

TRANSDISCIPLINARY AND INTEGRATIVE SCIENCE: HUMANITY'S MIND AND POTENTIAL

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Summary

We put forward two fundamental problems with which humanity is confronted in relation to sustainable development, and analyze them from a transdisciplinary point of view. The first problem is related to the incapacity of human talent to control and steer the actual complex world society. We suggest some solutions to this problem, ones that arise from a comparison of human society with the human mind and body as a multicellular entity, and analyze the way in which human society could develop the capacity to see, think, evaluate, and plan for the future as a semi-autonomous cooperative system. The second problem is related to the confusion and misunderstanding that exists in our actual society about the fundamental contradiction between potency and variety versus efficiency and yield. We show how this contradiction is a profound property of all layers of reality. By transdisciplinary reflection we investigate the ways in which solutions to this contradiction in old layers of reality can be applied to the present day. We show that very concrete problems, such as the problem of the acceleration of present-day society and the problem of peaceful collaboration, are due to the subtle confusion about this contradiction, and apply our analysis of it to the proposal of concrete solutions to these problems.

1. Knowledge, Science, Integration, and Transdisciplinarity

The cosmos, the solar system, and the Earth are self-sustaining. They are the result of billions of years of evolution and survival, and have settled themselves into stable and self-supporting patterns of existence. The plant and animal kingdoms that have come into being on the surface of the Earth are organized according to the same evolutionary groundswell, in ever-varying complex interaction with their surroundings, which in turn are also changing and adapting. It is this interaction, which leads to stable, and symbiotic forms of existence. The aim of sustainable development is to investigate how human beings, as living, thinking, acting, and evaluating creatures, and how humanity as a social and cultural entity, can fit into this basic “natural” dynamic, so as to safeguard their long-term survival. This is not a trivial matter; evolutionary history is strewn with extinction.

The specific new feature that humanity has introduced into the world is “knowledge,” with its corresponding potential for “action” and “influence” on the environment. Knowledge itself generates some of the risks of extinction; the threat of nuclear obliteration during the Cold War is just one illustration that springs to mind. However, knowledge also provides us with certainly the most important and perhaps the only available tool by which the goal of sustainable development may be achieved. It might therefore constitute humanity’s most precious asset in striving for a better, more valuable, and more beautiful world.

One of humanity’s precious attainments is the structuring of knowledge into experimentally testable or verifiable systems of prediction and clarification, which we call “science.” Scientific knowledge as a basis of more sophisticated ways of looking at the world has become the most important point of reference for humanity in its quest for a sustainable planet. However, this same knowledge not only carries in itself the risk of misuse, but is also fundamentally fragmented. The scientific method tends towards ever-increasing specialization as a result of its necessary preoccupation with analysis and expertise, leading to fragmentation of the total body of knowledge. Equal in importance to analysis, however, are synthesis and integration. It is in integrating different fragments of scientific knowledge that humanity is able to discover profound and more general aspects of the world. Synthesis will be of even greater importance with regard to sustainable development, because the principles by which humanity’s actions must be organized on a planetary scale will of necessity be integrative. Science, as used in this article, should not be considered in a narrow-minded way as a system focused on testing and predicting only. Since Karl Popper’s critique on induction, philosophers of science know that the quest for clarification and the construction of integrated worldviews, partly based on metaphor and intuition, play an important, not to say dominant, role in science. This awareness has not yet spread to many scientists, such that along with the efforts of integration and transdisciplinarity, a deeper understanding about the nature of science has to be achieved.

Special attention to transdisciplinary and integrative research, and a better understanding of science itself, will be of crucial importance in the decades to come, as well as being necessary to counter the pressure for specialization and fragmentation generated by the social structures involved in the current scientific dynamics of society.

The most convincing way we can argue for the importance of transdisciplinary research, and the common action that results from it, is by putting forward a concrete analysis of what in our view are several of the major problems with which our present world society is faced. We would then like to show how this analysis arose from transdisciplinary reflection on these problems.

2. Individual Human Talent: Seeing, Thinking, Evaluating, and Planning

Most living creatures on Earth have developed ways to “see” and “predict” aspects of the future. In diverse ways various non-human animals have even superior senses to humans; for example, birds can predict earthquakes. Humans have however developed a distinct and specific capacity to “think,” “evaluate,” and “plan” for the future. The higher mammals also have these capacities to a certain extent, but they remain at a primitive level compared to humans. The individual human capacity to “see” (that is, “foresee” as well as see visually), “think,” “evaluate,” and “plan,” “see,” which developed during a long evolution in symbiosis with the material and living entities our ancestors cohabited with, is a marvelous and unique quality. As far as we know it has not developed anywhere else. It is based on very subtle dealings and interaction with the evolution of the entities in reality, which surround and influence the individual human, and which he or she influences. It challenges the intrinsic impossibility of predicting the future, and plays with the ability to change and direct reality. In the following section we shall focus on several of these aspects; first of all, however, we want to point out what in our view will be one of the greatest problems for humanity in the future.

The marvelous capacity that humanity has developed for “seeing,” “thinking,” “evaluating,” and “planning” for the future is at present in crisis, as a consequence of the globalization of world events. This capacity developed in a situation where humans moved between relatively small communities, and were confronted by a relatively simple interactive dynamics (certainly when one compares it to the present state of world events). It is becoming increasingly clear that this capacity is losing its ability to keep a directive and influential hold on the evolution of today’s world society. It still works to a degree, by means of the system of states, peoples, and associations that developed in the run-up to our global world society, but the impact of this individual ability has been drastically reduced. This loss can be largely put down to the increasing complexity of the world society. At first sight it looks like a hopeless situation, because no one believes that the world society will once again become simpler, either spontaneously or by its own will.

Yet we would like to put forward a view that may offer a solution to this fundamental problem. This view implies a fundamental change with regard to the way the “political aspirations” of various action groups are expressed. What it largely comes down to is that humans have to orient themselves towards an organization of society, whereby the society itself, as a living, semi-autonomous, and interactive structure, develops the capacity to “see,” “think,” “evaluate,” and “plan,” and does this in a “forceful way.” As a result of this enterprise, a society that is “strong” should emerge—one that has the capacity to take advantage of unexpected changes. Humanity should aspire to an organization of society in which it gradually, step by step, develops “eyes,” “mind,” “morals,” “planning ability,” and “potential” as an emergent property of society itself.

We will refer to this emergent property of society as humanity's mind and potential. To make clear what we mean we would first like to analyze several examples in this light.

A peculiar phenomenon occurred in the developed countries from the 1970s: a long-term unemployment problem. Large numbers of people were no longer able to participate in the dynamic of the developing society, and had to be taken care of by the safety net of social security, which had originally been designed for occasional cases of unemployment. When we look at this with hindsight we can point out with apparent ease the direct cause of this evolution, which is in fact still applicable today. The nature of the work offered does not correspond to the abilities of the labor force. This is why it is mainly the semi-skilled and unskilled workers who suffered, and are still suffering from this problem. The remedy would appear to be additional training, so that they would again be qualified for a job that fits in with the dynamics of our society. But this is a shortsighted analysis that ignores the essence of unemployment. Let us try to put the phenomenon into a broader context.

In our society, apart from the long-term unemployed, there are also many who are employed but who are not doing the work that they and society as a whole consider the most important and meaningful. For example, the dynamics of our society make no problem of putting capital into the development of more highly perfected electronics for a new, sophisticated electronic product. This means it is no problem for engineers to participate in society's dynamics in a natural way. However, our society makes it much more difficult to generate capital for people who want to work, for example, in "development cooperation" or "health care," or even just "work for a better world in general" To mention only one specific example: mothers or fathers who decide to stay at home and take care of their children for several years in order to give them love and care are perhaps the least appreciated "workers" in our society. They receive neither economic support nor educational recognition, even though they are occupied with what is recognized to be a very important and long-term task in our society. Many other examples can be given where the tasks that are commonly considered to be most valuable are less easily funded by our society. So it is possible to claim with some certainty that humanity as a whole is occupied far too little with the really important things. We would like to make a few observations with regard to this last statement, so that it is not misunderstood.

The first is that we cannot really just know what "the most important things" are, or what it would imply "to work for a better world." This is a pertinent observation and we shall have to devote more attention to it later in this article. We shall argue that to a great extent we can know these things. In fact one aspect of the *Encyclopedia of Life Support Systems*, of which this article is a part, assumes that we can know this to greater or lesser degree, and that it is partly linked to the body of thought regarding "sustainable development." Nevertheless, we shall see in the sequel to our article that we are putting forward a highly specific analysis in connection with this question.

The second observation is that we do not want to make the positive assertion that humankind as a whole is too little occupied with the things that are really important in the framework of a moralist discourse on the nature of society. We do not believe it is right to think that people should in fact occupy themselves with "better" and "more

worthwhile” things, and that they are aware of it, but do not get around to it as a result of one or another characteristic of the human condition. It is rather the reverse: we believe that most people would like to become involved in things they consider more important and worthwhile, and by which they would be personally and intrinsically linked to the splendid and beautiful adventure of humankind on this planet, but that they cannot because they are all victims of the dynamics of society as it is now. It is made impossible for them, and this situation has become so natural over the years that we have already completely forgotten that it can be different.

This does not have to be interpreted as the common criticism of the present capitalist free market system that conquered the world after the fall of the communist system. That would be too easy and also incorrect. We think that the dynamic aspect of the free market has a special value that is worth fostering, and we also think that a “more worthwhile activity by society as a whole” cannot be achieved on the basis of a centrally organized state structure, such as communism tried to set up. We shall see how our continued analysis brings in well-founded arguments for this.

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Biographical Sketch

Diederik Aerts was born in 1953 in Heist-op-den-Berg, Belgium. He studied physics and mathematics at the Universities of Brussels and Geneva and obtained a Ph.D. in theoretical physics in 1981. He is now professor at Brussels Free University, and director of the Center Leo Apostel, an interdisciplinary and interuniversity (Brussels Free University, University of Ghent, University of Leuven) research center, where researchers from different disciplines work on interdisciplinary projects. He is also head of the FUND research group in the foundations of science at Brussels Free University. He is secretary of the International Quantum Structures Association (IQSA), and editor of the international journal *Foundations of Science*. He is a member of the board of directors of the Worldviews group, founded by the philosopher Leo Apostel, where the possibility of the construction of integrated worldviews is investigated, taking into account recent scientific findings.