HOLISM, ACTION ORIENTATION, ETHICS

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ABSTRACT

Starting from my contribution to the ISSS-Conference of 2000 (Conference CD, #45), I consider systems science as an instrument of networking the specialized disciplines on a holistic basis. For the realization of any concrete projects in the real world, like striving towards sustainability in any given local community, system science depends on cooperation with the specialized disciplines. This raises three problems:

What is the "coherent philosophical perspective" (Midgley, 1998, 2) that allows for both the "unity of Science" and the multitude of diciplinary approaches and methodologies ?

How is the cooperation organized ?

Are there any other scientific approaches that compete with systems science for this networking task ?

Contributions to answers are searched for in the following directions:

Holism as a basic systems science concept is seen as having the function to secure the inclusion of all the relevant factors needed for the solution of interdisciplinary problem. For organizing the cooperation, the normal modelling methods yield the paradigm to allow for the cooperation with scholars or practitioners from the specialized disciplines.

As a philosophical perspective, an approach to an action theory is suggested and will be sketched.

Concerning the quest for possible competing approaches, the philosophical domain of ethics is scrutinized in its aims and methods with the question of whether it could fulfill the same networking functions. Relations between systems science and ethics are discussed.

<u>Keywords:</u> networking the specialised sciences, holism, action orientation, ethics, routine behaviour, problem solving

Holism – Action Orientation - Ethics

Situation of Systems Science

In my contribution to the ISSS-Conference in the year 2000, I tried to underpin the view that the main function of systems science is the interdisciplinary networking of the specialised sciences. In this year's contribution, I want to draw a few conclusions as to the implementation.

Systems science as a scientific discipline has, after more than 50 years of development, not yet established its indispensability in the total context of the different sciences. In interdisciplinary applications of science it is by far not customary to include routinely a system scientist as co-ordinator or counsellor. These tasks are still decided by the project initiator or by the managers that are later on responsible for the project on the basis of their accidental disciplinary knowledge. Hardly any of those can, until now, include system orientated knowledge in their work.

In Osnabrueck we have been running a course of studies in systems science since 1989. The choice of this course of studies is more often generated by the contents referring to environmental protection than by the search for interdisciplinary system orientated methods. The general interest in the topic of environmental protection as a motivation for taking up these studies has been diminishing in the recent past, but the information about the interdisciplinarity of this systems science programme of studies is still insufficiently spread among the graduates from high school.

Now we have a rising proportion of those students that are searching for a kind of applied computer science or applied mathematics. There is a danger that, in the future, these students will directly choose computer science or applied mathematics; and won't take the detour via systems science; where these two subjects are important, but not the core of the syllabus. Interdisciplinarity as the main characteristics of systems science must be made more salient as a motivating factor for undergraduates and graduates.

This is dependent on the development of systems science as a scientific discipline. For that, the above mentioned priority of networking the specialised sciences must be made an attractive aim to be followed.

In the current scientific and public terminology, this function of networking the specialised sciences is very unprecisely indicated through the concepts "interdisciplinary, transdisciplinary, multidisciplinary".

An example for this and for the confusion that is associated with these concepts was the presentation at Osnabrueck of the philosopher Mittelstrass from the University of Konstanz in December 2000. For Mittelstrass, the unity of science is manifested in transdiciplinary research about inclusive problem areas like environmental protection or technology assessments. He sharply distinguished between interdisciplinary and transdisciplinary and favoured the concept transdisciplinary. His argumentation was partially plausible: "Inter" meaning "between" does not describe the reality of the co-operation of the disciplines. But “trans” meaning “beyond” is not totally correct either. In the layman public, these terms are not going to meet enthusiasm, so I would stick to the established term “interdisciplinary”.

Or a new concept could be coined and a consensus reached. How about meta-disciplinary ? Corresponding to meta-language and meta-theory ? Systems science would then be a meta-discipline together, among others, with philosophy.

A first conclusion from these remarks would be that it is necessary to describe concepts and methods of systems science in a very plausible way and to include in this the description of the relations of systems science to the total system of science in general. This has the triple function of

- reaching consensus in the community of systems scientists,
- convincing potential users in the specialised disciplines and in business administration, services and politics,
- motivating students to choose systems science as a programme of study.

Pragmatic Description of the Concepts of Holism and Action Orientation

Holism

In 1938 already, the German philosopher Schlick wrote: ”Holism has become a magic word, from which liberation from all difficulties is expected” (Schlick, 1938 (1965)).

Holism was developed as a scientific concept in opposition to reductionism. This is illustrated by citations from Klir . In his description of the development of systems science, he stresses the close connection to computer technology which for him is very important, but in the same paragraph he continues: ”the crucial factor in this emergence, however, was a host of systemhood-orientated ideas that have arisen in philosophy, science and engineering since the beginning of this (the 20th, E.U.) century. .... Perhaps the most important of these ideas .... were .... associated with a cluster of related views that are referred to as holism (from the Greek: holos, which means: a whole). The basic idea of holism is well captured by the famous statement: ‘The hole is more than the sum of its parts’, ... whose author is, presumably, Aristotle” (Klir, 1991, 24).

A few pages further down the text, Klir comes back to the significance of the idea of holism.: ”Holism, in opposition to reductionism, is undoubtedly one of the main roots from which the systems movement sprang. Initially a tendency towards a full commitment to holism and a total rejection of reductionism was quite visible in systems movement. Over the years, this extreme position became slowly moderated. Now the two doctrines are viewed, by and large, as complementary” (Klir, 1991, 30-31).

What is the significance of holism today and in a modern form of systems science ?
Holism can be understood as a designation of an extreme: The aim of including everything will never be reached, because in the end only the cosmos is the whole system. Those that

advocate holism rather have the intention to point out factors and aspects that are missing in a given analysis or scientific approach or scientific discipline. Because of this pointing to deficits, holism is also regarded as an expression of criticism by specialised scientists. An example is the scepticism that established scientist exhibit towards the famous author Capra, who wanted to introduce psychological and spiritual aspects into science. And was misunderstood by many of his readers as to aiming at abolishing the exact sciences. But what is needed is not rejecting them, but networking them into a holistic context.

For that, I want to suggest a working definition for a holistic systems science concept.

It starts from the conventional procedure of designing a systems model. Important steps that all our students learn in the first semester are:

- Statement of the problem that the model is supposed to solve,

- Detailed analysis of the existing situation,
  = Which are the most relevant factors?
  = How is the data situation?
  = How are the factors linked to each other?

- Designing a verbal model,
- Designing graphs and flow charts,
- Designing, if possible, a mathematical, computerized model.
- Testing and refining the model,
- Application of the model to the problem situation.

This procedure, with some variations, can also be applied to other problem solving situations. I will come back to that in the next section, action orientation.

Systems science for the sake of its function as a networking instrument must at the beginning of each research or strategy development project include the totality of the factors relevant for a problem. The verbal model must be as inclusive as necessary. This way, the holistic analysis is the first methodological step in a problem analysis or the analysis of the relevant state co-ordinates.

When all relevant factors, being studied by different disciplines, are included at first in a qualitative analysis, no limitations for including them can be accepted. Traditional reasons for excluding variables are:

- bad data situation,
- aspects being regarded as too complicated,
- certain factors being treated by other disciplines,
- certain factors having a low reputation in the scientific community,
- bad pre-requisites for mathematical modelling.

Only with the next steps in running a project, some of these factors have to be reckoned with as limitations. The relevance of this working definition is well illustrated by concepts that we use in our courses, the general circle of knowledge formation and action.

Action Orientation
Systems science that aims at networking the specialised disciplines for solving particular problems must have a clear idea about why and how people act.

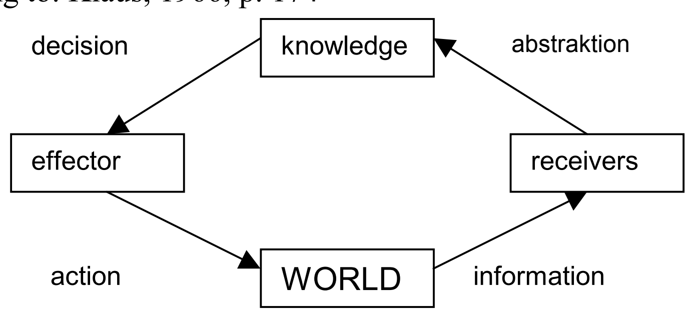
Action has been a continuous topic of practical philosophy and of certain applied sciences. Midgley (2000) presented a new synopsis of different approaches and of resistance to including action into systems science (Midgley, 2000, 272-277). He draws together a most impressive kaleidoscope of aspects underpinning the inclusion of action. But he then exemplifies it by referring largely to Community Operational Research (Community OR), a domain of action with a structure which is rather remote from everyday actions of ordinary individuals.

In the following paragraph, I would like to present a structural approach, giving a terminological framework to any purposive action, and allowing to see the factors involved in a holistic perspective. Domains of action like Community OR would be special cases with special basic factors to reckon with, with specialised methodologies and heuristics.

Perception - knowledge - action
The underlying reasoning starts with a holistic systems view of the main relations between

- the (mostly) outer world (or human environment or surroundings),
- perception by a person or actor,
- knowledge formation by actors and groups of actors and the structure of knowledge,
- decision making on the basis of knowledge,
- action, influencing the outer world.

Basic relationship between the actor and the world,
the latter being characterized by perception, knowledge formation and action
according to: Klaus, 1966, p. 174



Graphic 1: Perception - Knowledge - Action

This model was designed by the Eastern German cybernetician Georg Klaus, who called it "total feed-back loop of knowledge", though this particular model is not a feed-back loop, but just a circular process. It could easily be transformed into a feed-back loop, though.

The model can also be applied to non-human organisms. Implicitly inherent in the model is the basic fact that any organism, and as such a human, is compelled by his or her very nature to interact with the environment to maintain homeostasis.

Cognitive psychology and cognitive science have gathered a huge amount of evidence of how the human senses and the brain transform the incoming information and create an interior model of the actor's reality. Interaction with other human beings, language, and culture are important factors in that process. The interior model allows the person, among other functions, to evaluate possible outcomes of alternative actions before implementing them. The rate of success of actions thus increases, with positive effects on survival of the person and the human species.

Psychology has also made clear the important role of emotions for decision-making, i.e. transforming knowledge into action (cf. e.g. Spada, 1993). He enumerates more than 50 types of emotions in this context. Emotions are suggestions or impositions of the nervous system to evaluate incoming information. They often conflict with results of rational assessment of consequences. The question of how these conflicts are solved cannot be treated here.

The structure of decision making is made more explicit in the next paragraph.
Still referring to the diagram on perception - knowledge - action, it has to be repeated that action is the human means of maintaining homeostasis, in other words: of securing survival, but also of integrating oneself in a group and in a culture, and of shaping the environment according to human needs and tastes. The circle, beginning with the world and continuing via the actor and his different subsystems, is thus closed.

Two types of decision-making on action
In his interior model of his world, the actor has a set of every-day situations, in which he has learnt in the past how to act. He or she does not have to ponder about the actions to take in routine situations, in the family, at work, in his or her leisure time. The partners in the interaction confirm him in the routine behaviour, because they sanction deviations from their expectations by more or less subtle sanctions, either positively or negatively. Ubiquitous examples are the mother child-relationship or the teacher-student relationship. Sociologists call such structures "social roles".

More or less frequently, in the lives of actors, arise situations, where he or she has no routine behaviour in his interior model. The child behaves in an unusual way, therefore the mother is startled. Or the students are not satisfied with the routine behaviour offered by the institutional arrangements of a school or a college. When such situations arise, the actor has to engage in search processes. In cognitive psychology, these situations are called problem situations, which induce the actor to engage in a problem solving process.

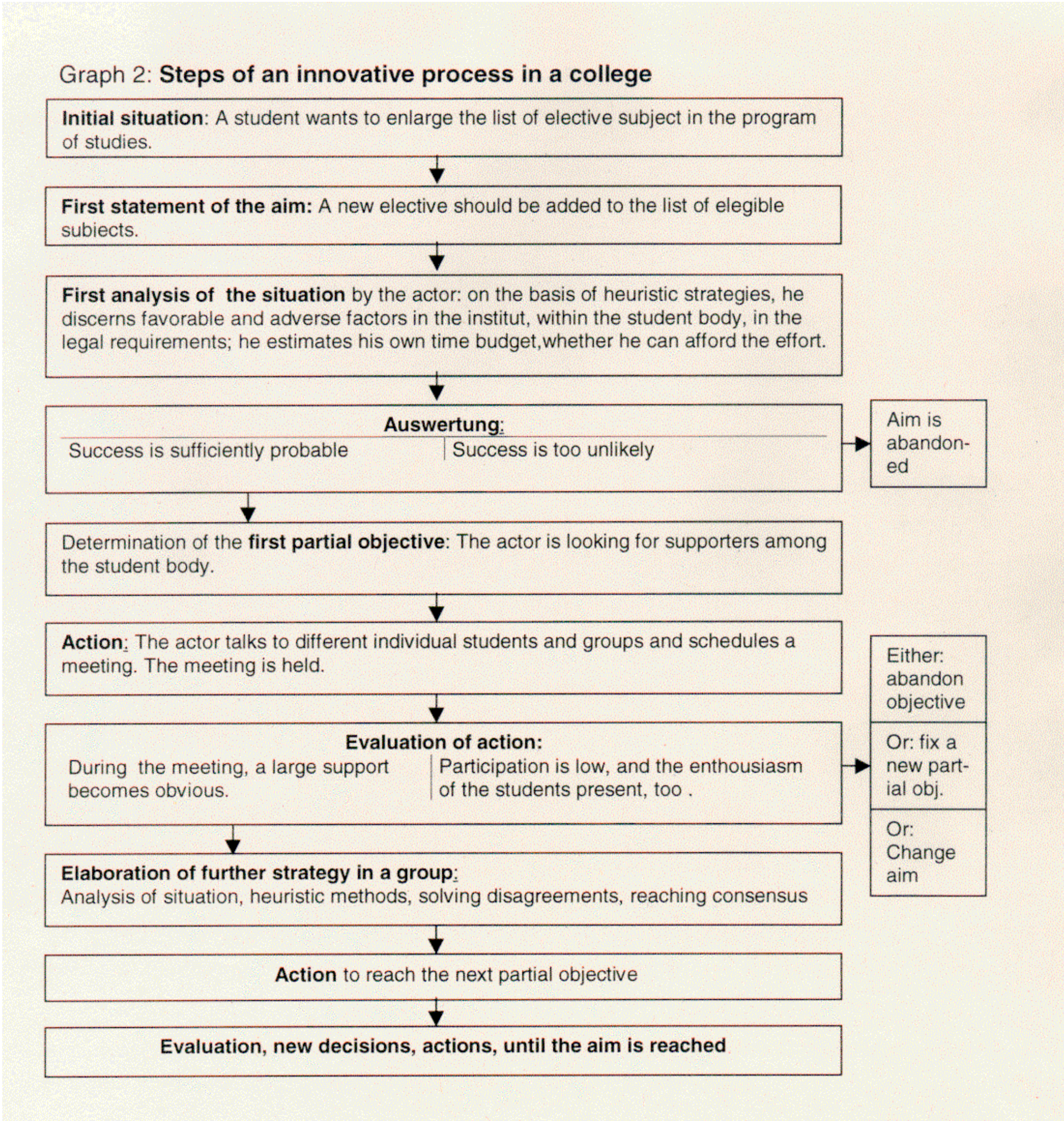
The next graphic contains the struture of such a process, taking the example of a student who wants to enlarge the list of elective subjects in his program of studies.

From the graphic can be concluded that such processes are

- iterative: similar sequences of action are repeated, especially the combination of analysis, planning, action, evaluation, conclusion;
- heuristic: strategies are taken from situation-specific knowledge and inference;
- open-ended: success is not guaranteed.

As has been pointed out before: lack of knowledge (poor interior model of the specific situation) makes failure more probable. But in this particular situation, failure is not final: the actor can always undertake new efforts, as long as he can afford investing the time. Thus failure is to some extent the result of his evaluation.

Any single action or sequence of actions can thus be interpreted as belonging either to routine behaviour or to problem solving behaviour or to a combination of both. In many routine situations, there are elements of problem solving; and in problem solving processes, elements of routine behaviour are contained.



Graphic 2: A problem Solving Process

My experience in research and teaching since the 1970s has convinced me that these terminological distinctions, with the underlying world view, facilitate the explanation of actions of others and the planning of own actions in a holistic way. Thus this terminology is suggested to be part of the basic consensual systems science terminology.

The underlying world view is characterised by, among others, evolutionary epistemology and a moderate constructivism, both of which cannot be elaborated upon here.

Systems Science and Ethics

Relevance of the topic
The reason for including the topic of systems science and ethics into this contribution stems from a comparison of

- on the one hand, systems science analyses and strategy developments for environmental protection and technology assessment and

- on the other hand, works by philosophers of ethics, that use pragmatic methods and do not start out with dogmatic propositions.

This comparison seems to show that the main line of arguments and the methods to come to conclusions are basically very similar in both approaches. Both seem to start with few simple value judgements, and take the multitude of methods of assessment of consequences as basis for their argument.

This observation was complemented by another one as to the importance to ethics. In Germany and, to a lesser degree, in the European Union (EU), the public and political debates on biotechnology, reproductive medicine, the reform of the old age security system and other issues that split the public, are increasingly characterised by the inclusion of ethical arguments and of scientists that consider themselves philosophers of ethics.

Ethics in public debates
A few examples for that tendency are the following:

- In the German Ministry for the Environment, as early as 1989, there was a bureau for Ethical and Social Policy Questions of Environmental Policy.
- The German Ministry of Health appointed an Expert Council on Ethics in the Health System.
- The Commission of the EU, in 1999, held a conference on "Ethics and Science - the social, legal, and philosophical debate" (Braun, 2001, 38).
- The German Government's Scientific Council on Global Change issued a special expertise on environment and ethics in 1999.
- In the Expert Council on Environmental Questions, an expert on ethics was appointed in the year 2000.
- At the University of Bonn there is a special Institute for Science and Ethics.
- At the University of Tuebingen there is a inter-departmental Centre for Ethics in the Sciences.
- There is an Academy for Ethics in Medicine in Goettingen, Germany, and a Centre for Ethics in Medicine at the University of Bochum.
- In the German Parliament, a Study Commission on Law and Ethics of Modern Medicine was established for the current electoral term.
- The German Federal Chancellor is planning to appoint a National Council on Ethics.

This impressive lists shows the significance that ethical arguments seem to have for the discourse on the development of science and technology in Germany.

Jonas and Meyer-Abich as influential philosophers of ethics
The author of this contribution has especially consulted the main publications by two famous philosophers of environmental ethics, namely Hans Jonas and Wolfgang Meyer-Abich.

Hans Jonas (1903-1993) was born as a Jew in Germany. After 1933, he had lived in Israel and Canada, and in the US since 1955. In his main publication ”The imperative of Responsibility”, he is moved by the concern about the harnessing of the powers of technology in the context of a nihilism of the ruling value system (1984, 57). He advocates a transcending of the prevailing egoism in favor of a responsibility for the life and its qualities of future generations. He roots this imperative in the philosophic, social and political thought since antiquity.

The German philosopher Meyer-Abich is relevant in Germany, as well because of his book “Ways to Peace with Nature” as for his activities in politics, especially environmental politics. He was, in 1984-87, Senator for Science and Research of Hamburg, a German federal state (Land), and a member of numerous important advisory bodies and study groups. He sees philosophy as the science of networking the specialised disciplines. He bases his arguments for environmental protection on a holistic approach of philosophy and especially ethics. In his interdisciplinary working-group Environment - Society - Energy, he devoted ethics to that task. Here is his justification of the capacity of philosophy to realise this co-ordinating function: ”The multifold disciplines whose isolation is seen as problematic in the present originated from philosophy, so that they have in philosophy their spiritual centre. At least some professors of philosophy ought to devote themselves to this task, and I wanted to be one of them” (Meyer-Abich, 1984, 16). This idea is deepened in section 10.4 of the same book, (ibidem, 231ff.)

Basic values of environmental ethics
In evaluating the public debates and the works of the two authors, a very small number of basic principles of ecological ethics can be discerned, irrespective of additional dogmatic arguments:

1. Human life (with qualities equivalent to the level we have today) and the biosphere is supposed to be protected into the distant future. In other words: Humanity today should not destroy the possibilities for life in the future (Kueng, 1996, 236)
2. Human life in the stable context of ecosystems characterised by bio-diversity, is in the long run more secure and preferable to life in ecosystems shaped by short range economic interests, loaded with pollutants, and with a reduced bio-diversity.
3. The realisation of 1 and 2 is possible only

– if the world-wide welfare and life qualities are distributed much more equally between countries and social groups as today and
– if there is a redistribution of advantages and loads transcending the present generation and including the interests of future generations.

The most basic of these values certainly is value 1. Value 2 can partly be regarded as instrumental for value 1. Value 3 can be considered partially instrumental for the realisation of 1 and 2.

But this does not include everything that is important for the advocates of these basic values. The values 2 and 3 go far beyond the instrumental aspects: they express a sympathy for fellow people and fellow creatures that is characteristic for many persons in our present world.

In addition, valuation 3 also contains a social orientation with the aim that drastic conflicts on the distribution of wealth and life qualities should be avoided by prevention, before they become acute.

Similarities and differences between ethical approaches and systems science approaches
As regards environmental issues, results of the scientific works based on ethics as they were mentioned in the last paragraph are nearly congruent to works based on systems science principles (Meadows et al., 1972; Mesarovic, Pestel, 1974; Global 2000, 1981; Jischa, 1993). The methods of both approaches are characterised by holism and by assessment of consequences. The results contain warnings and suggestions for actions to take. In both approaches, the initial problem is seen in the threat for mankind and the biosphere posed by the new technologies and the population explosion that resulted from science and technology. Both approaches are characterised by holistic methods.

But there are differences: Ethical approaches base their arguments more on interpretation of basic notions like ”nature” or ”values”, which are the basis of justification of actions and strategies. Systems science approaches begin with analyses and computer calculations and draw conclusions in the form of measures to take which can lead eventually to the formulation of general norms.

The conclusions for practical actions cannot in principle be differentiated according to whether they come from a systems scientist like Meadows or Jischa or from philosophers like Jonas or Meyer-Abich. Both classes of approaches concentrate on issues like

- avoiding emissions,
- Protection of bio-diversity,
- protection of ecosystems,
- development of environmental consciousness,
- environmental education,
- reducing the level of consumption in industrial countries,
- new lifestyles.

Co-operation between systems science and practical philosophy
We need a form of co-operation between systems science and practical philosophy or ethics. For practical purposes, in large projects, a philosopher and also a systems scientist ought to be part of the team. By that, the conceptual and methodological limits of the representatives of these approaches would be transcended. Prejudices of project participants regarding one-sidedness of methods of the co-ordinators would be reduced.

In this context the question arises in how far these representatives of both of the two approaches exist in a sufficiently large number. Capable representatives of the two approaches may not be available. The reason for that is that in philosophy orientations go predominantly into other directions and in systems science the number of trained persons is small.

Co-operation between ethics and systems science should not be limited to isolated contexts with different projects. Rather, the representatives of both communities should exchange their findings in epistemology, methodology and contents on conferences and by means of presentations. A positive example, which I mentioned already, was the presentation by Mittelstraß in the Systems Science Forum at the University of Osnabrueck. He described some possibilities and also limits of such a co-operation. Also collections of articles by different authors must be welcomed to the topic of sustainable development. Anexample is a collection, edited by Kastenholz from the Academy for Technology Assessment of the State of (Land) Baden-Wuerttemberg. In this collection of articles the principle of co-operation suggested above is realised by the inclusion of a psychologist, a philosopher and a theologian.

Environmental ethics and environmental systems science are largely complementary on behalf of their points of departure at the opposite poles of the normative approach on the one hand and the data and concept analysis or data and structural analysis on the other hand. From their co-operation, a considerable thrust to solve these problems could develop. This could lead as well to a more precise statement of necessary action in environmental policy, environmental management and environmental behaviour of citizens as to convincing the actors to realise the strategies that were found necessary.

Thus, systems science would be rendering service to humanity in co-operation with philosophy and the specialised disciplines.

Conclusions for Further Action
– To enhance the function of networking of systems science, in project management, the qualification of councellors or co-ordinators for networking disciplines should be developed. Not recommendable is the continuation the status quo: networking the disciplines on the basis of the accidental orientation of the project manager.

– The concept of ”meta-discipline” and ”meta disciplinary” for scientific use should be considered; the alternative would be the use of the three concepts inter-, multi- and trans-disciplinary. But these widely used expressions should be maintained for popular communication.

– – Basic notions in systems science should be further concretised in order to communicate them to a large public, as was tried in this contribution for the terms ”holism” and ”action”.

– – The main aim must be to present systems science to a large public in a convincing and understandable way.

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