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Responsible Economics

E.F. Schumacher and His Legacy for the 21st Century

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16 Initiating an Open Research System Based on Creativity

1 Introduction

In the Norwegian White Paper 'An Open Research System' (NOU 2011: 6) a call is made for initiatives to facilitate the experimentation with new types of knowledge and research methods. The reality of the ecological and societal challenges assaults us from many directions. The belief that scientific research could answer most of the challenges that arise in the interaction between man, nature and society has increased considerably in recent years. In this article we discuss critically to what extent specialized knowledge based on 'objective' research methods are able to live up to these expectations. The NOU 2011: 6 White Paper draws attention to the fact that the world around us is constantly changing, which leads to new challenges we must face and the need for new types of knowledge and skills. A key task for a well-functioning research system is that it has incentives to contribute to such renewal. This means that 'the individual researchers' ability for critical thinking, creativity, commitment, interest and exploratory behavior, must be stimulated' (NOU 2011: 6, 18). This means that scientists with other ideas or new initiatives across the established paradigms must get the chance to develop within the Norwegian universities and research institutions. The conclusion is that the research system in Norway must be able to contribute to 'the renewal of the specialized disciplines, renewal across established disciplines and to produce knowledge that covers the new needs of society and industry' (NOU 2011: 6, 133).

In the following paragraphs we discuss how such a renewal of the research system could be initiated from the need of a more open and creative attitude towards the world. Our point of departure is that our world is described too narrowly and in a biased way by the maps of life and knowledge – given to us through school and university. We are in particular inspired by Schumacher's *A Guide for the Perplexed* (Schumacher 1977). One of Schumacher's statements is that the maps are only showing things that can be proved to exist, based upon the principle 'if in doubt, leave it out'. It means that I may 'limit myself to knowledge that I consider true beyond doubt' and thus minimize the risk of error. But at the same time I maximize the risk of missing out on what may be 'the subtlest, most important, and most rewarding things in life' (1977: 3).

We argue that a more balanced approach between convergent and divergent thinking should be a central means to approach the problems in our time. We also argue that we need wisdom that may transcend the linear logic of either/or and that more is always better than less. Simple logic cannot help us to solve the most important divergent problems, which may be called divergent because they have no definitive answer. While convergent problems are solvable in principle, divergent problems cannot be solved by finding a correct formula. A divergent problem will not converge even when a number of highly competent experts try to study the problem and come up with answers. On the other hand, 'the more intelligently you study a convergent problem, the more the answers converge. And if they are not solved after a certain amount of time, they will be solved later with more time, and more money for research and development'. (Schumacher 1977: 121–2).

Schumacher does not use the concept of divergent and convergent thinking. His contribution is to make the distinction between convergent and divergent problems. To illustrate some of the importance of including divergent problems in the maps of the world, Schumacher refers to Aquinas who asserted that 'The slenderest knowledge that may be obtained of the highest things is more desirable than the most certain knowledge obtained of lesser things' (cited in Schumacher 1977: 3). Specialized research comes up with exact knowledge focusing on increasingly smaller parts of the reality. Holistic knowledge and understanding could never be exact in

the same way, but holistic knowledge is of great importance in many real-life situations, e.g. as a context for understanding how more specialized phenomena are interconnected. We believe that a distinction between divergent and convergent thinking may extend, deepen and complement Schumacher's contribution.

We describe divergent thinking as a method used to generate creative ideas by being open to a variety of possible solutions. One important part of divergent thinking is to ask new questions. To stress this point we refer to Einstein who stated that; 'Any intelligent fool can make things bigger, more complex, and more violent. It takes a touch of genius – and a lot of courage to move in the opposite direction'. In other words new answers to old questions are within the frame of convergent thinking while asking new groundbreaking questions presupposes divergent abilities.

The counterpart to divergent thinking is convergent thinking, which follows a defined set of rules to come up with one correct solution. We see divergent and convergent thinking as dimensions along a continuum. The difference is manifested in the extent of input variation and the transformation of new information. A wide breadth of categorization characterizes divergent thinking, while analytical–logical thinking characterizes the convergent thinker. Convergent thinking will provide 'the prevailing functions when the input information is sufficient to determine a unique answer' (Guilford 1967, 171).[1] Concerning divergent thinking we will emphasize two fluency-factors and two flexibilities factors, plus one redefinition factor. Divergent thinking consists of 1) *ideational fluency*, the speed of beliefs, an ability within a limited timeframe to produce ideas that satisfy certain criteria. 2) *Expressional fluency*, ability to produce new arrangements of words rapidly so that they satisfy certain structural criteria. Guilford emphasizes 1) because in a problem solving process usually a search for alternative answers and alternative solutions will be a key variable. Guilford argues that ideational fluency plays an important role in

1 We use Guilford's definitions because he was one of the first modern psychologists that made an important distinction between divergent and convergent thinking, and thus he opened a more nuanced way to look upon intelligence (see Grimsø 1976).

problem solving because many problems will need new and creative solutions. In addition, more creative thinkers are often flexible, stepping out of old thought paths, and dare to think in new directions. 3) *Spontaneous flexibility*, defined as an ability or disposition to produce a large variety of ideas, in particular across different categories. And 4) *Adaptive flexibility*, defined as an ability to vary ideas in accordance with the characteristics of the task. This ability will be manifested when it is impossible to come up with a good solution within the established frame of reference. Originality may be seen as part of adaptive flexibility because it involves the capability of leaving what is obvious, ordinary or conventional. In addition one more factor in our interpretation of divergent thinking may be added: 5) *Redefinition*, an ability to let go of old interpretations of known objects in order to use them in new ways. In general 'improvisation' will mirror the ability of redefinition (Grimsø 1976: 17–22).

A concrete example of divergent thinking may be found in some personal reflections by Martin Seligman, one of the fathers of 'positive psychology'. In a biographical note Seligman tells how he arrived at the conviction that a movement toward positive psychology was needed.

> The moment took place in my garden while I was weeding with my five-year-old daughter, Nikki [...] I am goal oriented and time urgent, and when I'm weeding in the garden, I'm actually trying to get the weeding done. Nikki, however, was throwing weeds into the air, singing, and dancing around. I yelled at her. She walked away, then came back and said. 'Daddy, I want to talk to you'.
>
> 'Yes, Nikki?'
>
> 'Daddy, do you remember before my fifth birthday? From the time I was three to the time I was five, I was a whiner, I whined every day. When I turned five, I decided not to whine anymore. That was the hardest thing I've ever done. And if I can stop whining, you can stop being such a grouch'. This was for me an epiphany, nothing less. I learned something about Nikki, about raising kids, about myself, and a great deal about my profession. First I realized that raising Nikki was not about correcting whining. [...] I realized that raising Nikki is about taking this marvelous strength she has [...] amplifying it, nurturing it, helping her to lead her life around it to buffer against her weaknesses and the storms of life. Raising children I realized is vastly more than fixing what is wrong with them [...] The broadest implication of Nikki's teaching was about the science and profession of psychology. (Seligman and Csikszentmihalyi 2000: 5–6)

In short, the turn towards positive psychology was a radical change from a disease framework by repairing damage to a new field based upon a human flourishing framework by studying strength and virtue. Psychology should not only be the study of pathology, weakness and damage, but also work, education, insight, love, growth and play. And for Seligman his little girl was the inspirational source for breaking out of the old paradigm and enter a new one.

Referring to the requests in NOU 2011: 6 asking for renewal in the research system we argue that the complexity of today's challenges force us not only to find new answers – it is even more required to ask new questions that pave the way for divergent thinking. Divergent thinking is styles of thought that are employed both in problem understanding and in solutions at the edge of or even outside the established scientific paradigms. The tradition of posing questions is not new. One tradition can be traced back to Socrates who posed a series of questions to help a person to discover his beliefs about some topic. However, Socrates' dialogues cannot simply be characterized as divergent, because seemingly the process had a known outcome defined a priori by Socrates himself. If so we might rather call his questioning a convergent process. The Socratic method, arriving at the one correct conclusion via logic and induction, was considered by Aristotle to be the essence of scientific inquiry.

To deal with the requirements of a renewed research system focusing on the connection between specialized science, holistic understanding and real life challenges, it is necessary to go deeper into the concept of divergent thinking. As already mentioned, we argue that it is necessary not only to use divergent thinking to find new solutions to the most important environmental and societal questions of our time, rather it is even more urgent to use divergent thinking to define new interdisciplinary questions. The reason is that the most threatening problems of our time are part of the living universe, while the existing 'materialistic science', to use Schumacher's terminology, is first and foremost concentrated on solving problems that are adequate for studying the dead parts of the universe – the most shallow part of it which may be called the mineral domain.

2 The Context of the Arguments – Levels of Being and Adaequatio

To grasp the importance of the distinction between convergent thinking related to the dead aspects of the universe, and divergent thinking involving life, it is necessary to determine what characterizes life. Schumacher introduced four Great Levels of Being (or Chain of Being); on the first level he defined characteristics of the mineral world (m), on the second level, characteristics of the plant world (p), on the third level, a description of the animal world (a) and on the fourth level Schumacher described characteristics of the human world (h) (Schumacher 1977: 15–38). According to Schumacher self-awareness which leads to freedom and inner experiences are features especially of the fourth level in the life pyramid. The idea is that physics and chemistry deal with the lowest level, the mineral world which consists of inanimate matter. Botanists work with the plants – the next level which consists of living beings, then zoologists investigate the animal world – the third level, which is characterized by living beings with consciousness. Finally, a number of professions deal with the human world – the top of the pyramid. Because human beings differ from all other beings by having self-awareness, professions like sociologists, economists, philosophers, psychologists are active on the 'top level' in the life pyramid.

An important aspect of the life pyramid is that human beings are on all the different levels. Man = m + p + a + h. Each higher level comprises everything lower and is open to influences from everything higher. According to Schumacher the 'most important insight that follows from the contemplation of the four great Levels of Being 'is that [...] at the level of man there is no discernible limit [...] Self-awareness, which constitutes the difference between animal and man is a power of unlimited potential [...] to become superhuman' (Schumacher 1977: 37–8). As an example, this understanding leads to a need for a revision of the rational instrumental definition of the economic man in economics.

Given the different levels of being – Schumacher introduces the concept of 'adaequatio' or adequateness in order to evaluate the fitness of

different methods to the different levels of being. The point is that nothing can be known without an appropriate method or instrument 'fitted to the object', i.e. the understanding of the knower must be adequate to the thing to be known. What Schumacher calls 'materialistic scientism' denies the reality of 'the invisibles' and focuses instead on what can be counted, measured, and weighed. This way of looking upon the world drastically reduces the richness of what exists in the world. The problem may be seen as a mismatch between the level of the knower – the scientist – and the level of the object of knowledge. Schumacher stresses that the result of materialistic scientism is not only factual errors, but something much more serious: 'An inadequate and impoverished view of reality' (Schumacher 1977: 42). The reason behind this statement is that perception is not determined simply by the stimulus pattern, rather it is a dynamic searching for the best interpretation of the available data.

This means that data do not speak for themselves. There are no innocent data. Data have to be seen, identified and interpreted by the scientist. And the essential question is then what is the scientist's context of interpretation? Or more precisely, what are the scientists' accepted theories? One consequence of this argumentation is that at the highest levels of being, science needs different methods and scientists that have developed their higher faculties in order to understand the depth of different kinds of lives.

A renewal of a research system inspired by Schumacher's life pyramid could contribute to creative interdisciplinary perspectives. In other words, research inspired by the life pyramid stimulates divergent thinking.

3 Convergent and Divergent Thinking

To understand the deeper difference between convergent and divergent thinking we must elaborate on the connection between text and context of interpretation. From the discussion so far, we can conclude that convergent thinking is based on a mechanical worldview while divergent thinking

is based on an organic worldview. According to Schumacher convergent thinking is the predominant style of thinking in our modern technological society.

This connection is also of great importance to understand the need for renewal of the research system in Norway. According to the distinguished Norwegian economist and humanist, Holbæk-Hanssen (2009), the mechanical worldview has been dominant in Norwegian institutions for higher education and science for a long period of time. He was particularly critical of the reductionist thinking that prevail in economics and other social sciences.

In convergent thinking, we locate the problem at the 'center' of our focus and then we gather resources to solve the problem. In fact there is an anxiety not to find problems that are 'solvable'. One consequence is that resources 'converge' on the isolated problems. The idea is that there is a single best solution to all kinds of questions. An example of convergent thinking might be the demand to grant constantly increasing amounts of money to fund research focused on technical solutions to problems connected to the growth in the global emissions of CO^2.

We will also see linear thinking as one aspect of convergent thinking. In linear thinking more is better than less, and still more is even better. The current energy and material intensive growth model which defines the global economy is an illuminating example of linear thinking prevalent in economics. Exponential growth in GNP is defined as a common measure of welfare and progress in society. The result is that the more growth there is in GNP, the more welfare and 'well-being' there are in a society. According to the Norwegian White Paper, 'An Open Research System' (NOU 2011: 6), we have to encourage researchers to ask critical questions to the well-established truths, to come up with new solutions of society's complex environmental and societal problems.

Linear thinking also means that faster is better than slower, i.e. it is always good to speed up, without noticing that the vehicle might be on the wrong track – leading to an abyss. According to Holbæk-Hanssen (2009), one of the most important problems connected to convergent thinking is not the thinking per se, but that convergent thinking has displaced other

possible ways of thinking. Examples of established truths within economics that could be questioned:

- To be healthy the economy must grow continually, i.e. increase the consumption of matter and energy
- In order to be happy people must consume more and more
- Economic growth is the presupposition for increasing the well-being for all people in the world
- To increase the level of well-fare amongst poor people, the rich must get richer.

An interesting path to follow, if we take the ideas in 'An Open Research System' seriously, is to put more focus on divergent thinking. We can summarize the previous discussion by saying that divergent thinking generates a much richer context of stimuli, which initiates new and creative modes of interpretation. A characteristic of divergent thinking is that the process of both problem identification and problem solving are located in integrated networks of occasions. This means that both the questions and the answers often are defined outside the original scientific paradigm. This understanding could be exemplified by a citation from the American economist Kenneth Boulding who discovered that 'the pursuit of any problem in economics always draws me into some other science before I can catch it' (Kerman 1974: 6).

Instead of doing research focusing on quantitative growth, more attention could be paid to stimulating qualitative growth in human well-being and environmental sustainability. Quantity, like matter and energy, tells us about the property of the parts. Within the mechanical worldview the sum total of the parts is equal to the whole. According to Capra and Henderson, qualities 'like stress or health [...], cannot be expressed as the sum of properties of the parts [...] Qualities arise from processes and patterns of relationships among the parts' (Capra and Henderson 2009: 7).

Today when we experience that most problems within economics and business administration are interconnected with an ecological and societal context, it becomes clear that the answers to economical challenges require understanding on a deeper holistic level (Ims and Jakobsen 2011). According

to Boulding 'knowledge is a many-storied hotel with poor elevator service. Each floor or "discipline" has many alcoves and balconies peculiar to itself. Nevertheless there is some sort of common ground plan, which is worth investigating. Furthermore the plans of one floor may give leads as to the dark corners of others' (Kerman 1974: 40).

In order to solve complex interdisciplinary problems we have to use different procedures than are applied to convergent thinking. Rather than gathering information and converge it on the central problem, we may change perspectives and interpret the problem in a different context, opening new perspectives, novel ideas, and creativity. Instead of searching for the one correct answer, we must open a whole lot of different possibilities. An example of using divergent thinking might involve asking for new ways of organizing society in order to reduce the consumption of fossil fuels.

Schumacher views divergent problems as problems beyond problem solving in a narrow sense. Divergent problems characterize our moral life. They are not to be solved, but grappled with. They are challenging the logical mind to the extent that 'the pragmatic scientist' tries to avoid them. Simple logic cannot help to solve divergent problems because it implies that if a thing is true its opposite cannot be true at the same time. However, divergent problems have often a paradoxical nature – when one attempts to clarify them, the more they diverge, and finally they may appear as opposites of each other, as for example growth vs. de-growth. These problems cannot be solved within a solely economic paradigm; they must be transcended by interdisciplinary paradigms where values are included. The question cannot be solved by an algorithm or a formula, we have to develop a holistic perspective where growth and de-growth are parts of a bigger organism.

The difference between green economics and ecological economics gives an illustrative example of convergent and divergent thinking respectively. Both branches of economics try to solve the environmental and social problems embedded in mainstream economics. Green economics by introducing minor changes based on the same toolkit as in mainstream economics, ecological economics by questioning the frame of reference. In green economics environmental and social costs connected to business activities are increasingly internalized. The principle is that damage caused by business activity is paid by the polluter. The idea is that by making the

environment into a costly commodity, business will be given an economic incentive to design environmental friendly products, procedures and uses of resources. Business managers will recognize that ecologically responsible activities represent a potential competitive advantage. Ecological economics accepts that our limited, linear way of thinking and problem solving often brings about unintended and undesirable affects. Management could not be studied in isolation since it forms part of a much larger network. Central in ecological economics is the concept of holistic thinking, including adaptability, flexibility, learning, self-organization and cooperation. The mechanical tool kit is replaced by the wisdom of organic life science in ecological economics.

Today it is more or less obvious that we can neither increase the total extraction of resources nor the total amounts of waste without disturbing Gaia's ecosystems seriously. This means that within a reduction to a scale appropriate for Gaia's source and sink capacity there will be continually changes. According to Capra and Henderson quantitative economic growth on a finite planet cannot be sustainable. Qualitative economic growth can be sustainable if 'it involves a dynamic balance between growth, decline, and recycling, and if it also includes development in terms of learning and maturing' (Capra and Henderson 2009: 8). This means that some industries may increase while others decrease. Economic growth may be pathological when we quantitatively use more resources than we have, on the other hand growth in quality of life could increase without damaging nature or society. Quality of life is connected to a fair distribution of resources within a sustainable nature.

4 Discussion

Based on 'An Open Research System' (NOU 2011: 6), which points out that research systems of great diversity are the most vigorous, 'diversity in methods and tolerance for alternative perspectives give a greater chance to

obtain new knowledge' (NOU 2011: 6, 18). In the report we find arguments claiming that in more complex environments, greater diversity is necessary. According to Boulding the 'reality is always a great multidimentional splodge' (Kerman 1974: 20). In the following paragraph we will discuss how these goals could be actualized.

According to Schumacher (1977), Capra (1982), and Holbæk-Hanssen (2009) most challenges and problems have to be grappled with through a practice in which convergent and divergent thinking are to be combined. In many situations it is relevant to encourage divergent thinking as a first step, in order to stimulate creativity and generate many novel ideas. Then the second step could be to transform the ideas into practical problem solving procedures.

Therefore, in practical problem solving it is wise to diversify our thinking patterns to include both divergent and convergent thinking. The problem is that the educational system to a large extent focuses on convergent thinking. As a consequence most scientists are trained to practise convergent thinking. In addition to intellectual pursuits and training the tendency to use either convergent or divergent thinking can also be explained as a result of personal characteristics and personal relationships. In our opinion it could be a good idea to combine people and networks with opposite characteristics because a predominantly convergent thinker may be inspired by collaborating with a divergent thinker.

Holbæk-Hanssen (2009) argues that creative people are characterized by openness to new ideas and perspectives in addition to having special individual skills or traits. He declared that the most creative ones often give test results similar to those you get from schizophrenia. But because they seem to have a stronger ego, they can manage to live with some unrealistic ideas, thoughts and images. Holbæk-Hanssen stresses that the features that characterize the creative individual do not solely consist in specific abilities, but he adds that creativity is associated with certain attitudes, certain forms of orientation towards life. These phenomena could not be explained as a specific set of skills, it is more a question of connectedness to the living world. The researchers rely heavily on personal experience of relationships. To understand creativity we have to focus more on relations than on objects. Key concepts in this research tradition are imagination, inspiration and intuition.

Imagination refers to the capability to suddenly 'see the whole context', as if in a picture (cf. Holbæk-Hanssen) In other words, a creative process that consists in finding or creating a pattern where the individual elements are joined together, synthesized into a whole. The whole represents more than the sum of the elements and the patterns of the connections are essential. *Inspiration* refers to an experience where the researcher understands how the part is connected to the whole. The researcher experiences the interconnectedness in the living reality. This experience is essential in the process of finding new solutions to divergent problems. In this perspective creativity is interconnected to a process where ideas are confronted with reality. Holbæk-Hanssen defines *intuition* as the capability to translate ideas into practice. Intuition is of great importance to finding solutions on how practical tasks should be solved or handled.

Holbæk-Hanssen states that an important measure to foster creativity is to create the conditions to abolish the old thought forms and paths by expanding the understanding of the interpretative context. Creativity is defined as the ability to develop, understand and implement new and better solutions. An important instrument to achieve this deeper understanding is to develop the ability to question the established paradigms. To succeed, the research training should not only pave the way for loyal paradigm carriers, as is the case today in many academic colleges and PhD programs at the universities. We must allow researchers to break out of the paradigm limitations and ask questions that promote creative thinking.

Our contention is that higher academic institutions for a very long time have put too much emphasis on educating specialists who have little training in looking at reality from different perspectives and seeing connections between different subjects. The consequence is that more and more researchers are working within distinct paradigms in which new and challenging perspectives have little space. According to Schumacher researchers are mainly working with convergent problems based on the idea that knowledge can progress cumulatively and that there are no hierarchical levels of knowledge. The price is 'Dealing exclusively with convergent problems does not lead into life but away from it' (Schumacher 1993: 76). Schumacher cites Viktor Frankel who formulated the problem connected to specialism 'not so much the fact that *scientists are specializing*, but rather the fact that *specialists are generalizing*' (Schumacher 1977: 5).

To explore these questions further we will argue that the problem with specialization is not over-specialization, but the lack of depth of knowledge. With reference to the preceding paragraphs we argue that the complex problems in the real world must be analyzed holistically, i.e. as components of the whole of which they are component parts. The main assumption is the recognition that today's science to a limited extent is able to capture the systemic nature of complex relationships that exist in the real world. Therefore, the sum of discipline-based expertise is inadequate to deal with the challenges which are perceived as complex and global in character.

The inadequacy consists both in the absence of interdisciplinary knowledge and understanding, and in the limited collaboration between science, practice and art. Both Schumacher (1977), and Holbæk-Hanssen (2009) argue that Western civilization is in a state of permanent crisis. According to Schumacher 'we are suffering from a metaphysical disease, and the cure must therefore be metaphysical' (Schumacher 1993: 80). Holbæk-Hanssen used the concept of 'spiritual cleaning' (åndelig storengjøring) to illustrate the same phenomenon.

Schumacher argues that we must have deeper knowledge, i.e. we must go deeper into the topics we are studying. In our opinion this means that it is necessary to disambiguate ontology and epistemology. To grasp the unity of the real world we have to develop knowledge on more basic levels. On this deeper level we may well think in terms of intradisciplinarity (on the ontological level) instead of interdisciplinarity (on the epistemological level).

5 Conclusion

We argue that a fair interpretation of the ideas and intentions articulated in 'An Open Research System' (NOU 2011: 6) is, firstly, to give students the opportunity to see their own discipline in relation to other traditions and to reflect on values from other paradigmatic points of view. Secondly,

according to Schumacher the divergent problems cannot be solved by logical reasoning only, they have to be experienced and transcended. These kinds of problems 'force man to strain himself to a level above himself; they demand, and thus provoke the supply of forces from a higher level, thus bringing love, beauty, goodness, and truth into our lives (Schumacher 1999: 75). We agree with Schumacher arguing that the higher things cannot be known with the same degree of certainty as can the lesser things. Therefore it would be a dangerous loss if knowledge were limited to things beyond the possibility of doubt. Thirdly, to develop an open research system in Norway, we need a radical change in education to focus more on development of the students 'higher faculties', such as self-awareness, creativity and judgment. For economists it may, e.g. mean that 'the economic man' must be questioned. Maybe 'the ecological man', a person deeply embedded and integrated in society and nature would open up for new perspectives in economics (Ingebrigtsen and Jakobsen 2009)? It might e.g. have important impact concerning man's sensitivity for other living beings. A misplaced use of binary logic may, according to Schumacher, have negative influence on people's sensitivity. The danger is that the mind becomes rigid and lifeless, fixing itself on only one side of the pair of opposites. We think, in accordance with both Schumacher and Boulding that by stimulating to more 'tension into the world', we can sharpen man's sensitivity and increase his self-awareness (Schumacher 1977: 127). Fourthly, in accordance with Boulding's organic theory of knowledge we argue that higher education and research must stimulate initiatives leading to creativity. Research should no longer be like a mechanical process, but processes which depend to some extent on the unreliable processes of inspiration. To sum up, it is of great importance to inspire researchers and students to look for connections between fields of knowledge, to see '[...] the treads of theory that would tie together economic man, biological man, perhaps even the religious man, and bring the fragmented back together again' (Kerman 1974: 7).

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