TOWARDS A CONSENSUS GLOSSARY OF SYSTEMS CONCEPTS

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ABSTRACT
An ironic, yet frequently heard criticism of the well-established custom of annual conferences is that they do not lead to significant communication. The short amount of time allotted to each paper, the rushed questions permissible from only a very limited number of participants, and the very large number of papers presented makes it impossible to engage in the type of deep, lengthy, careful multi-logue necessary for synthesis of contributions or their improvement. While disciplinary-oriented societies accustomed to reducing problems to pieces may not find this feature disturbing. It actually runs totally contrary to the central purpose of the Society for General Systems Research. This brief paper represents an experimental symposium of the 29th Annual SGSR Conference which had as its purpose the provision of time for critical multi-logue on the often mentioned desirability of producing a glossary of systems terms. To reserve the time needed for open discussion yet provide enough ideas to initiate the discussion, three systems researchers who had studied the problem of systems terminology, or' attempted to assemble a glossary of systems terms, presented a ten-minute summary of their findings. The remainder of the session was reserved for free discussion by participants monitored by the presenters as a panel. The panel is expected to produce a report for publication in the General Systems Bulletin on the success or failure of this experiment and plans that were made, if any, for organization of the glossary-building effort.

PAST ATTEMPTS: REVIEWS OF SYSTEMS TERMINOLOGY

This discussion will not be the first attempt to characterize systems concepts and terms. There have been many attempts each guided by a different strategyand so ending in uniquely different results. The start of the discussion should center on establishing a consensus strategy. What would be the purposes of assembling a glossary? Consensus at the stage of strategy would make the resulting glossary useful for a wider range of systems scientists, and would enable the unification of different individual efforts. It is the differences between initial strategies and intended optimizations that has made past efforts incompatible, or worse contributory to the appearance of a "tower of Babel" relative to the systems movement. Below I list some of the attempts to study systems terminology in terms of their different strategies.

One of the first efforts possessed also the purest strategy. Young (1964) studied 36 concepts typical of general systems approaches and not only defined them, but tried to categorize them. His intent was to provide an overview of the field to capture its knowledge and represent the uniqueness of its approach. These are appropriate strategies for today. But Young's attempt is, by now. quite outdated.

Ackoff (1971) went beyond the strategy of characterizing the field to focusing on the need for a "system of systems concepts." He included 32 terms in his study and claimed that, consistent with its *raison d'etra* , the field of general systems science should not only provide a glossary of single terms but define how these terms interacted in explaining systemness. His challenge is as pertinent now (some fifteen years later) as it was then. Margaret Mead also often complained that this sensitivity to system connectedness which should be the hallmark of our field was actually not being applied to the subject matter and the process of the field. She found this an intolerably ironic condition. Neither Ackoff or Mead, however, went very far in accomplishing these worthy strategies.

Textbooks, the usual source of glossaries for a field, either do not exist for general systems science (Boulding. 1984), or are too dated to be useful (eg. Bertalanffy, 1968; Weinberg, 1975), or are on a specialized area only partially overlapping with general systems science. A good example of the latter is the text by von Foerster (1974) which has a glossary of some 238 terms. Many of these are useful for systems science but are concentrated on the sub-field of control engineering. Valuable as it is, this field does not encompass the scope of general systems science. A more recent book that could be used as a text (Miller's Living Systems, 1978), defines and utilizes many systems terms and has a detailed index. Here the focus is on biological and social systems, however, and the terms are not elucidated in physical and natural systems which are clearly part of the range of systems included in general systems science. Thus, the textbooks have not been as good a strategy as they usually are simply because none were at the level of a true general theory of systems.

Another strategy which elicits glossary-like results are compendia. The Union of International Associations publishes an encyclopedia (last edition, 1976) which has a section on "holistic terms." Members of the systems community helped in assembling and defining the 421 terms included. In this case the strategy was one of completeness. Probably many terms are included in this collection that are too nebulous for use in systems science. Klir and coworkers (1977) published a bibliography of the general systems literature including over 1400 entries. The articles and books are listed according to a number of "keywords" that could serve as a glossary. In addition, the titles of the articles and books are listed in a keyword-in-context-of-title format which would be a good source for a glossary. These terms are unfortunately not defined, but they have the advantage of tight coupling to the source literature. Trappl and co-workers have just published an update of this bibliography surveying the field up to the present. Banathy (1981) led a team of researchers in a three-year study in which systems concepts were utilized to help teach teachers how to teach environmental education. Many of the systems concepts used for this purpose are carefully defined and at an admirably simplified level. They are also illustrated by application to well-publicized environmental problems. None of the compendia listed here used rigorous criteria similar to those a professional society would for defining what should be included or what excluded from a GTS glossary.

There have been direct attempts to "capture" the essence of general systems and these could be modified for assembling a prototype glossary. A two-year computerize conference funded by the National Science Foundation was designed to advance the field by bringing dozens of widely geographically dispersed theorists into more frequent contact (Umpleby, 1977). One associated project of this conference was an on-line project that was tasked with the assembly of a glossary of definitions for systems. This medium was an excellent one for the task allotting a number of participants to debate terminology until a consensus could be reached. Although unpublished as far as this author knows, it is probable that the print-out of this portion of the conference still exists. Cavalho (1982) undertook the ambitious task writing a State of the Art Report for the field. Several points of terminology and method were discussed therein, as wll as lessons learned about attempts at group production at consensus. In general, these direct attempts at producing a GTS glossary or summary have not been particularly successful and this symposium should try to determine specifically why.

Still another strategy that might contribute to assembly of a glossary Involves taxonomic oriented surveys of models and methods. Oren (1985) has just completed a series of five articles analyzing and organizing the various approaches to systems modeling and simulation. This proposed taxonomy undoubtedly contains information directly relevant to defining terms and showing their relationships and applications. Miser and Quade have expanded an original survey (1983) into a book that attempts to be a comprehensive presentation of techniques of systems analysis. Again some of the information Included would necessarily be summarized in any systems science glossary. Both of these studies however, must be recognized as covering only a portion of the range included in general systems research Troncale (1985) presents an initial taxonomy of isomorphies which possess the breadth of scope expected of a general theory of systems, but he warns of the preliminary nature of this first attempt, and in any case eliminates many methodological and analytical terms which would be required in a comprehensive glossary. He purposely left out these terms because he wanted to focus only on terms that represented mechanisms that could be modeled for a dynamic simulation of systems in general. That is why he emphasizes “processes” rather than the multitude of human-based philosophical terms often included in glossaries.

A recent strategy begins where the early strategy of Young left off. Its purpose is to measure how systems concepts are being used by systems practitioners; this is a study in sociology and history as much as it is a study of the knowledge base of general systems theory. Jains (1981) used agglomerative techniques to associate general systems concepts into six sets that illustrate dependency relationships between the different source disciplines feeding into general systems research. Robbins and Oliva (1982 & 1984) studied systems terminology as it appeared in the literature (*in situ*) in an attempt to find the most commonly used terms and their interdependencies. This resulted in a list of 51 concepts. Although I disagree strongly with the conclusions of both of these studies, they should be carefully reviewed and utilized by anyone hoping to assemble a systems glossary.

My own lineage of work on systems concepts (especially Isomorphies) continues the tradition begun by Ackoff cited above. The LPTM model (now called SP^3T) utilizes some 75 Isomorphles and tries to describe their interactions in detail using semantic Linkage Propositions (LPs) as connectors. Although this model purposely omits many systems terms as anthropomorphic and non- phenomenological and so could not serve directly as a glossary, two uses could be made of it. First, any glossary should contain all of the Isomorphic Systems Processes (ISPs) so used. Second, the Linkage Propositions connected to any one of the Isomorphies would be a fruitful source of information about the Isomorphy and could be used in its definition.

Besides the 15 relevant projects cited above. I am aware of continuing efforts on the part of several SGSR members. For example, Kjell Samuelson, 13th President of SGSR, has a booklet of systems terms used by the students of his systems education program and he continues to expand it. W. Reckmeyer and Samuelson both have been working on systems glossaries and surveys of systems education programs for several years. Weekes (Australia) and Charles Francois (Argentina), as well as Delgado (Spain) are assembling lists of simple definitions of common systems concepts for use in their countries. These projects illustrate the felt need for a systems glossary capable of multiple uses.

SIGNIFICANCE OF A SYSTEMS GLOSSARY

From the profusion of related past attempts. It seems that there exists at least a basis for assembling a glossary of general systems science terms. The participants in this symposium discussion could begin by trying to list the uses of such a glossary. Then this list will be publicized and used as a stimulus to attract workers to the task. Some possible uses might be: 1) as an educational tool for students of the field. 2) as a reference for systems researchers. 3) as an Introduction to the field for new Initiates. 4) as evidence of the productivity of the field. 5) as a measure of the "special knowledge" in the field. 6) as a tool to attract new comers to the field. 7) as a method for arriving at some rudimentary consensus within the field. 6) as a means for comparing terms used in the field with disciplinary-based terms or distinguishing between general theory and systems application terms. 9) as a method for reducing what appears to be the chaos inherent in the field. 10) for improving focus on the most critical issues in the field, and finally 11/12) as a means of improving communication within the field, and between this field and other fields. The existence of twelve compelling reasons for organizing efforts at assembling a glossary of general systems terms indicates the significance of the task.

BARRIERS TO SUCCESSFUL ASSEMBLAGE OF A SYSTEMS GLOSSARY

Past experience teaches us that a very good beginning for any winning strategy is a careful appraisal of the enemy (Musashi,1589) or in this case barriers to success. Conscious awareness of these obstacles enables one to plan specific mechanisms in the strategy to overcome each barrier. So a second task for the discussants at this symposium will be making a list of anticipated difficulties. Some include: 1) need for a communication technology that enables sufficiently rapid interchange to allow participants to interact frequently enough to learn from each other. 2) provision for the needed continuity of a long-term effort. 3) funding if possible. 4) some method of overcoming the continuing barriers between "soft" and "hard" systems science approaches as well as barriers between systems-synthesis-oriented and systems-analytical-oriented practitioners, and further between social science and physical science migrants to the systems field. 5) absence of a consensus strategy which unifies diverse efforts and purposes in assembling glossaries. 6) establishment of a tradition of openness to insure that any consensus reached on terminology does not become a dogmatic orthodoxy inhibiting future research, and 7) adoption of a perspective that encompasses the full range and scope expected of general systems science.

EXPECTED OUTCOME: DESIGN OF PRACTICAL MECHANISMS FOR PRODUCING A SYSTEMS GLOSSARY

For each of the above cited obstacles and those added by the participants a mechanism should be designed through group discussion. Commitments should be made at the meeting, if possible, for portions of the overall task. Future meetings might include a regular series of workshops devoted to this important task. If members decide this task Is fundamental enough they might petition the Board of Directors to name SGSR members to a Working Committee dedicated to the task.

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