THE BIOCYBERNETIC APPROACH AS A BASIS FOR PLANNING AND GOVERNANCE

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The last decades, with societies and economies mostly focussing on quantitative growth and at the same time wasting natural resources with linear production processes, are now culminating in a critical situation for our social, ecological and economical systems.

Regardless that general consciousness about the interdependencies in our interconnected global world, caused mainly by the world wide web and effects of globalization, and also the knowledge about ecological contexts have grown, the use of this knowledge in our reality - in politics, governance, economy, education - is still missing. It seems that something constrains fundamentally the necessary change in our modes of governance and planning.

Until now, generations of scientists, politicians, organizations and individuals have been dealing with interdisciplinary questions, with the nature of complex systems, with models of complex problems and their possible solution – an actual example is climate research and the huge international climate conferences.

But we have to recognize, if we want to see it or not, that real systemic and integrated solutions in order to govern our society towards resilient technical, economical and social developments are despite this big efforts not consequently designed or implemented.

The German biocybernetician, leading ecologist and bestseller author Prof. Frederic Vester explains in his lifework the possible reasons: to achieve real change and transformation of our behaviour and governance towards the design of resilient systems to safeguard the only basis of all human existence, which is nature, it is necessary to understand the interconnections and the complexity of the highly complex systems and their likewise high dynamics and rate of change of our environment.

Like many cyberneticians and system researchers before him, Vester analyzed on the basis of his interdisciplinary research on cells, on brains, on ecosystems, on economies and human-created systems of all kind, how these functioning systems are able to work with such great efficiency.

These systems have a few similar and typical patterns in common, which he described as “Eight Biocybernetic Rules”, and which can be used as an orientation model for successful and resilient systems: only nature with its feedback processes, independency of quantitative growth, function orientation, self organization, self regulation, adaptation, homeostasis, symbiosis, recycling and biological design gives us the only valid example of a resilient system.

But what we need for a real implementation of these basic rules is a shift from our traditional, mainly linear, causal-effect thinking towards a new thinking what Vester characterized with the expression “interconnected thinking”. This means to think in relations, in feedback cycles, in patterns, in networks, in systems. Only this new way of thinking guides towards a real understanding of our complex world. And only the real understanding of the complexity and cybernetic behaviour of these systems can cause the long lasting and effective necessary change in the behaviour of the acting persons and organizations.

To make these findings of his scientific and didactic research easily understandable and applicable in the daily practice in education but also in the concrete planning and management processes Vester developed various media and tools.

User friendly Planning Tools for the Management of Complex Systems

The Sensitivity Model by Professor Frederic Vester and its computerized 'System Tools' are developed as a practical planning tool. Parallel with many applications in management, planning and politics it has been developed in continuous feedback with the users. It offers an iterative, error friendly and evolutionary structure. The user is guided through the process of capturing a system, understanding its main variables and relations. With the analysis of the feedback cycles and the cybernetic behaviour of the system and its variables it offers a new and unique access. The use of fuzzy logic aspects allows the integration of hard and soft factors. If-Then Scenarios and a transparent simulation open the understanding of the dynamics of the systems and its adaptability, its robustness against internal and external changes – its “sensitivity”. Finally, the resilience of the system is evaluated with the eight biocybernetic rules, what leads towards the development of sustainable and viable measures.

Two examples of different fields – climate change and the financial crisis

Vester gives with his systemic analysis of climate change with a few key factors and the main interactions an interesting new focus on the discussion: the feedback analysis shows the reinforcing effects of the variables with mainly positive feedback cycles and also negative feedback cycles. But the detailed analysis of the feedback cycles shows, that all regulating negative feedback include the variable “Behaviour & Consumer Changes. With this the only effective lever which enables regulation is identified: it lies in the “soft” variable of “Behaviour & Consumer Changes”. Without this variable all sophisticated and high-tech interventions and innovations will fail at the long term. What is interesting here is that no quantification is needed - on the level of the general pattern of this system, possible details or deep quantifications are not necessary any more – already the fuzzy model shows the main context.

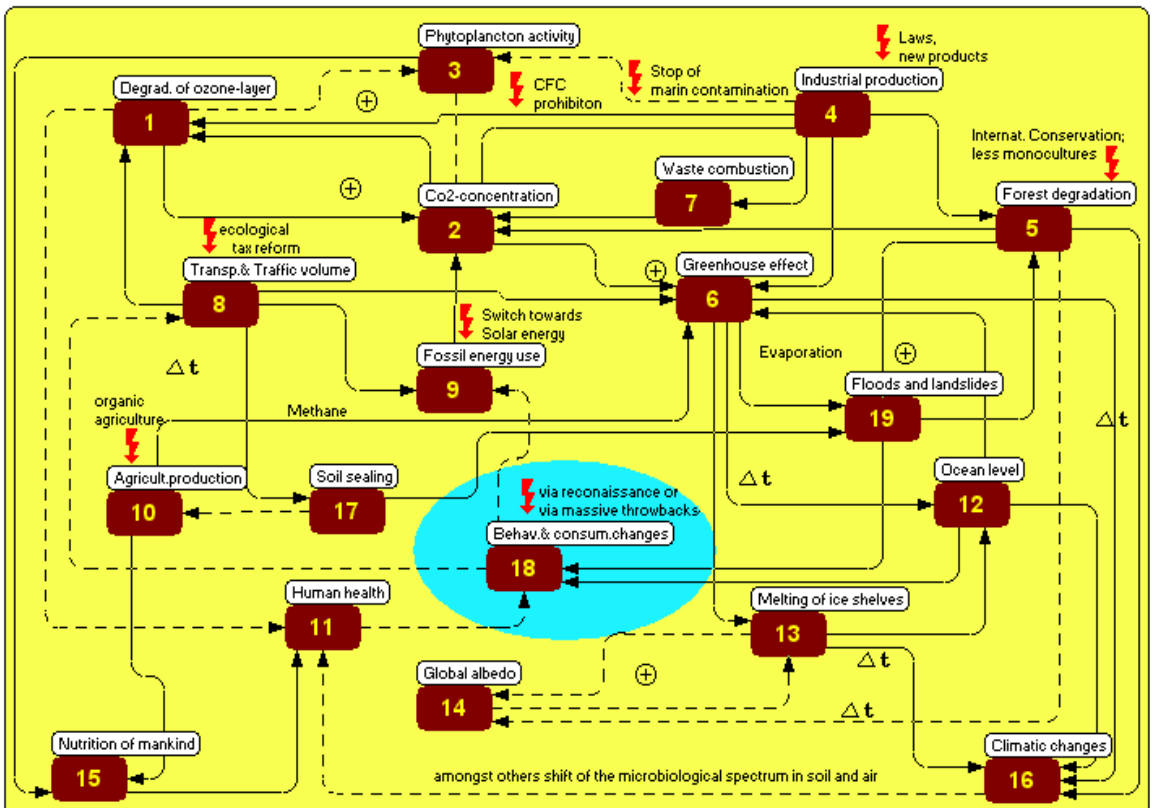

Table 1: Time Bomb Climate Change. F. Vester: The Art of Interconnected Thinking.

The second example is a system analysis of the financial crisis and corporate governance system by Fredmund Malik. With a few variables the main influence factors of this system are described. All variables are based on the orientation towards "Shareholder Value". The network shows only reinforcing connections (full lines) and positive feedback cycles – any variable or relation which might indicate a regulation via negative feedback is missing. The development of the system – consisting only in a large number of positive, self enhancing feedback cycles starts with a growth phase, but due to missing regulation mechanisms, is designed to collapse.

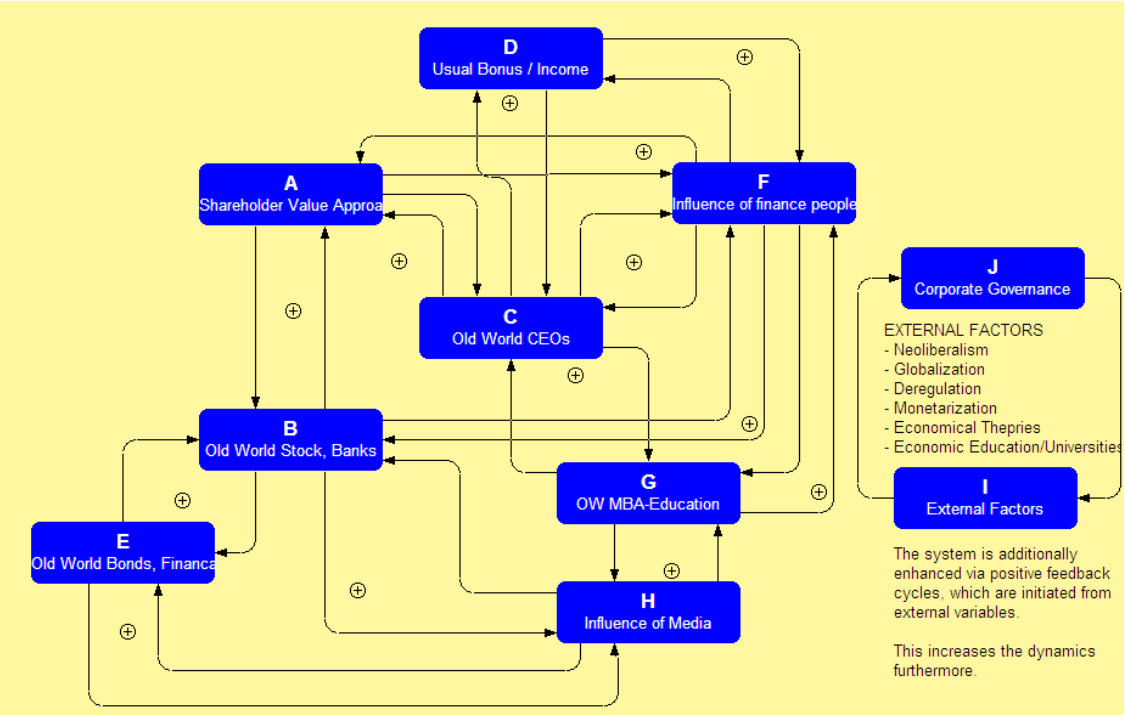

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Table 2: The Collapse of the Shareholder Value System, based on the "Old World" (OW-)
Unsystemic Thinking and Behaviour. DYNAMICS Of THE SYSTEM -Variables A with H demonstrate the dynamics of the system. The variables enhance themselves via short positive feedback cycles to a total number of 79 positive feedback cycles, which additionally are interconnected.

F. Malik: *Corporate Governance. How Organizations regulate and organize themselves.* Frankfurt/New York. In Print for 2011.

Interconnected Thinking in Education

To allow an playful introduction to tackling with complex systems and to model complex systems, Vester designed as an accompanying means the cybernetic simulation game „ecopolicy“. It allows a easy understanding of complexity. The player is governing a virtual country called Cybernetia. With his decisions to invest in different areas of life he experiences to control and regulate a complex system. Ecopolicy is used in a German wide gaming contest of students and politicians, supported by the German “Federal Centre for Political Education“. In 2008/2009 over 90.000 students experienced interconnected, systemic thinking and its useful consequences on management and decision making. The contest continues in 2010 and will be enlarged in several countries to an international contest in systemic thinking.

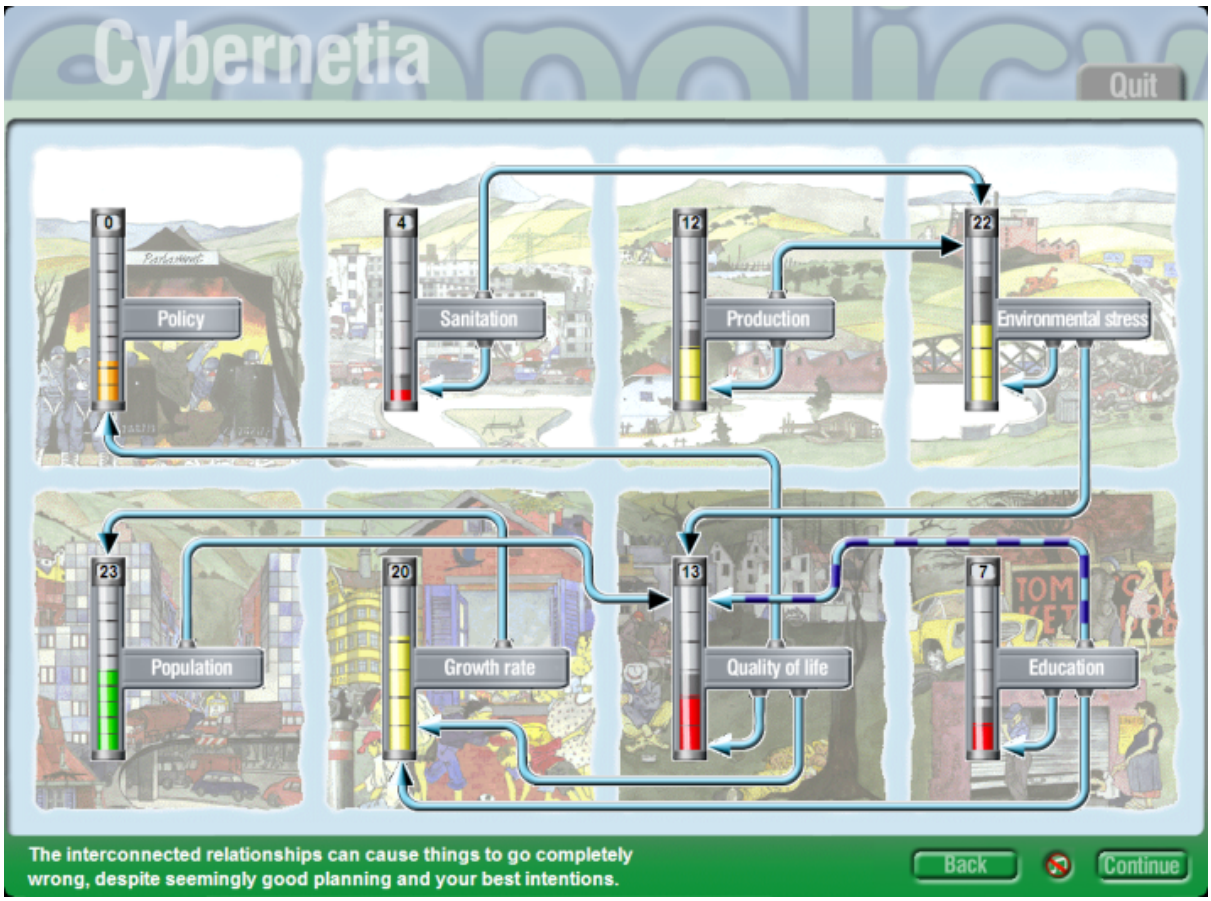

Table 3: The interconnected System of the Fantasy Land “Cybernetia”. F. Vester: ecopolicy. An environmental cybernetic simulation game.

The last drastic examples for dangerous developments caused by ignoring the cybernetic behaviour of complex systems are well known - in the economical field the financial crisis which is threatening not only parts of financial systems, but is now reaching national and international dimensions. In the field of environment and economy, the present drilling catastrophe in the Gulf of Mexico is threatening huge marine and coastal areas and their complete habitat, including human population and its economy.

These systemic catastrophes show the same typical pattern: an highly complex system grows without the necessary control and regulation. As a consequence of enhancing positive feedback cycles, it may function even without good management over a long

period, only as a consequence of its self enhancing processes. But at a given moment when the limits of the system are reached, an even rather small incident causes breakdown and collapse of the system in "nano time". The organization structure of the system, its information system and the main control systems have not been designed with the necessary complexity – as already described in one of the basic laws of cybernetic, Ashby`s law: "Only Variety can absorb Variety". Each complex system needs a control system with adequate complexity. Many technical and social systems have been developed more and more complex without the necessary understanding of their governance and without equally complex regulation systems. The same pattern may be observed with the growth of organizations: if also concentrated only on quantitative growth, but neglecting systemic limits of growth and system typical time dimensions. These organizations can be controlled and regulated only with a new kind of organization structure which Stafford Beer has described with his "Viable System Model" and a new way of effective interconnected communication between many participants – the "Syntegration".

In the last two years Fredmund Malik has consequently applied these approaches and tools in hundreds of governance and planning projects. Different combinations of the methodologies enhance their efficiency and effectiveness in the now necessary short time frame. Many systems are now struggling to survive. With the "Malik Wholistic Management Systems®" he defined a range of effective and efficient tools to use in any complex question and organization.

Only a profound systemic thinking, systemic understanding and systemic acting may lead our societies towards tackling complexity and the development of viable, functioning, resilient systems, respecting the dignity and fragility of human life.

F. Malik: "Cybernetic Thinking is the key knowledge of the era of Complexity".

Background

Prof. Frederic Vester (1925-2003) has been a renown Germen Systems Researcher. Beyond other activities in his "Study group for Biology and Environment" he was a Member of the Club of Rome and published his findings in 17 books. His last book: "The Art of Interconnected Thinking. Ideas and tools for Tackling with Complexity" was selected as a „New Report to the Club of Rome" in 1999 and was finally translated into English language in 2007. With the "Sensitivity Model Prof. Vester®" he developed an instrumentarium with computer based tools allowing an user friendly and consequent implementation of the Systems Approach in Planning and Management.

Prof. Fredmund Malik. Founder of Malik Management St. Gallen and reknown author of his "Malik Management Systems®". His General Management Theory is system-oriented and valid for all areas and industries of any society. With his consistent alignment along the natural phenomena of complex systems he sets the standard for management in the era of knowledge and transformation. With his company of 300 employees, he provides the application and further development of the work of leading Cyberneticians like Stafford Beer and Frederic Vester for the society.

About the Author

Gabriele Rosa Maria Harrer. Dipl. Geologist. Germany and Switzerland. Over 20 years collaboration with Frederic Vester in research and practical application of the "Sensitivity Model Prof. Vester® and the cybernetic simulation game „ecopolicy® " in Vesters "Study group for Biology and Environment". Since 2006, after the integration of Vesters lifework into Malik Management St. Gallen she is continuing this work at Malik Management as a Senior Systems Expert. Beyond other, together with Malik Management she supports an international school contest, the "ecopolicyade", allowing children and students to experience tackling successfully with complexity with the computer simulation "ecopolicy". Additionally she is lecturing about the systems approach in management and education at various universities, e.g. Munich Military University, Zurich University for Applied Sciences.

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