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# THE PLANETARY MODEL AS AN ORGANIZATIONAL FRAMEWORK FOR THE GENERATION OF INNOVATION

## A CRITICAL REFLECTION ON TODAY'S INNOVATION PRACTICE

## Planetarni model kot organizacijski okvir za ustvarjanje inovacij
## Kritična refleksija o današnji inovacijski praksi

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**Abstract**

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In this paper the »Planetary Model« is introduced as a meta-model for dealing with the complexity of sustainable innovation. Based on a sociocybernetic point of view, the »Planetary Model« can support innovators and their teams to organize innovation processes for the uncertainty and dynamics of complex innovation problems. Consequently, the importance of creative problem-solving is stressed. These interdependences also lead to a permanently changing pattern. Circularity instead of linearity becomes the determining element. Finally, provocative questions on the ability of science itself to be innovative and deal with complex problems are asked.

*Key Words:* Sustainable innovation, complex systems, creativity, collaborative problem-solving, morphic fields

**Izvleček**

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V članku prikažemo »Planetarni model« kot metamodel za preučevanje kompleksnosti dolgoročno vzdržnih inovacij. Z vidika sociokibernetike lahko »Planetarni model« pomaga inovatorjem in njihovim ekipam, da organizirajo inovacijske procese za delo v negotovosti in v dinamiki kompleksnih inovacijskih problemov. Zato poudarjamo pomembnost ustvarjalnega reševanja problemov. Te vzajemne odvisnosti vodijo v nenehno spreminjajoče se vzorce. Kroženje namesto linearnosti postane določujoč element. Ob koncu razpravljamo tudi o provokativnem vprašanju, ali je znanost sama po sebi sposobna biti inovativna in se spopasti s kompleksnimi problemi.

*Ključne besede:* vzdržne inovacije, kompleksni sistemi, ustvarjalnost, reševanje problemov s sodelovanjem, morfična polja

JEL: M10

## 1 Introduction

For innovators there is usually no single option with respect to the development of innovations. Further, innovators mostly have little experience in attaining the comprehensive goals of sustainable development, especially because in many cases there is only very limited understanding of the potential outcomes of sustainable innovation and sustainability-oriented business processes. Here, sustainable innovation aims at the development of innovation that is sustainable from a social, ethical, economic, and ecological point of view.[1] Whereas the attainment of economically sustainable innovation seems obvious, the other facets of sustainability seem to be much more critical. Since within complex problem-solving people are of crucial interest, I want to discuss the implications of socially sustainable innovation briefly. Whereas socially sustainable development in general is characterized by dynamic patterns, it is increasingly complex with regard to the development of innovation. Innovation represents not only the development of new and more appropriate solutions, but also may imply – to some degree – the destruction of former solutions (Schumpeter, 1980). However, these former solutions stand in close relation to people, such as their users or creators. Accordingly, it seems necessary to build awareness of such diverse effects on different stakeholder groups and make decisions based not only on a majority principle, but on intense communication and interaction in order to attain consensus if possible. For that purpose, an extensive stakeholder analysis is needed:

- Who is concerned with the specific form of innovation and of what kind (internal and external stakeholder)?
- What are the value systems and expectations of the stakeholders?
- What might the roles of the stakeholders be within the innovation process (passively concerned or actively participating)?
- How is the specific role of future generations to be dealt with?

Informal systems thinking and the dialectical systems theory proposed by Mulej might therefore be very useful in order not to get lost or otherwise become too restrictive or too specific when working on complex problems (Mulej et al. 2004; Mulej et al. 2003).

## 2 Complex Problems Call for Creativity

The development of innovations and specifically sustainable innovation can be considered a complex problem characterized by an unknown or ambiguous »target state« of the problem-solving process. Further characteristics of complex problems are the huge amount of interacting elements and subsystems together with high systems dynamics leading to changing patterns, structures, and intensities over time (Gomez/Probst, 1999, pp. 22-24). Moreover, the initial state cannot be precisely described and the barriers which need to be overcome are not exactly known in advance (Scholz/Tietje, 2002, pp. 26-27). The development of an

[1] Sustainability affairs are not going to be discussed extensively in this paper. For that, see WCED, 1987; UN, 1992; Perman, 1997; Strebel, 2002; Strebel, 1997; Laws et al., 2002; Steiner/Posch, 2005.

innovation is always heavily influenced by a wide variety of factors that are not controlled or even known by the innovator. Especially the overall target of an economically, ecologically, ethically, and socially sustainable development of any system is quite vague, so that there is definitely no clear target state at which to aim. We are confronted with a highly complex situation with dynamic, non-linear phenomena. The feedback processes between cause and effect produce further uncertainty (Thompson Klein 2001, p. 39). Therefore, understanding the complex relations between humankind and nature is a prerequisite for overcoming cognitive barriers (Scholz et al. 1998, p. 16).

Because of their specific characteristics, complex problems usually cannot be solved by applying standard solutions (which are nevertheless useful for simple and complicated problems). Instead, complex problems ask for innovative solutions, which require creative problem-solving capabilities from the problem-solving agents. In this paper, the »Planetary Model« is used as a basis for dealing with the complexity of sustainable innovation by utilizing given creative capabilities. It is necessary to stress the importance of combining this model with other effective tools. Further, for the complex problem of generating innovations it seems necessary to broaden the paradigm of many traditional approaches of innovation management, whereby problems are often considered as something given. The »Planetary Model« is thought to support the innovators who are working in transdisciplinary teams towards the development of a sustainable innovation.

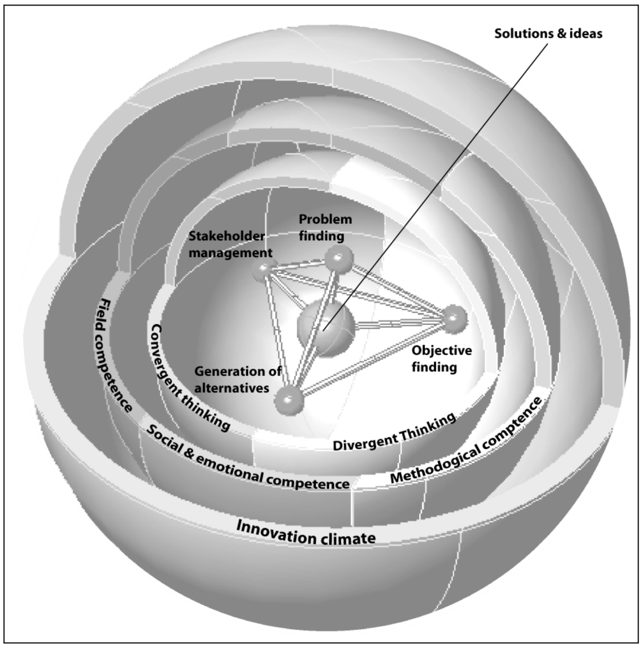
## 3 The Planetary Model: A Framework for Complex Problem-Solving

The Planetary Model can roughly be divided into three dimensions. In the middle of the Planetary Model there is the sun, symbolizing the solutions and ideas generated within the problem-solving process. Whereas both solutions and ideas are outcomes of the creative problem-solving process, solutions are directly connected to a certain problem and an idea has no obvious relation to the problem one was working on. The sun is surrounded by the planets, which represent the various phases of the creative problem-solving process. The sun and all the planets are embedded within cosmic clouds, symbolizing the needed thinking styles and competences, as well as the innovative climate together (see Figure 1).

Since the whole system is strongly interconnected, the planets can be neither seen neither in isolation from each other nor as isolated from the influence of the rest of the cosmos. They are continuously interacting. These interdependences also lead to a permanently changing pattern. Circularity instead of linearity becomes the determining element.

By focusing on the single planets, it becomes obvious that each planet itself represents another more detailed micro-cosmos, in which single moons (as subsystems of the single planets) are surrounding the planets in a dynamically interacting way. Moreover, the moons are influenced by the other planets and the cosmic clouds as well (see Figure 2).

Figure 1: *Planetary Model: A Dynamic Creativity Management Model for Solving Complex Problems (modified on the basis of Steiner, 2002; Steiner, 2003; Steiner, 2005)*

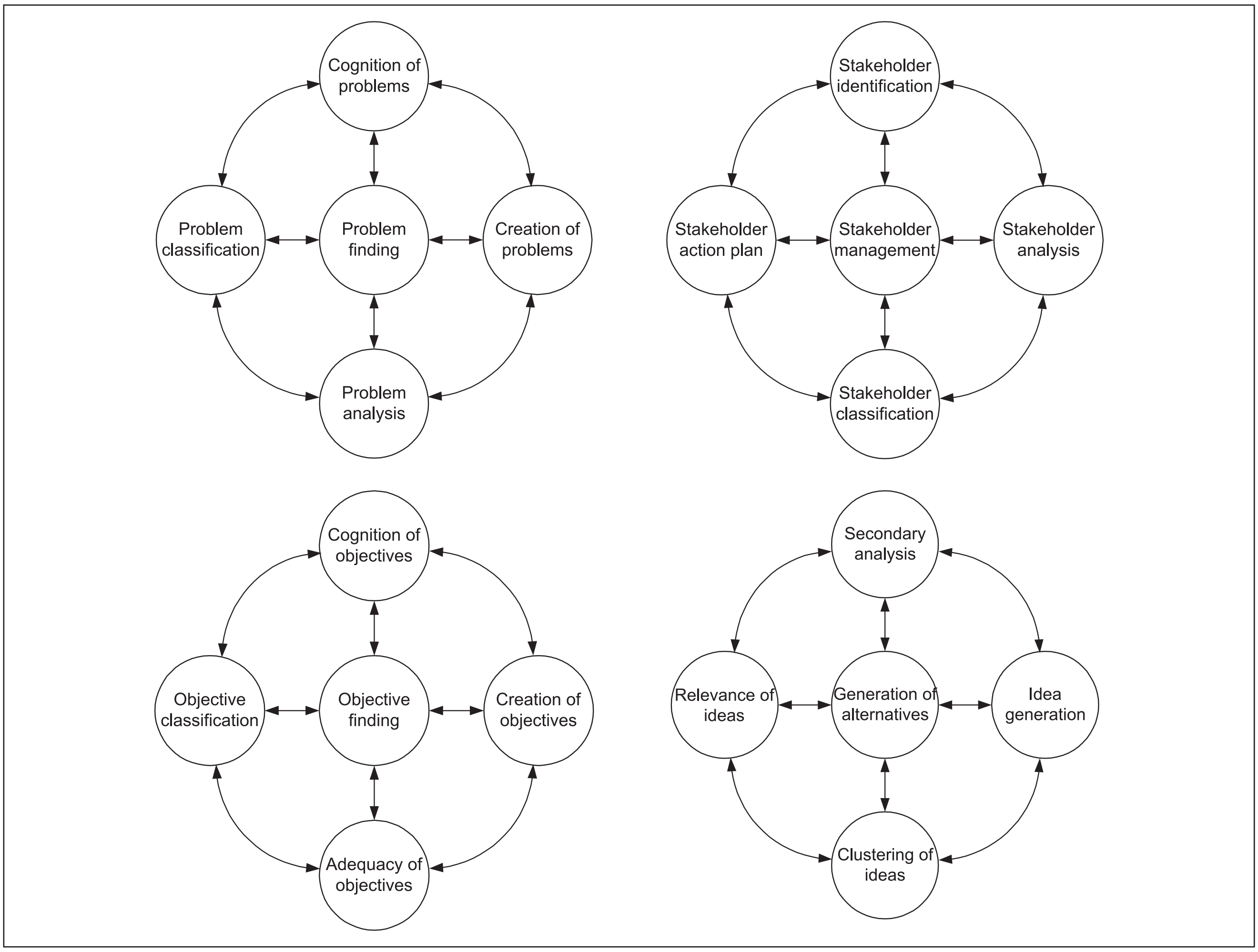



The planet »Problem finding« is surrounded by the moons »Cognition of problems,« »Creation of problems,« »Problem analysis,« and »Problem classification.« The planet »Stakeholder management« is surrounded by the moons »Stakeholder identification,« »Stakeholder analysis,« »Stakeholder classification,« and »Stakeholder action plan.« The planet »Objective finding« is surrounded by the moons »Cognition of objectives,« »Creation of objectives,« »Adequacy of objectives,« and »Objective classification.« The planet »Generation of alternatives« is surrounded by the moons »Secondary analysis,« »Idea generation,« »Clustering of ideas,« and »Relevance of ideas« (for a detailed explanation, see Steiner, 2005).

Although the sun includes specific procedures of instrumental evaluation and selection, in real world scenarios this is only one facet of evaluation and selection. Whereas in the context of the sun there is a concentration on potential solutions dependent on a generated set of alternatives, formal as well as informal evaluation and selection procedures also occur at all other planets and moons, whether talking about the interpretation of a problem, the construction of goals, or the choice of certain creativity techniques that have to be applied.

Furthermore, it seems necessary to broaden the paradigms of many traditional approaches of innovation management, whereby problems are often considered as something given. Within sustainability-oriented change processes, a shared vision among the various stakeholders acts as a set of meta-objectives that is usually not something given; instead it very often has to be constructed. Additionally, as expressed in the planet »Objective finding,« cognitive processes play an important role. Hereby, the planet “Stakeholder management« strongly influences the process

Figure 2: *Planetary Model: the planets with their moons*




of the creation of a shared vision among the problem-solving agents and other stakeholders. Consequently, the linearity of cause and effect can no longer be assumed. Therefore, the »Planetary Model« can support problem-solving agents who are working together with other stakeholders on the complex task of developing sustainable innovation, including students and teachers within certain systems such as case studies (e.g. in a regional context) (concerning case studies, see also Steiner & Laws, 2005).

## 4 Does Science have the Right Attitude to solve Complex Problems?

Since the whole paper so far has been about the capabilities to solve complex innovation problems in general, I want to complete this paper by asking a provocative and simultaneously constructive question: With regard to the acknowledged scientific floor, where scientific effort is very much linear and deterministic itself, does current science provide, support, and accept the appropriate forms of scientific behaviour in order to deal with complexity, chaos, innovation, and change in an uncertain world?

As an example, scientific journals only give very limited space for explorative research, especially when it is »jiggling« at the paradigms of the prevailing scientific doctrines. The scientific community, such as at universities, does not really encourage innovative scientific efforts that in the majority of cases are vague at their very beginning – as innovations most times are. In this paper I do not want to call for a need to neglect traditional rationality-based scientific approaches, but instead I call for an extension of scientific behaviour with the emphasis on the fact that both sides have their importance according to the specific needs of the »scientific innovation.« Similar to every kind of creative performance and innovation, there is a stage where a high degree of freedom and flexibility is needed to attain different points of view or even changes in prevailing paradigms.

Learning from innovative companies, it is not about the decision for either rational, quantitative, and evidence-based research vs. explorative, qualitative, speculative, and adventurous research. Instead it is more about finding the appropriate research behaviour for the specific stage of the research process under consideration of the underlying basic objectives for the scientific work. Every successful company working on new product innovation will allow space for creativity and freedom at the particular stages within the product development process; here evaluation, criticism, and purely rationality-based thoughts can be damaging to or even destroy the potential creative performance. At later stages, however, they are very much welcome in order to gain insight into phenomena that are of relevance. If we are not aware of these systems' peculiarities, the potential creative outcome will be destroyed before getting a chance to develop – similar to a sensitive plant!

In line with the incitements above, I want to question traditional limitations with special regard to creativity research using the following critical points of discussion (some points have already been addressed within the »Planetary Model« above):

- System considerations on creative thinking still rely more or less on a mechanistic paradigm, but instead require a broader system consideration on different levels of complexity. Examples of this are e.g. the extension to multiple intelligences (Gardner, 1985; Solomon/Powell/Gardner, 1999).
- Haven't we reached a stage that requires more courage in our thinking and doing? Further, I argue that since complex systems are themselves characterized by change, dealing with them – from an observer's point of view but also from a stakeholder's point of view – requires flexibility and openness in one's thinking. Further, as Schumpeter already pointed out, innovation and consequently change are not really welcomed by the affected people (Schumpeter, 1980). Instead, because innovation consequently also implies destruction of former structures and the necessity to make changes within the system's borders, rejection and in many cases fear arise because of the unknown and the unpredictable.
- Therefore, shouldn't it be true for a creative science approach what innovation research assumes as a matter of fact for every other real world innovation process?
- Understanding creative processes and complex problem-solving as a whole might need more thinking which considers not increasingly smaller systems such as atoms or quanta, but instead bigger systems such as e.g. organizations, cultures, and humankind or GAIA. What role can complex problem-solving and creativity play for the attainment of an extended form of sustainability not only focusing on the needs of present and future humankind with regard to social, economic, and ecological affairs, but also with respect to GAIA as its own entity, together with specific rights for animals and plants released from their utility for humans?
- The concept of quality of life, well-being, and poverty have to be rethought by extending the existing systems view by also taking into account elements such as inner joy, happiness, etc. (e.g. considering behavioural habits of an immense part of the population in Tibet; experiencing and showing happiness and joy while simultaneously being poor and annexed by China as their conqueror). Although, for sure, such concepts are difficult to measure, that cannot be a reason for not trying to take them into consideration. This also strongly influences the concept of sustainability.
- Don't we need more tolerance for not only different thoughts, paradigms, cultures, but also different scientific points of view?
- Isn't it time to start discussing the scientific taboos of belief and prayer (not to be equated with religiousness)? How can a serious scientist believe and pray without losing one's identity?
- »….this place gives me a good feeling.« Is this really just about what we get through visual, auditory, kinaesthetic, olfactory, and gustatory senses?
- ….and further, what if complex problem-solving is not limited to processes within our brains and our body?

Let's have a closer look at the last question, what it implies, and its consequences for the understanding of creative problem-solving processes.

## 5 What if Complex Problem Solving is not Limited to our Brains or Inner-Human Systems?

It has been said so far that creative problem-solving must be considered a needed means for dealing with complex problems on an individual, organizational, and inter-organizational level. As pointed out within the »Planetary Model,« the systems dynamics usually increases from the first to the third one, but always under the pre-assumption as given that creative processes are determined by divergent and convergent thinking processes within the human brain.

By focusing on an individual, creative performance can be understood as a function of attention, intrinsic motivation, time, and knowledge (see Equation (1)) (Steiner, 2005).

$$CP(Ind.)= f(A, Mi, T, K) \tag{1}$$

| | |
|---|---|
| CP(Ind.) | Creative Performance of the individual |
| A | Attention |
| MI | Intrinsic Motivation |
| T | Time |
| K | Knowledge |

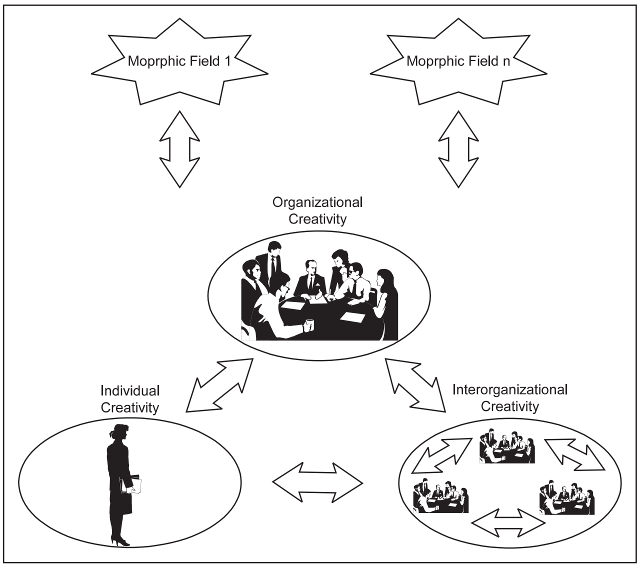
The peculiarities of these single factors of the individual creative performance are:

- Every single factor has to be provided.
- No single factor can be substituted by others.
- The interplay between the individual factors builds the basis for a potential creative performance of the individual.

By going a step further, the overall creativity of a group or of an organization within collaborative problem-solving is much harder to determine, since it cannot be assumed that this is just the sum of the single individual performances, but instead synergies might allow creative solutions to emerge that are the result of associative thinking among different people with different backgrounds, different experiences, different value systems, and different expectations (Steiner, 2005; Risopoulos/Posch/Steiner, 2004).

By assuming the existence of morphic and morphogenetic fields,[2] it becomes obvious that creative performances other than thinking processes within the inner human system and communication between people and within groups or between organizations are further influenced by evolving morphic fields (see Figure 3).

**Figure 3:** *Creativity and Morphic Fields*




The assumption behind the theory of morphic fields is that the mind is not limited to our brain, but is extended beyond it. This view of an extended mind is different to the view of a contracted mind inside the brain. In any case, the morphic field does not represent an »amorphous,« »undifferentiated universal mind,« or God, but instead it has to be seen as a part of our individual and collective mind (Sheldrake, 1992; Sheldrake, 1997). Behind the underlying »hypothesis of formative causation«[3] lies the assumption that nature itself possesses a memory. This memory is of a collective and cumulative kind and implies that, e.g. besides its personal memory an individual has access to a collective memory of the same species through non-material force field, known as morphic field. Through this, the individual gains access to formative causation leading to specific learning habits according to the accumulated experience within the morphic field. Consequently, morphic fields can spread in space and continue over time, also called morphic resonance. In this understanding, forms, structures, and habits of organisms, as well as molecules, atoms, and the whole cosmos are strongly influenced by these morphic fields.

With special respect to human beings as potential problem-solving agents, this implies that their habits would not simply be based on their genes and the experiences made within their personal development or due to the influence of the society around them, but – and this is very much speculative – also by the learning experiences of former generations and societies which are not in immediate contact with the specific individual.[4] By asking the »what if« question, what if there is really something like a morphic field, it becomes obvious what implications this would have for creativity research: an additional perspective of creativity besides individual, organizational, and inter-organizational (networks) creativity would need to be considered, that of a collective creativity inherent in morphic fields (see Figure 3).

With this concluding example, I want to point out the necessity to be open to different perspectives. It has been openness and curiousity that built the basis for gaining insight into a broad variety of scientific fields together with the courage to question prevailing paradigms.

## References

1. Gardner, H. (1985), *Abschied vom IQ: Die Rahmentheorie der vielfachen Intelligenzen.* Klett-Cotta, Stuttgart.
2. Gomez, P., Probst, G.J.B. (1999), *Die Praxis des ganzheitlichen Problemlösens. Vernetzt denken, unternehmerisch handeln, persönlich überzeugen,* 3., unveränd. Aufl., Haupt, Bern, Stuttgart, Wien.
3. Laws, D., Scholz, R., Shiroyama, H., Susskind, L., Suzuki, T. and Weber, O. (2002), *Expert Views on Sustainability and Technology Implementation*, Working Paper 30, ETH-UNS, Zurich, and accepted in International Journal of Sustainable Development and World Ecology.
4. Mulej, M., Bastic, M., Belak, M., Knez-Riedl, J., Mulej, N., Pivka, M., Potocan, V., Rebernik, M. Ursic, D., Zenko, Z. (2003), »Informal Systems Thinking versus Systems Theory,« *Cybernetics and Systems*, Vol. 34, No. 2, pp. 71-92.
5. Mulej, M., Trninic, V., Pozdnyakov, V. (2004), »Support to Creativity as a Precondition of Growth and Innovation in CEECs,« Rebernik, M., Mulej, M. (eds.): STIQE 2004, Proceedings of the 7th International Conference on Linking Systems Thinking, Innovation, Quality, Entrepreneurship and Environment, Maribor, pp. 73-80.
6. Perman, R. (1997), *Natural Resource and Environmental Economics*, Addison Wesley Longman, London, New York.

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[2] Morphic fields and morphic resonance go specifically back to the research of Rupert Sheldrake. He further points out that since the 1920s many developmental biologists propose that morphogenetic fields are responsible for biological organizations. These fields are also sometimes called biological fields, developmental fields, or positional fields.

[3] »The hypothesis of formative causation…postulates that organisms are subject to an influence from previous similar organisms by a process called morphic resonance. Through morphic resonance, each member of a species draws upon, and in turn contributes to, a pooled or collective memory. Thus, for example, if animals learn a new skill in one place, similar animals raised under similar conditions should subsequently tend to learn the same thing more readily all over the world. Likewise people should tend to learn more readily what others have already learnt, even in the absence on any known means of connection or communication (Sheldrake, 1992).«

[4] Sheldrake conducted a large series of experiments on the hypothesis of formation causation. See also Sheldrake, 1992; Sheldrake, 1997; Sheldrake, 2003.

7. Risopoulos, F., Posch, A., Steiner, G. (2004), »Transdisciplinary Creation of a Shared Vision for Sustainable Development,« Rebernik, M., Mulej, M. (eds.): STIQE 2004, Proceedings of the 7th International Conference on Linking Systems Thinking, Innovation, Quality, Entrepreneurship and Environment, Maribor, pp. 109-117.
8. Scholz, R., Mieg, H.A., Weber, O., Stauffacher, M. (1998), »Sozio-psychologische Determinanten nachhaltigen Handelns,« *DISP (Documents and Information on Local, Regional, and Country Planning in Switzerland)*, No 133, pp. 14-21.
9. Scholz, R., Tietje, O. (2002), *Embedded Case Study Methods, Integrating Quantitative and Qualitative Knowledge*, Sage, London, New Delhi.
10. Schumpeter, J.A. (1980), *Kapitalismus, Sozialismus, und Demokratie*, 5. Aufl., Fancke Verlag, München.
11. Sheldrake, R. (1992), »An experimental test of the hypotheses of formation causation,« *Biology Forum,* 86, Vol. 3, No. 4, pp. 431-444.
12. Sheldrake, R. (1997), *Das Gedächtnis der Natur. Das Geheimnis der Entstehung der Formen in der Natur*, 3. Aufl., Piper Verlag, München.
13. Sheldrake, R. (2003), *The sense of being stared at and other aspects of the extended mind*, Crown Publishers, New York.
14. Solomon, B., Powell, K., Gardner, H. (1999), »Multiple Intelligences,« Runco, M.A., Pritzker, S.R. (eds.): *Encyclopedia of Creativity,* Vol. 1, Academic Press, London, pp. 273-283.
15. Steiner, G. (2002), »Dynamic Creativity Management as a Tool for Sustainability – a Constructivist Point of View,« Rebernik, M., Mulej, M. (eds.): STIQE 2002, Proceedings of the 6th International Conference on Linking Systems Thinking, Innovation, Quality, Entrepreneurship and Environment, Maribor, pp. 145-152.
16. Steiner, G. (2003), »Kreativitätsmanagement: Durch Kreativität zur Innovation,« Strebel, H. (Ed), Innovations- und Technologiemanagement, utb, Wien.
17. Steiner, G. (2005), *Kreativitätsmanagement*, Gabler duv, Wiesbaden.
18. Steiner, G., Laws, D. (2005), »From Harvard Business School to Transdisciplinary Case Studies,« *International Journal of Sustainability in Higher Education* (in print).
19. Steiner, G., Posch, A. (2005), »Higher education for sustainability by means of transdisciplinary case studies: An innovative approach for solving complex, real-world problems,« *Cleaner Production* (in print).
20. Strebel, H. (1997), »Nachhaltige Wirtschaft – Sustainable Development als Problem einer umweltorientierten Betriebswirtschaftslehre,« *UmweltWirtschaftsForum* No. 2/97, pp.14-19.
21. Strebel, H. (2002), »Möglichkeiten und Grenzen nachhaltiger Wirtschaft im Unternehmen,« Keuper, F. (ed.): *Produktion und Controlling*, Gabler, Wiesbaden, pp. 105-125.
22. Thompson Klein, J. (2001), »The Discourse of Transdisciplinarity: An Expanding Global Field,« Thompson Klein, J., Grossenbacher-Mansuy, W., Häberli, R., Bill, A., Scholz, R.W., Welti, M. (eds.): *Transdisciplinarity: joint problem solving among science, technology, and society: an effective way for managing complexity*, Birkhäuser, Basel, pp. 3544.
23. UN (1992), *The Rio Declaration on Environment and Development*, Rio de Janeiro.
24. World Commission on Environment and Development (1987), *Our common future*, Oxford University Press, Oxford, New York.