quantitative monitoring information (level 4) and application of innovative ideas and technologies.

Focus: Process alignment.

Key Process Areas and Key Practices:

- **Error avoidance**
    - Identify and eliminate causes of errors.

    Product innovation management
    - Integration of new technological developments at product level.

    Process innovation management
    - Identification of new, useful ideas and their orderly introduction.

CMMI specified:

- Organisation-wide introduction of innovations
- Analysis of causes and elimination of errors

References

[1] Victor B. Khristenko, Andrei G. Reus, Alexander P. Zinchenko et al. (2014). Methodological School of Management. Bloomsbury Publishing. ISBN 978-1-4729-1029-5.