

Toward a Holistic Anticipation (by Mulej's Dialectical Systems Theory)

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Abstract

Systems thinking fights onesided, biased, thinking because the latter causes complex and complicated consequences by (over)simplification of the observer's and/or decision maker's view at reality. Holism, which L. v. Bertalanffy decades ago has aimed at making a very broad new world view, has been found uncommon sense again and again, but also a necessity for mankind to survive. Specialists are unavoidable, but we/they tend to limit our/their view to a single selected viewpoint, which causes a fictitious holism rather than a Bertalanffian one. Interdisciplinary co-operation helps, but it requires consideration of interdependence of mutually different viewpoints. A methodology supportive of this consideration, is Mulej's Dialectical Systems Theory, and its applied methodology USOMID. They ease attainment of a requisite holism, which lies inbetween the dangerous fictitious holism and the unattainable total holism. Over 25 years of both theoretical and applied results speak for Dialectical Systems Theory as a useful tool for dealing with complex situation, events, and processes. Anticipation, be it computed or not, depends in terms of its quality on the holism if thinking and feeling of the persons working on it. Hence, it should not be provided with tools only, but also with capacity of holistic subjective starting points of those involved.

Key Words: Bertalanffy, Complexity, Dialectical Systems Theory, General Systems Theory, Interdisciplinarity, USOMID.

1 The Selected Problem and Viewpoint

Contemporary life is complex. So it is anticipation of the events to come. That's why many discuss modern trends in systems theory and its application. This is crucial: humans act somewhere between mastery and mystery, because we have to work and live with what we can not know, understand or manage holistically (Flood, 1999). This

is why the (General) Systems Theory was created, five decades ago. Unfortunately, it has not become a tool of a general use, but rather a topic of quite a few scientists and practitioners (Molander, Sisavic, 1994; number of journals on systems theory and professional literature, which is rather small, equally small number of conferences and attendees in these conferences; etc.). Even smaller is the number of new books on the General Systems Theory, while there are quite a number of the less general and more focused, applied, ones. One of them is Mulej's *Dialectical Systems Theory* (1974, and later).

The selected problem of this contribution is a brief look at the Dialectical Systems Theory (DST) as one response to some of GST's practical deficiencies¹. The selected viewpoint is presentation of the DST (and its applied methodology USOMID) as tool of coming closer to holism when dealing with complexity. Complexity is an attribute of situations, events and processes which are not simple due to their interactions among their elements and with their environment, by definition. This is what has been the basis for the notion of dialectics since ancient times (Vodnik, 1960; Bai, Lindberg, 1998; Delgado, Banathy, 1993; etc.). On the Latin rather than ancient Greek basis, dialectics is expressed with the notion of interdependence in a number of European languages.

2 Holism, Complexity and Thinking Styles

Humankind has gone through a number of different periods of life style including the thinking style. The dilemma can be grouped in two extreme alternatives: *onesided or biased versus holistic thinking*. The first one has always been more common, the second one frequently more needed. In ancient China, e.g., they were fighting one-sidedness and superficiality of thinking with their notion of «yin and yang» (see e.g.: Delgado, Banathy, eds., 1993): mutually different and opposing attributes are interdependent such as day and night, good and bad, etc. In ancient Greek culture, the more or less direct background of the European and hence the Western culture of today, they did the same fight with their notion of dialectics (see e.g.: Vodnik, 1960). Both ancient notions were rather superficial, on contemporary scientific terms, they lacked argument and background. In the idealistic dialectics of Hegel, the background was given more clearly, but in a not fully realistic way, as the name of his version of dialectics says itself. But his work (in early 19th century) was an essential contribution: after centuries of the medieval onesidedness he revealed interdependence of mutually different and opposing attributes. The period of half a century later on, was full of findings in both natural and social sciences proving that interdependence of the different ones (attributes, parts of nature, ideas etc.) is a fact and a basis of life processes. The only serious difference arising from the new findings was the extension of the notion of interdependence from the limited world of ideas (and ideas as independent causes of

¹ This paper may be considered a next step of our work after the paper by Mulej and Kajzer (1994) and Mulej and Kajzer (1998).

natural processes) to *the entire world* (including ideas; nothing is independent or unilaterally dependent, interdependence is natural) and its evolution (see: Engels, 1953).

Conclusion from the summarised facts:

- *complexity* surfaces from mutual impacts of the interdependent attributes / parts of one whole / different wholes as parts of a larger whole; in thinking it *is the opposite of simplicity*, which may forget about reality's complexity;
- complexity produces attributes, which single parts do not possess, but the new whole does because of relations resulting from interdependence and mutual impacting of parts; they are called *synergies, emergent attributes, systems*;
- from the first molecules and cells on, the *complexity* of life and of entities on the planet Earth *has kept growing* (Prigogine, 1999; Myers, 1991) and it grows beyond the human capacity to holistically understand the real complexity;
- humans tend to *simplify their pictures of reality* from the level of unknowable to the level of knowable; they / we try to cope with the growing complexity by
 - *specialization* into single professions and single parts of the planet Earth, which we choose to live in and work on;
 - *relying upon other specialists*, when we feel / know we need them;
- by simplification, *complexity* of the real life and its conditions tends to be *forgotten about*, which results in (un)pleasant surprises;
- over millenia, *new ways of handling complexity* have tended to be needed, to surface and disappear, due to the quite general human tendency of (over)simplification, until the surprises came to be too bad, which has caused a new need and chance for a rather realistic consideration of complexity to show up again, and a new method/ology/ to support it.

A common denominator of a realistic consideration of complexity might be called *holism*, which means the tendency to cover *all attributes* of a whole under consideration. In times of a rather local life, the whole under consideration has tended to be limited to the local community. In times of the market economy with a growing division of labour and lots of resulting trade between specialists, the whole under consideration tends to show up in two forms:

- the whole *limited* to one's own profession, organization and local community;
- the other whole *extending the limits* to many partners etc., all the way to the current globalization, or even Universe.

This duality causes the danger, that persons with a rather limited perception of the whole, i.e. biased, onesided persons, come to make an *impact beyond the limits of their perception knowledge*.²

² Managers of larger organizations, politicians of more or less all levels, etc., have a poor chance to know all the attributes of the situation when they make decisions. They have to rely on advises of their advisors

In the first half of the 20th century this danger culminated in an enormous three-parts crisis: two world wars and the big depression, i.e. the world wide economic crisis. After the 1st World War some thinking showed up, which they later on called a forerunner of systems theory. After the 2nd World War, Cybernetics and the General Systems Theory were formulated. Their aim was to help humans deal with complexity better (Elohim, 2000). *Specialization came to be unavoidable, so did holism*, otherwise would humankind hardly be able to survive³. The problem is really a complex one.

Nobody or nearly nobody is permitted to keep the old non-systemic culture due to the general globalization and growing complexity, in principle, everybody must make the *transition from the non-systemic and non-innovative culture to the systemic and innovative one*. But: what is its *methodology* supposed to be? There is no such thing as a free lunch, there is no such thing as a long-lasting cultural change made by a quick fix, there is no such thing as making an innovative economy with no deep cultural change, there is hardly a systemic culture without an innovative economy. (Mulej et al. 1992, Mulej et al. 1994, Dyck, Mulej et al, 1998; Afuah, 1998; etc⁴)⁵. Complexity of human life has grown a lot especially since they freed entrepreneurship in the West (and only in the West, then) in the second half of the 19th century (see: Rosenberg, Byrdzell 1986). From then on, the innovative culture has embraced 20% of mankind, the other 80% kept their old rather routinized culture and were left aside (Dyck, Mulej and coauthors, 1998).⁶ Now, their people keep going North-West, legally or illegally. Lack of systemic thinking on both parts of mankind is causing new complexities, in the homeland of systems and complexity theories, too, not only among the forgotten four-fifths.

and their own intuition, too. Time, profession and human nature do not allow for more. Total holism can not be attained.

³ Keeping the nuclear weapons out of use, over the last half a century, is a good case of a rather systemic (i.e. holistic) thinking about very complex matters, such as peace, cold war, technological and nontechnological inventions and innovations, high tempers with business persons, politicians and army commanders, etc. *On the other hand*, the need that United Nations claim «sustainable development» in a special conference and resolution (in 1992 in Rio de Janeiro) and keep following the track of action with a set of further conferences about parts of the same complex topic, is a sign that systemic thinking has hard times in its fight against biased, onesided interests, feelings, knowledge and thinking.

⁴ There are very many books, journals and conferences about innovation, now. But, a close to 100% majority of them come from the most advanced part of mankind, the West and Japan. They can hardly tackle problems of innovation in Central and Eastern Europe and in world's South with their specifics.

⁵ We better leave aside a global return to the preindustrial or even nomadic culture of a full and even passive adaptation of humankind to other parts of nature. This is no longer a feasible way of coping with complexity of the contemporary life, unfortunately. Humankind needs to find a way between too much onesidedness, which is a dangerous way of life, and a total holism of *thinking and feeling*, which cannot be attained any more, with all the contemporary and expectable amount of mankind's knowledge.

⁶ According to World Bank data, the difference between the extremes - the richest and the poorest country in terms of GNP per capita, has grown from 3:1 in mid 19th century to +150:1 in 1970, and to +400:1 in 1995. New kinds of complexity join the old ones all the time. Human thinking / knowledge management tries to follow.

3 Anticipation, Systems Theory, and Systems Thinking

Ludwig von Bertalanffy, the founding father of the General Systems Theory (GST), was a mathematical biologist. He discovered the human lack of care for holism, concerned with the *entire planet Earth*, and required such a broad holism as a *new worldview*. To him GST was not merely a methodology, even less a method limited to description of (parts of) reality (Elohim, 1999, quoting Davidson, 1983). Thus, Bertalanffy (rightly) required what we might call a «total-system approach». To most humans, this is more than they find requisite (i.e. both necessary, sufficient and possible) in their own work and life framework. The idea of the GST as a broadest worldview has, gradually, come to be a formal methodology which transfers some important insights from one specialised discipline to another and lets them benefit from transfers rather than from interdisciplinary cooperation (see: EMCSR etc., incl. EMCSR, 2000). A lot of benefit, but far away from Bertalanffy:

- Systems thinking, as the practice of holistic thinking, comes to be *partially holistic*.
- Systems theory, as its theoretical reflection and background, comes to be supportive of such partial holisms, as GST, in practice.
- Reductionism, which has been a very useful scientific approach over several centuries, comes to be fortified rather than partly replaced and partly complemented with a more holistic, interdisciplinary and transdisciplinary approach.
- The resulting innovations are partial, too, and cause many bad side-effects, such as an urgent need for a «sustainable development» rather than a «nature-robbing, one-sided one».
- The traditional human selfishness needs to include *more interdependence into criteria* of a good work and life, in order to be able to survive (Mulej, Kajzer, Potocan, Knez-Riedl, 2000).

As a result of a such a practical shortcoming of a nice theory, beside / on basis of GST, other methodologies of holism surfaced inside systems movement (Jackson, 1991) and with the chaos and complexity theories (Mulej et al., 2000). They are all trying to find new ways of handling complexity⁷, including the one of anticipation. So does our DST.

4 The Dialectical Systems Theory (DST) and „Usomid« as its Applied Methodology

⁷ They have some attributes in common, but also so many differences, that we found it worthwhile to make a »Dialectical system of criteria defining the systems theories« (Mulej, Kajzer, 1998)

4.1 Dialectical System (Ds) Versus the System

The *traditional definition* reads that a system is a complex or very complex feature made of a set of elements and a set of their relations; it may have an environment and relations with it, as well, or not. Due to *relations interdependencies* and hence interactions, a system is more than a sum: the whole system has attributes which its single elements / components do not have, it has *synergies*. In mathematical terms, a system is an ordered set. Systems form a hierarchy (see: Schiemenz, 1994; etc.).

The point of the original introduction of the systems concept was an *end of the oversight of interdependencies and synergies*. Holism of the systems view replaces one-sidedness due to which the humankind has suffered terribly for ever and especially in the 20th century. Decades of application of such a concept of the 'system' demonstrated that it is a good concept in its very general, philosophical contents, but its aim is hardly attainable if no *methodology supports holism well enough*. This fact demands human attitudes and behavior to change - a narrow specialization is still unavoidable, but no longer sufficient, it oversimplifies.⁸

If the approach causes an *exaggerated simplification*, the usual oversight results, which causes *complex consequences*: it is not reality which is simplified, but only human dealing with it. That's why we must be able to be (requisitely) systemic in our thinking, feeling and acting. There were several attempts to solve the said problem such as the General Systems Theory, Cybernetics, Soft Systems Methodology, Living Systems Theory, Viable System Model, Fuzzy Systems Theory, Critical Systems Theory, Autopoiesis, to name but a few. Each of them made a different contribution.⁹

Good twenty-five years ago, a specific systems theory was produced in Slovenia, too - the Dialectical Systems Theory (DST). It starts from the notion that *a system does not exist, but the object does, and the system reflects it, but partially*: it exposes the part of object's characteristics which is requisite from the viewpoint/s selected, only. Thus, a system is supposed to support wholism, but it is fictitiously holistic in its own traditional definition:

- from the formal mathematical viewpoints, a system is an ordered set, hence holistic;

⁸ The mathematically based notion 'system' may easily support reductionism and on-sided specialization. If we, e.g. say 'Boston is a system', this is true. But: how can we know which attributes of Boston we have in mind? From different viewpoints we may specialize in different selected parts of attributes. Thus we are no longer holistic, but we still match the mathematically based notion 'system'. We talk of systems without being systemic, if we do not go for interdisciplinary cooperation on the broadest requisite level.

⁹ In literature on chaos and complexity theories, which actually try to replace or complete up the systems theory as new methodologies of holistic, systemic thinking, authors tend to use the word system frequently, but with no exact definition what does it mean. Our years-long friend dr. Robert Massey used to comment: «What do you mean, what it means? It means what I mean it to mean!» The reader / listener is then hardly able to get the message, the author is hardly able to get the intended impact over the reader / listener.

- in its contents, a system embraces only a part of the really existing attributes, hence it is not holistic; its scope is limited to the viewpoint(s) / aspect(s) selected by the observer(s) / manager(s) of the topic under consideration.¹⁰

Holism is defined by DST as a system (= ordered set) made of

- systemics (= consideration of global characteristics of the object / event / process under consideration, i.e. in a synthesis, synergy),
- systematics (= consideration of detailed characteristics of the object under consideration per parts with no synergies, i.e. analytically),
- dialectics (= consideration of interdependences among--mutually partly equal and partly different or even opposing--elements of the object under consideration, and of processes which are caused by them and make the transition from systematic to systemic attributes of the object under consideration),
- realism (= materialism, i.e. consideration of reality rather than self-bluffing about the attributes of the object under consideration).¹¹

Wholism normally includes consideration of the *environment* of the object under consideration, of course. The open system concept, on these terms, does not simply include environment from the specific selected viewpoint only, but also *a system of all different viewpoints* which might be requisite for achievement of a requisite holism¹².

The problems caused by the lack of systems thinking in the first half of the 20th century and later, cannot be solved by a fictitious holism. The solution suggested by DST is called the dialectical system (DS). Its definition reads

DS is a system of all requisite and
only requisite aspects/systems, which
reflect the same object under consideration.

4.2 The Dialectical Systems Theory (DST)

What is requisite? It *depends on a subjective decision* what is found so, and varies in time etc. Different attributes of e.g. complexity of consideration are differently requisite to different sciences / practices / viewpoints (= aspects) selected; the same holds of an

¹⁰ In terms of L. von Bertalanffy we would have to add, that the topic under consideration is also a selected part of the entire reality. This fact also inhibits such a holism as Bertalanffy conceived of.

¹¹ See P. Checkland's classical example: water is a real object; it has two basic elements, hydrogen and oxygen, from the chemistry viewpoint; they are interdependent and their synergy makes water's chemical characteristics which are quite different from the ones of its components (Checkland, 1981). And he never mentions other viewpoints and sciences, which would add complexity.

¹² A total wholism is actually impossible due to natural limits of human mental capacities. Remaining inside the framework of one / too few single viewpoint/s causes a fictitious wholism. They are both hardly helpful. The middle ground is covered according to the author's decision what is needed and sufficient, i.e. requisite. (Mulej, Kajzer, 1998, formulated this fact as the law of requisite holism. Several tests at a number of international conferences proved the finding to be realistic.)

enterprise and anything else. There is *no one single truth*, unless each and every aspect is made a part of a total aspects system, which is a total synergy. This would reach beyond human capacities. A DS is a reduction still making sense because it does not go all way to a one-sided and superficial approach of one single viewpoint / system from the old times.

DS makes a both needed and sufficient,
i.e. requisite holism possible.

To make the DS survive as a concept, the DST was produced and employed. As we said, it is no mere coincidence that the Systems Theory surfaced first as a GST and after WWII: the post-industrial and post-world-war period made the human existence increasingly and clearly complex and hence depend on *holism and creativity* applied for *innovation* which demands holism on its own. The current *globalization* is a part of the same process. But, in the real life practice, the GST concept did not prove viable, although very worth while. Its basic ideas need to be revitalised because they are still very accurate, but lack a *methodological support*.

This means that the *starting points* of defining a DS must support creativity and holism instead of a routinized and one-sided behavior / work, and let *creativity and holism* no way disappear throughout all the way from the definition of starting points to the final step - the goal attainment. The alternative is clear and very bad: the entropy as the permanent natural tendency toward destruction of everything may become reality, not only a threatening (and motivating) tendency any longer.

The DST making the DS concept (instead of a GST one) methodologically supported is hence made of *three elements and three relations*, as a system (= entity, whole, object).

1 The three relations are:

- The *law of entropy* (natural permanent tendency of everything to change into something else, dissolve; it demands holism and innovation permanently, giving them the role of preconditions of survival since the times when mankind has given up mankind's own adaptation to other nature).

- The *law of hierarchy of succession and interdependence* (later events depend on earlier events of the same process rather than on persons entitled to give orders to „subordinates“; processes and events interact when and because they are interdependent, interaction is a precondition of survival, too, without which life stops).

- The *law of requisite holism* (it is up to the authors' / observers' / decision makers' and their subjective starting points to take responsibility and define, which (dialectical system of) viewpoint/s will be applied when they are dealing with a selected topic / object under their consideration. This responsibility applies also to the selection of the topic.).

2 The three elements are:

- Ten guidelines on *defining the subjective starting points* (values and other emotions, knowledge on contents, and knowledge on methods, as one system). They are

aimed at helping the person/s go for creativity and holism rather than for routinism and one-sidedness; this is the way to consider the contemporary reality, i.e. the objective starting points of the activity undertaken. Consciously or subconsciously, humans tend to address ten questions when preparing themselves to undertake an activity, by defining their own subjective starting points¹³. Thus, they come to their policy.

- Ten guidelines on *assuring the said policy to survive* in later steps of the working process (in which several more narrowly specialized and routinized persons normally enter the stage. *Making* the starting points is one affair, *implementation* of them is another. Thus, it makes sense to remind these persons of the original starting points by guidelines concerning their implementation)¹⁴.

- A *methodology of creative co-operation* aimed at making all said components viable in the daily practice by a shared framework programming of the creative activities (e.g. our own methodology is called USOMID in Slovenian acronym).

The concept was labelled DST in order to demonstrate its difference from other concepts. Dialectics expresses *changing based on interactions of the interdependent* components of the entity under consideration. They are interdependent because they are partially equal and partially different. Interdependence is what replaces isolation and therefore one-sidedness, and creates relations, makes them felt and found requisite, therefore also studied and considered. Hence, it is interdependence which results in synergy toward wholism. Interdependence exists between the *simultaneously different and complementary* ones (e.g. man and woman; tools and raw material and labor, flowers and bees): their being so causes them to *need each other* for their own success

¹³ The ten guidelines about formulating the subjective starting points read as follows:

1. Purpose: to create something new against entropy
2. Approach: to reach the purpose holistically and creatively
3. What precisely is the trouble, the objective, and the tasks? What are their interdependencies?
4. How, precisely, does the procedure go with each task?
5. Covering everything important (by a system of viewpoints)
6. Holism on the basis of capability of creative cooperation (by dialectical thinking)
7. Dialogue and organized cooperation making (requisite) holism possible
8. Continuous up-dating of information
9. Interdependence of knowledge and emotions
10. Evolution and intuition

¹⁴ Ten guidelines about implementation of the starting points read as follows:

1. Holism throughout the entire process
2. Openness (to different viewpoints, not only environment as such)
3. Dynamism (including different viewpoints)
4. Interdisciplinarity
5. Probability
6. Interaction and flexibility based on interdependence
7. Delimitation of roles, jobs, viewpoints, systems
8. Realism in generalization of outcomes
9. Using a dialectical system of viewpoints
10. Analysis is based on synthesis of its starting points and leads to synthesis of findings

and survival, beating their entropy, at least for the time being and to the detriment of others who want/try to consume same resources; that's why they all permanently both compete and co-operate.

In the daily life, interdependence needs to be made felt and work along the lines of DST. Toward this end, we produced USOMID.

4.3 Usomid

The experience with employment of the DST in non-academic settings soon demonstrated the need for those rather philosophical (i.e. general and concerned with thinking) concepts to be expressed in an organizational technology, i.e. methodology. This is why USOMID came about; the acronym reads (in Slovenian): Creative Co-operation of Many for an Innovating Work (Mulej et al., 6 revised editions since 1981).¹⁵

Creative co-operation can hardly take place if e.g. only *hard systems methods* are employed since they are aimed at finding and exposing mechanical, deterministic kinds of relations. They are a very important achievement if a routinized behavior is good enough. It is so when e.g. one deals with very *technical details of production* for all products to be fully equal and reliable. It is different when creativity is needed in the work/life process. Then, *soft systems methods* become the right choice exposing probabilistic and possibilistic attributes. Both types are normally needed, of course.

For the soft systems methods to support a work process, the DST has developed (and frequently applied) its USOMID methodology. In DST the *human work process* is modelled: it starts from the starting points--a system of five elements:

- the *objective starting points* are the objective (i.e. outer) 'needs' and 'possibilities',
- the *subjective starting points* are 'values and other emotions', 'knowledge on contents', and 'knowledge on methods' (internal to the person/s in charge).

All further process steps depend on them (but have an influence over them, too, indirectly at least).

In USOMID everyone of them is *reflected*:

- *Objective needs* reflect the law of entropy, which causes the need for the modern innovative society, innovative business and its culture, policy, strategies, tactics, innovation objectives, awards for inventions, potential innovations and innovations. Subjectively, the objective needs are in turn reflected in values and emotions.

¹⁵ Over two decades of employment of DST through USOMID in consultancy to enterprises and other organizations, we worked with beyond 400 organizations, mostly on the level of seminars. It was mostly in Slovenia and, before 1990, in other areas of Yugoslavia, less internationally, but as well. The organizations who went beyond seminars, were able to produce innovation leading to up to about 30% of cost saving. Up to six full time jobs were possible. Some of them worked on Business Process Reengineering, later on, and found it very similar. (see next footnote)

- *Values and emotions* are impacted by the objective needs of a modern society in the form of a deliberate search for many possible changes aimed at creation of inventions, potential innovations and innovations. The motivation for it is created by a well grounded feeling of appreciation for creative co-workers.
- *Knowledge on contents* is digged out and activated for both above purposes. More than two thirds of innovations are incremental and have to do with the work processes. They can best be produced by the work performers. A written insight into processes is usually lacking, especially into the rather creative ones. Hence: making this insight in the form of 'programoteque' is the visible informational outcome of employment of USOMID. It is done on a framework level first and then goes toward more and more detailed levels, all way to a computer support. It is first a description of the given facts, then comes their 'causes tree' analysis, than linking of the partial process under consideration with others (as its input and output relations), in order to see the entire process in a more systemic way. Later one perhaps innovating follows, too.
- *Knowledge on methods* has a general and a specific part. The specific part is problem / topic dependent, the general part is made of the USOMID/SREDIM procedure of creative work and co-operation.
- The *objective possibilities* for a creative work and co-operation to take place are made of the USOMID Circles, a version of the Quality Control Circles, with some additions.

The *relation* between all the elements quoted is double:

- *Learning* by an initial course, and learning by doing.
- Working out and employment of the *programoteque* by a creative co-operation process of performers of the studied activity and their consultants. Then, *innovating* process can follow. (see many cases from 1969 on)

Hence, in practice the application of DST via USOMID starts with working out the *insight* into the processes under consideration. This is usual, of course¹⁶; in this case it takes place in the form of working out the programoteque.

4.4 Programoteque

There are hardly any organizations, in our experience, be them enterprises or others, with a *holistic insight into their entire work process*, ie. the basic, information and

¹⁶ The well known concept of the business process reengineering (BPR) has similar roots. We learned a lot from Alan Mogensen and his Work Simplification (Mogensen et al., 1980, earlier and later). Back in 1926 Mogensen learned that it is wrong to suppose that subordinates are not able to be creative, while doing a motion study. From Taylor, author of Scientific Management (Tajlor, 1967) and from R. Reich (Reich, 1984) we learn, that in times before Mogensen this supposition may have been making sense, in the West, later on no longer so. Education became necessary and increasingly more frequent and higher, when machines were becoming more complicated and complex to produce, use and serve. Thus, creativity could increasingly become a source of innovation, both technological and nontechnological, which has been also increasingly necessary in the increasingly complex world of global competition of today.

management aspects, as well as their links, interdependences. The *basic process* of a factory covers supply, manufacturing and sales, it transforms in-coming material and energy into out-going products and in-coming earnings. The *information process* links the basic and the management processes as well as environment by transformation of data in information. The *management process* transforms the in-coming information into decisions, instructions etc. for the basic and information processes and other out-going information (Kajzer, 1982; Kajzer, Mulej, Marn 1995; Potocan, 1999 etc).

It is quite hard to control or even innovate the entire business, or its production subsystem at least, without a holistic enough insight into the entire process.¹⁷ It is equally hard to innovate or optimally control the entire business or any of its subsystems without the motivation of the employees to be creative toward innovation rather than toward abuse; the same is true of their knowledge and experience. USOMID is a method to meet both needs. How?

- Programoteque provides for a *felt respect* for knowledge and creativity of the job performers, and involves them.
- Programoteque provides for a framework level of structuring, without causing a rigid structure of the process information. Hence, it *supports creativity* rather than replaces it (such a replacement is - on the other hand - needed inside a mass production of equal products except in its engineering and other preparation!). Thus, programoteque supports optimization of the rather creative parts of the work process which cannot be optimized by hard systems methods, and hence tend to be neglected causing lots of otherwise avoidable costs (see: Carson 1989 etc.).¹⁸

Hence, programoteque can ease the process of anticipation, because it can offer a framework overview over the foregoing experience concerning the procedures of anticipation and their links in both the input and the output side. Experience has demonstrated that a qualitative analysis must take place before any computer support and computation make sense. A clever and a stupid procedure, both are able to fit in a computer program.

5 Some Concluding Remarks

Some people, especially in the less advanced areas / societies tend to think that their economic and social environment still allows them to remain one-sided and superficial.

¹⁷ Invention, i.e. a new and possibly promising idea can be produced individually and onesidedly. Innovation is much more of a team work of many professions, because one may speak of innovation only in the case of a novelty proven useful by acceptance on the part of consumers (see: EU, 1995). Innovation is hence much more complex than invention and requires much more of systemic thinking, which can be informal, too (Mulej et al, 1998)

¹⁸ Thus, USOMID is complementary to methods such as »Paper Work Simplification« of dr. Ben S. Graham Jr. from Dayton, Oh. His work does a wonderful job on the routine part of the processes outside production in terms of their innovation, especially rationalization. (See: The Ben Graham Corporation, Tipp City, Ohio)

They tend to remain so. It is, or seems to be, simpler. Hopefully, their simple current processes will not cause to them too complex and tough *consequences*, as it frequently happens. The same fear is possible in the case of too narrow specialist who are not willing to enter interdisciplinary cooperation. These experiences apply to anticipation, as well.

Prevention of such unpleasant and unhelpful consequences may be called a major aim of the (dialectical) systems thinking. In many cases it has worked over its 25 years of development and application, but not until it was accepted by the decision making persons into their conscious or even subconscious subjective starting points, eg. in the form of the individual and organizational *culture*. This is why the cited suggestion made by Molander and Sisavic (that systems thinking needs to become a mass movement, like TQM is doing) is so important. This in turn is why the *quality movement* is so important, if its notion is conceived in a (dialectically) systemic style (see: Peters 1995), not in an bureaucratic one (see: Ursic et al., 2000). Systemic thinking needs to be made more popular and generally applied, including the complexity theory (see: Dent, 1999). And this is what demands more of a modern learning (Lessem 1991; Parsloe 1995; Coghlan 1994; Flood, 1999; etc.). This is what consideration of complexity (e.g. of globalization of economy) supports, but does so better, more effectively and efficiently, if conceived in a (dialectically) systemic style, rather than eg. in a bureaucratic, biased, onesided one. The latter one tends to show up if more short-term, one-sided and superficial business etc. criteria tend to prevail over more long-term, wholistic and deep ones, i.e. over systemic ones, including the ones required by complexity science (Waldrop, 1994; Dent, 1999; Lisack, 1999, etc.) as a modern version of systems theory.

References

- Afuah, A. (1998): *Innovation Management*. Oxford University Press
- Carson, J. W. (1989): *Innovation - a Battlefield for 1990's*. Gower Publishing Co. LTD
- Checkland, P. (1981): *Systems Thinking, Systems Practice*. Wiley, Chichester, etc.
- Coghlan, D. (1994): Change as Reeducation - Lewin Revisited. In: *Organizational Development Journal*, Vol. 12, No. 4, pp. 1-8
- Davidson, M. (1983): *Uncommon Sense. The Life and Thought of Ludwig von Bertalanffy (1901 - 1972). Father of General Systems Theory*. J. P. Tarcher, Inc., Los Angeles
- Delgado, R. R., Banathy, B. H. (1993): *International Systems Science Handbook*. Systemic Publications, Madrid
- Dent, E. B. (1999): Complexity Science: a Worldview Shift. *Emergence* 1(4), 5-19
- Dyck, R., Mulej, M., et al. (1998): *Self-Transformation of the Forgotten Four-Fifths*. Kendall/Hunt, Dubuque, Iowa, USA
- Elohim Jimenez Lopez (1999): A Letter from Professor Elohim. *Poster at the 11th International Conference of WOSC*, Uxbridge, UK
- Elohim J. L. (2000): Business Based on Bertalanffy's Weltanschauung. A Renew Entrepreneurship Spirit is Urgently Needed. In: Rebernik, M., Mulej, M., eds. (2000):

- STIQE '00, *Proceedings of the 5th International Conference on Linking Systems Thinking, Innovation, Quality, Entrepreneurship and Environment*. Institute for Systems Research, Maribor, et. al.
- EMCSR (1972 - 2000, biannually): Trappl, R., (ed., sometimes with coeditors): *European Meeting on Cybernetics and Systems Research. Proceedings*. Different publishers
- Engels, F. (1953): *Dialektika prirode*. (Dialectics of Nature. Translation to Slovene). Cankarjeva založba, Ljubljana
- EU (1995): *Green Paper on Innovation*. www
- Flood, R. (1999): *Rethinking the Fifth Discipline. Learning with the Unknowable*. Routledge, London and New York
- Jackson, M. (1991): *Systems Methodologies for Management*. Plenum Press, New York
- Kajzer, S. (1982): *Istrazivanje strukture i kompozicije mikro-ekonomskih sistema u udruzenom radu* (On Structure and Composition of Business Systems. In Croate). University of Zagreb
- Kajzer, S., M. Mulej, F. Marn (1995): The Process Approach to Business as a Well Proven Tool of Maintaining Cybernetics in Business Management. *Systemica*, Vol. 10
- Lesser, R. (1991): *Total Quality Learning, Building a Learning Organisation*. Basil Blackwell, Oxford, and Cambridge, Mass.
- Lissack, M. (1999): Editor's Note. *Emergence. A Journal of Complexity Issues in Organizations and Management*. Vol. 1, 3, 3-6
- Mogensen, A. (1980): *Work Simplification*. Executive Conference Material. Lake Placid
- Molander, E. A., M. Sisavic (1994): Contrasting Paradigms and Movements: Systems Theory and Total Quality Management. *Systems Research*, Vol 11, No 1, pp 47-58
- Mulej, M. (1974): *Dialektična teorija sistemov*. University of Ljubljana, School of Sports. Unpublished lecture to M.A. students
- Mulej, M. (1976): Toward the Dialectical Systems Theory. In: Trappl, R., P. Hanika, F. Pichler, eds., *Progress in Cybernetics and Systems Research*, Vol 5, Proceedings of EMCSR, 1976, OeSGK, Vienna, A
- Mulej, M. (1979): *Ustvarjalno delo in dialektična teorija sistemov* (Creative Work and the Dialectical Systems Theory). Razvojni center Celje, SLO, YU
- Mulej, M., Devetak, G. (1985): *Od zasnove do uspešne prodaje izdelka*. Gospodarski vestnik, Ljubljana, SLO, YU
- Mulej, M., et al. (1986): *Metodologija USOMID*. (Methodology USOMID). 4th edition. Ekonomski center Maribor, SLO, YU
- Mulej, M. et al. (1992): *Teorije sistemov* (Systems Theories). University of Maribor, School of Business and Economics, Maribor, SLO
- Mulej, M. et al. (1994): *Inovacijski management, I. del, Inoviranje managementa* (Innovation Management, Part I., Innovation of Management). University of Maribor, School of Business and Economics, Maribor, SLO
- Mulej, M. et al. (1999): *Mehkosistemske teorije*. University of Maribor, Faculty of Economics and Business, Maribor, SLO

- Mulej, M. et al. (2000): *Mehke teorije sistemov kot podlaga uspesnega managementa*. (Soft Systems Theories as a Basis of Successful Management. In Slovene) University of Maribor, Faculty of Economics and Business, Maribor, SLO
- Mulej, M. (2000): *Dialekticna teorija sistemov*. (Dialectical Systems Theory. In Slovene) Politehnika, Nova Gorica, SLO
- Mulej, M. (2000): *Basics of Systems Theory. Applied to Innovation*. University of Maribor, Faculty of Economics and Business, International Program FEBA, Maribor, SLO
- Mulej, M., Kajzer, S. (1994): Chaos theory – a New Reinforcement of Dialectics, Systems Thinking, and Cybernetics. In: Rebernik, M., Mulej, M., eds. (1994): *STIQE '94. Proceedings of the 2nd International Scientific Conferences on Linking Systems Thinking, Innovation, Quality, and Entrepreneurship*. ISRUM et al., Maribor
- Mulej, M., Kajzer, S. (1998): Ethics of Interdependence and the Law of Requisite Holism. In: Rebernik, M., Mulej, M., eds.: *STIQE '98. International Conference on Linking Systems Thinking, Innovation, Quality, Entrepreneurship and Environment*. Institute for Systems Research Maribor et al., Maribor, SLO
- Mulej, M., et al. (1998): Teaching on/for Systems Thinking. In: Hofer, S., Beneder, M., eds., *IDIMT '98. 6th Interdisciplinary Information Management Talks*. Universitaetsverlag Rudolf Trauner, Linz
- Myers, N., gl. ur. (1991): *Gaia – modri planet*. (Original: The Gaia Atlas of Planet Management, 1985). Slovene edition by Mladinska knjiga, Ljubljana
- Parsloe, E. (1995): *The Manager as Coach and Mentor*. Institute for Personnel and Development, London, UK
- Peters, T. (1995): *The Pursuit of Wow*. Macmillan, New York, NY, USA
- Prigogine, I. (1999): *Evolution of Complexity*. Unpublished lecture at 11th WOSC. Uxbridge, UK
- Reich, R. (1984): *The Next American Frontier*. Penguin Books, New York
- Rosenberg, N., L. E. Birdzell (1986): *The Past. How the West Grew Rich*. Basic Books. New York
- Schiemenz, B. (Hrsg.) (1994): *Interaktion. Modellierung, Kommunikation und Lenkung in komplexen Organisationen*. Duncker und Humblot, Berlin, D
- Tajlor, F. W. (1967): *Naucno upravljanje*. (Scientific Management. In Serbian) Izd.pod Rad, Beograd, YU
- Ursic, D., et al. (2000): *Precess Reengineering in Europe: Choince, People and Technology. PRECEPT. National Uptake Study Slovenia*. Research in progress. University of Maribor, Faculty of Economics and Business, University of Ljubljana, Faculty of Social Sciences. April, 2000
- Vodnik (1960): Britovsek, J., et al., eds: *Vodnik skozi cas in druzbo*. (A Guide Through Time and Society. In Slovene) Zalozba Mladinska knjiga, Ljubljana, SLO, YU
- Waldrop, M. M. (1994): *Complexity. The Emerging Science at the Edge of Order and Chaos*. Penguin Books, London