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The Quest for Ecological Sustainability: A Multi-level Issue

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Abstract

The issue of ecological sustainability has been addressed in various contexts - local, regional and world-wide. This paper postulates that sustainability can only be achieved if actors at multiple levels cooperate towards the vision of a sustainable world. For this purpose, the structure of a model is presented, which shows how the efforts for sustainability can be organized in a more powerful way. This presentation should also help decision-makers understand that pertinent frameworks are needed to enable actors at each level, from individual to global.

Keywords

organizing for sustainability, Viable System Model, structural prerequisites for sustainability

1 A model for viable systems

The Brundtland report "Our Common Future" which was made by the World Commission on Environment and Development defines *sustainable development* as a "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." [Brundtland, 1987]. From a long term perspective, all of this is about the viability of humanity.

Consequently it makes sense to revert to one of the system models, aimed at making such viability possible. In an earlier work, a survey of such models has been given, and a detailed comparison of the two strongest models in terms of design has been made [Schwaninger, 2006]:

- James Grier Miller's Living Systems Theory [Miller, 1978], and

- Stafford Beer's Viable System Model [Beer, 1981, 1984, 1985].

The comparison led to the conclusion, that both models have an enormous potential, which has spurred an increasing use of them by people in organizations. While Living Systems Theory is older and therefore has been corroborated by more empirical studies published, the VSM has an advantage as to its strength of theoretical claim and falsifiability¹, as well as its diagnostic potency. Consequently we shall revert to this model as a guideline.

In the VSM a set of "control mechanisms" is specified, which Beer describes as the necessary and sufficient conditions for the viability of any human or social system².

2 Outline of the Viable System Model

A social body is viable if and only if it has a dovetailed structure of regulatory units whose functions and inter-relationships are precisely specified (cf. Figure 1). These will be outlined here, the examples being mainly from the organizational domain:

- *System 1*: Regulatory capacity of the largely autonomous and mutually adaptive operative basic units (A, B, C, D in the Diagram), optimization of daily business. Basic units with their respective management are called *primary units*. Example: the company's business units.
- *System 2*: Strengthening ('amplification') of the self-regulatory capacity, reduction ('attenuation') of oscillations, and co-ordination of the activities of the primary units by means of

¹ The VSM has not been falsified, i.e., it has not been proven to be wrong. Therefore, following Popper [2002] it can be assumed that it holds.

² On the following see Beer [1981, 1984, 1985].

information and communication. Examples: the information- and budgeting-systems, co-ordination teams, internal service-units, standards of behaviour, knowledge-bases.

- **System 3:** Internal guidance, providing synergies, allocation of resources, and striving for an overall performance optimum of the set of primary units. Example: the executive corporate management.
- **System 3*:** Investigation and validation of the information flowing through channels 1 – 3 and 1 – 2-3, by means of auditing and monitoring activities which imply directly accessing the basic units. Examples: auditing, special investigations into operations.
- **System 4:** Comprehensive external orientation, and long-term orientation to the future, the ability to grasp, diagnose and model both the whole organization and its relevant environment as well as the organization-environment-interaction. Examples: company development/strategic management, research and development, knowledge creation.
- **System 5:** Striking the balance between present and future, keeping internal and external perspectives in proportion, checking interactions between Systems 3 and 4. Determining the identity of the organization, its functions in the larger context, incorporating the supreme values, norms and rules, i.e., the ethos of the system as a whole (Normative Management). Example: The board and the corporate charter, the sovereign people (in the case of a democracy), and the will of the sovereign as succinctly expressed in the Constitution.

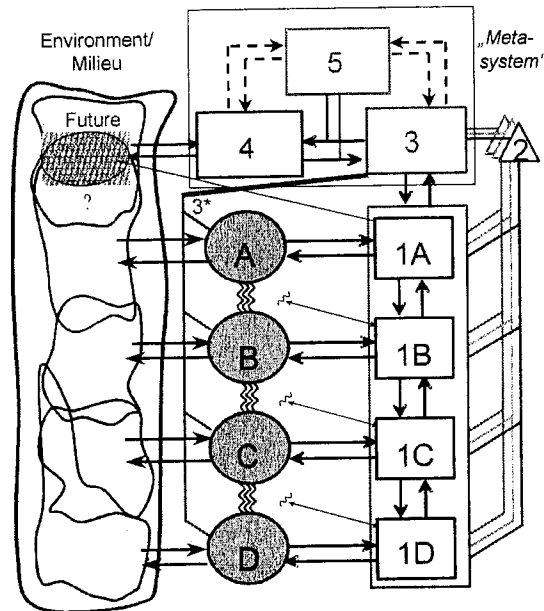


Figure 1: Beer's Viable System Model (VSM)³

To sum up: Systems 1, 2 and 3 (including 3*) represent Operative Management, System 4 (in interaction with System 3) Strategic, and System 5 Normative Management.

Defects in the structure just outlined, such as missing components, insufficient capacity or inadequate co-ordination of the components, all impair or endanger the organization's viability. Consequently, strong diagnostic points can be discovered by applying the VSM properly. For example, Systems 4 and 2 are often underdeveloped. In the latter case, this may be the cause of overload on management. In the former, the firm-in-focus may still be making a lot of money in its operations, while a VSM-based diagnosis reveals that, from the strategic point of view, the company is already doomed to failure.

3 The Principles of Recursion and Autonomy

The viability, cohesion and self-organization of a social body depend upon these functions being recursively present at all levels of its organization. A recursive structure comprises autonomous units within autonomous units. Moreover, a viable social system, e.g. a company, is made up of viable units and is itself embedded in more comprehensive viable units. Each unit, inasmuch as it is producing the organization's task, rather than servicing or

³ Slightly simplified version [cf. Beer, 1985].

supporting this production, replicates - in structural terms - the totality in which it is embedded.

With specific respect to the management functions, the principle of recursion manifests itself as follows: together, Systems 3, 4 and 5 constitute the meta-system of a unit at a given level of recursion (for example, a division of a company). At the same time that very meta-system constitutes System 1 of the next higher level of recursion (in this case, the whole company). This structure of recursively embedded systems provides a vertical integration which is essential to the viability of the organization.

At this point it should be clear that autonomy is basic to the VSM. From Greek 'autos' (self-) and 'nomos' (law) this term refers to the primary unit as a whole being 'a law unto itself' [Beer, 1981: 103]. The autonomy in question is therefore both a system's freedom and responsibility to regulate itself. This is the pivot of an organization's adaptation and learning, which requires subsystems disposing of high degrees of freedom. The autonomy is not absolute, but limited by the aspect of interdependence: as the logical hierarchy of the management functions outlined above clearly shows, the autonomy of subsystems is moderated through checks and balances in order to maintain the viability of the whole system-in-focus.

In case the challenges confronted exceed the capability of such a unit, joining forces is necessary. In many cases this can be achieved by a horizontal cooperation. However it can indicate the necessity of jointly constituting a new unit at a higher level of recursion. For example, municipalities form states and states form nation states. However the formation of a new organizational unit is not necessarily linked to a merger of all aspects of the activities of the components. For example, two units can join forces to deal with the ecological challenge in a more prolific way, than if they go on their own. So they form an organization for that purpose. We have for example seen super-national control organs of two or more countries emerge, to reduce pollution and control the quality of the water of a lake on which they border.

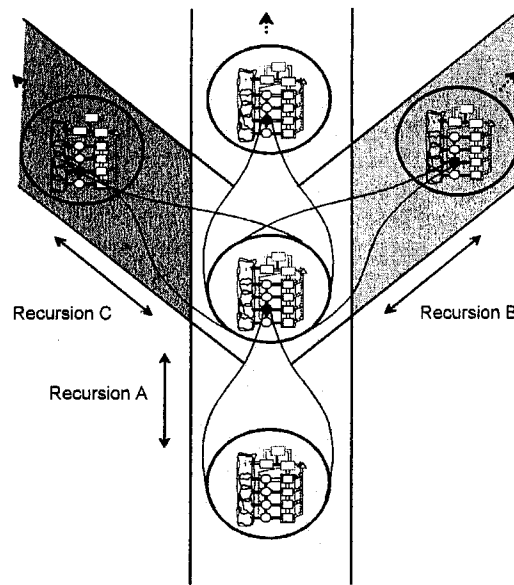


Figure 2: Recursive Structure - a multidimensional concept

Recursion is a multidimensional concept. The structure outlined in figure 2 shows that one and the same organization or organizational unit can function simultaneously both as a sub-system and a super-system within the framework of different recursive organizational configurations. Not only can it function in this way, but it can also be conceived or can perceive itself in this fashion. A simple example illustrating this point is an enterprise which is a part of a large corporation and is itself composed of several divisions (recursion A in Figure 2). In order to cope with the ecological challenge, the firm in focus joins other enterprises to form an association for that purpose (recursion B). Additionally, this company is a member of a consortium for research and development (recursion C).

4 An Organizational Framework for the Pursuit of Ecological Sustainability

After this outline of the Viable System model, it can now be applied to our issue at hand: how can the pursuit of ecological sustainability be supported organizationally?

Instead of starting at the global level, we shall begin with the individual agent. An agent is someone who moves something⁴. One often hears that sustainability starts in the head of the one who acts according to ecological principles.

⁴ From Latin: „agere", to act, to do or to move.

Actors exist at different levels, if you look at the world from a system-theoretic perspective. For example, we can identify a team or a whole company as one actor. If Toyota presents a vision "to achieve long-term, stable growth in harmony with the environment, the global economy, the local communities it serves and its stakeholders" [Toyota, 2003:12] this huge firm speaks with one voice. Also, the aggregated results of the strategies to make this vision come true will be measured and reported in organs of the corporation as a whole. The views, preferences, values and actions of different departments, teams or staff members will centre on lower levels of resolution: e.g., "my contribution to the vision of Toyota is...". There may also be deviations expressed by subsystems which diverge from the mainstream. As we know, strong and viable organisations thrive on the mutual alignment of values, strategies and actions from bottom to top and from top to bottom.

Summing up this discussion, we conceive of actors as human or social units, acting as wholes, at different recursive levels of a human or social system. In the context of the quest for sustainability or, in a narrower conception, of ecological management and policy, we can proceed by outlining a structure of the multiple agents concerned. In Figure 3, such a structure is sketched, which reaches from the level of the individual to the level of the whole world. One might think that the multiplicity of actors forming the system at all of these levels is prohibitive to an endeavour of mapping all of them at once.

The key to the simplicity of the diagram is in the concept of recursiveness: wholes at different levels absorb complexity along the fronts at which complexity is being faced. To maintain viability, each actor has to deal with that task of absorbing complexity, in accordance with Ashby's Law of Requisite Variety: "Only variety can absorb variety" [Ashby, 1956; Beer, 1979].

The point about figure 3 is that it visualizes a crucial matter. Issues of ecological (and social) sustainability emerge at each one of the organizational levels. The actors at each one of these levels must deal with their specific issues in a highly autonomous way. At the state level, for example, regulating institutions have to attenuate the variety of potential behaviours of citizens (and enhance their own repertory of behaviours at the same time) by setting a legal framework, policies and incentives. At the level of an enterprise, ecological policies and strategies must be designed and implemented, etc.

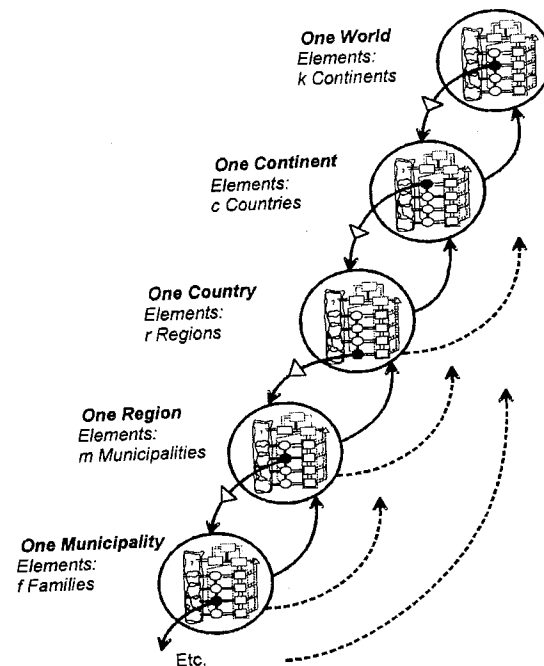


Figure 3: Structural Prerequisites for a Sustainable Development

Interfering into the domain of discretion of another level of recursion is not only pointless, but it is usually also counterproductive. An exception is the case where an instability cannot be brought under control within the unit concerned. In such an instance the unit of a higher recursive level will have to assume the control. This example also shows that the principle of subsidiarity is not one working from top to bottom, but the other way around: if and only if a unit at a given recursive level is incapable of coping with an ecological issue, the capability of the unit of the next higher level will be invoked. In other words, a delegation "upward" will take place. An example are the supranational institutions which gain both their legitimacy and authority from the states which have constituted them. The main point here is that many aspects can be regulated at the bottom, and higher levels should only regulate what cannot be taken care of at the lower ones.

Inside each unit of each level, a structure as mapped in Figure 1 is necessary to make that unit sustainable. Sustainability issues are, first of all, in the responsibility of the 'line' functions, i.e. the functions which are linked downwards (and upwards) via a command channel. In the VSM, these are represented in Systems 1 and Systems 3. However all other units are concerned with sustainability issues, as well. This is an aspect of distributed organizational intelligence. I shall give a respective account, but I have to delimit it to one

level of recursion. We take the example of the firm level; in figure 3 this would be at least one level below 'municipality'. If we refer to a medium sized enterprise, the sustainability-related tasks could be distributed as follows across the functions of the VSM:

- *System 1:* Regulation and optimization of ecological management, in the short term, of *primary units*. Example: Environmental and security managers at the factory or business unit level.
- *System 2:* Coordination of the ecological efforts across the basic units. Educational programs concerning sustainability. Planning and control of ecology-related programmes. Examples: ecological budgeting and accounting systems, co-ordination or service unit for sustainability, eventually a "sustainability circle", ecology-related standards of behaviour and knowledge-bases.
- *System 3:* General responsibility for the sustainability of the operations, allocation of resources, and striving for an overall ecological performance optimum of the set of primary units. Example: the executive corporate management.
- *System 3*:* Auditing and monitoring activities for their ecological efficiency, through direct access to the basic units. Examples: (ecological) audits and special investigations into operations.
- *System 4:* Long-term orientation concerning sustainability, and especially ecological and social performance. Diagnosing and modelling the whole organization and its interaction with its relevant environment. Examples: company development/strategic management, research and development, knowledge creation, from a sustainability perspective.
- *System 5:* Determining the identity of the organization, its functions in the environment, incorporating the supreme values, norms and rules, i.e., the ecological ethos of the system as a whole (Normative Management). Example: The board (eventually through a board delegate for sustainability), the corporate charter, a sustainability charter or vision statement.

This arrangement shows that ecological responsibility is and should not be confined to a single person or function of an enterprise. As the ecological issue is a subject that transcends the boundaries in and of an organization, coping with it calls for distributed intelligence. This is what the list just presented visualizes. The logic of it can,

obviously, be transposed to the other levels of recursion, without difficulty.

Sustainability will not happen, if merely enforced from the top. If we take a view on the whole of figure 3, it becomes apparent that the actors of all levels must cooperate to achieve global sustainability. It also becomes evident that political fragmentation is an obstacle to enhancing worldwide sustainability. Careful diagnosis at the different levels of recursion could provide important clues to enable the design for sustainability [cf. Sharma and Aragón-Correa, 2005].

5 Conclusion

This paper is dedicated to a burning problem, - the ecological challenge. I have rolled out an organizational concept for the achievement of sustainability. This is an attempt to answer the question: "How do we have to organize ourselves to cope with the ecological challenge?" The proposal elaborated here hinges on Beer's Viable System Model, a cybernetic model which specifies the necessary and sufficient preconditions for the viability of a social system. It leads to a more sophisticated answer than the often simplistic recommendations which simply postulate solutions at the top of the world or at the bottom.

The approach taken here leads to a multi-level system of self-organizing wholes each of which assume their ecological responsibility, in a recursive structure of viable systems. As each level - local, regional, etc. - presents its specific challenges, each level needs its own structure to cope with them. In other words, all levels from individual to world need their specific "ecological management", and this has to be considered also when making up the global framework.

The power of the proposed structure lies in that the actors at each different level have to cope with complexity adequately. As they all face similar levels of complexity and have resembling capacities to deal with that complexity, a balance can be maintained and regulation become effective. Global sustainability can only be achieved if actors at multiple levels cooperate towards the ideal of a sustainable world. Consequently, pertinent institutional frameworks are needed to enable actors at each level, to make their contribution.

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