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THE APPLICATION OF LIVING SYSTEMS PROCESS ANALYSIS TO INSTITUTIONAL DEVELOPMENT IN HIGHER EDUCATION

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Presented at

The 31st Annual meeting of the
International Society for General Systems Research

Budapest, Hungary

June, 1987

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INTRODUCTION

Living Systems Process Analysis (LSPA) is a methodological tool stemming from Living Systems Theory (LST). Currently, LSPA is being developed by a handful of practitioners for use at the level of organization to assess organizational effectiveness. There have been analyses of army battalions (Rusco et al., 1985), elementary schools (Banathy and Mills, 1985), a public transportation system (Merker, 1985), a Thai electronics manufacturer, and a Japanese vending company (Merker, 1986). The potential of LSPA for an ever increasing variety of organizations is even more apparent after reading Swanson and Miller (1986), in which they explore the applicability of the LST framework to accounting information systems.

Purpose

The purpose of this paper is to examine yet another type of organization for LSPA, the institution of higher education. This examination outlines the steps which are required to do a LSPA, using an educational institution, Saybrook Institute, as an example.

Saybrook Institute

We are studying the feasibility of a LSPA at Saybrook. The Institute is a small, independent graduate school with a student body of 170 students and 20 core and adjunct faculty members. Saybrook offers doctoral and masters programs in the Human Sciences and in Psychology. While Saybrook's main base of operations is in San Francisco, California, the school uses the External Format of Distance Education. The Institute provides these programs primarily to mid-careers professionals located in 36 states and four foreign countries. There are two intense 12 day long periods each year in the San Francisco Bay Area, termed National meetings and workshops, which augment the graduate courses being completed between these intense periods. Coursework involves various educational formats, such as face-to-face meetings, telephone dialogs, correspondence and scholarly papers, and messaging and conferencing on the Saybrook Electronic Network.

Living Systems Theory

LSPA is the research arm of LST. Formulated as early as 1949 by James Miller and published in his highly recognized contribution entitled *Living Systems* (1978), LST is a general approach for studying systems at various levels of complexity. Living systems exist at seven levels of complexity: cell, organ, organism, group, organization, society, and

supranational system. All living systems are open systems. They take in and give out matter, energy, and information.

A living system, such as an organization, has been referred to specifically as an Human Activity System or HAS (Banathy, 1973). A HAS can be studied and described with LST concepts in terms of the flow of matter, energy, and information into the system (inputs), among the subsystems of the system (throughputs), and out of the system (outputs). There are 19 critical processes which a living system must sustain in order to maintain itself and survive. Each vital process itself can be conceptualized as a subsystem. LSPA is a means to examine the functioning of the 19 critical subsystems of an organization.

DOING THE LSPA

Although Banathy and Mills (1985) and Ruscoe et. al (1985) have outlined some phases in doing their projects, it is Merker (1985) who has provided a general seven step outline of a LSPA. Unfortunately, these accounts provide insufficient detail to understand the procedure. In practice, because of the scope, complexity, and effort required for a LSPA, it appears to be better described as a 12 step methodological procedure.

The 12 steps emerge from two sources: 1) the published accounts previously cited, particularly Merker (1985), and 2) the author's project in progress at Saybrook Institute.

To do a LSPA, it is suggested that the practitioner proceed through the 12 steps to be described next.

Step 1. Identify the system.

Identifying the system is the overt recognition of all the major components of the system which could be considered in the LSPA. Saybrook Institute would itself be the system of interest. Consulting the school catalog one finds that there are four major components which comprise the institution: Board of Trustees, Graduate School, Research Center, and Community Services.

Step 2. Identify the purpose of the system.

An examination of the published literature used in the system may be very helpful here. Purpose often translates into mission. The mission of the institution (*Saybrook Institute Catalog 1987-1988*, p.2), as adopted by the Board of Trustees, is:

> ...establishing and maintaining Saybrook Institute as the pre-eminent institution in setting standards of scholarship and providing resources for education and research into the meaning and enhancement of human experience.

Step 3. Identify the general inputs to and outputs from the system.

Inputs are matter, energy, and information which enter the system. They are conceptualized as flows as well as resources which the system requires to survive. Outputs are the products, results, and byproducts of the system. They are also conceptualized as flows that must occur for the system to survive. To maintain its health and effectiveness, a system must have a steady stream of inputs, throughputs, and outputs. At the level of organization, the general resources which make flows possible consist of materials, services, communications,

money, and personnel. An example of an input and output for each flow relevant to Saybrook Institute is shown in Table 1.

Table 1

An example of the five general flows (resources) through the system called Saybrook Institute.

Flow	*Input*	*Output*
Materials	supplies	course manuals
Services	registration	instruction
Communications	requests	presentations
Money	tuition	payroll checks
Personnel	staff hires	graduates

Step 4. Identify the 19 subsystems (critical processes).

Rather than define the subsystems of the organization by departments, divisions or positions, LST reconceptualizes the system in the form of 19 critical subsystems engaged in activities required to maintain the health and the effectiveness of the organization as a whole. These subsystems usually involve traditionally defined organizational entities, but in relationships which often are more implicit than explicit to the members of the organization. Table 2 indicates the label and symbol designations of the 19 subsystems according to two published sources. Each subsystem needs to be viewed as a process performed by the organization to maintain itself. Each subsystem needs to be described in terms of the traditionally defined organizational entities and general flows (Table 1) which are involved in carrying out the process. Two helpful questions to ask are: 1) "Who participates in the process?" and 2) "What does each person do to make it happen?"

For example, one aspect of organizational life which interests most people is the process of how decisions get made. This is the *Decider* subsystem. At Saybrook Institute, this subsystem requires several positions and organizationally defined group entities (Figure 1). The arrows in the schematic indicate the formalized communication channels whereby individuals and bodies send verbal and written information in making decisions and recommendations to lower and higher entities of responsibility, respectively. Without this subsystem operating efficiently and effectively, the institution cannot maintain itself properly and develop. Similarly, it is so for each critical subsystem.

Table 2

The 19 critical subsystems to examine in a LSPA.

From Miller (1978)	*From Ruscoe et. al (1985)*
REPRODUCER (RE)	REPLICATE (RP)
BOUNDARY (BO)	ENCLOSE (EN)
Subsystems which process matter-energy	
INGESTOR (IN)	RECEIVE (RC)
DISTRIBUTOR (DI)	DISTRIBUTOR (DI)
CONVERTER (CO)	TRANSFORM (TR)
PRODUCER (PR)	PRODUCER (PR)
MATTER-ENERGY STORAGE (MS)	STORE (ST)
EXTRUDER (EX)	REMOVE (RM)
MOTOR (MO)	MOVE (MV)
SUPPORTER (SU)	STRUCTURE (SR)
Subsystems which process information	
INPUT TRANSDUCER (IP)	INPUT (IN)
INTERNAL TRANSDUCER (IT)	MONITOR (MN)
CHANNEL AND NET (CN)	CIRCULATE (CR)
DECODER (DE)	DECODER (DE)
ASSOCIATOR (AS)	RELATE (RL)
MEMORY (ME)	REMEMBER (RE)
DECIDER (DC)	DECIDER (DC)
ENCODER (EN)	ENCODER (EN)
OUTPUT TRANSDUCER (OT)	OUTPUT (OT)

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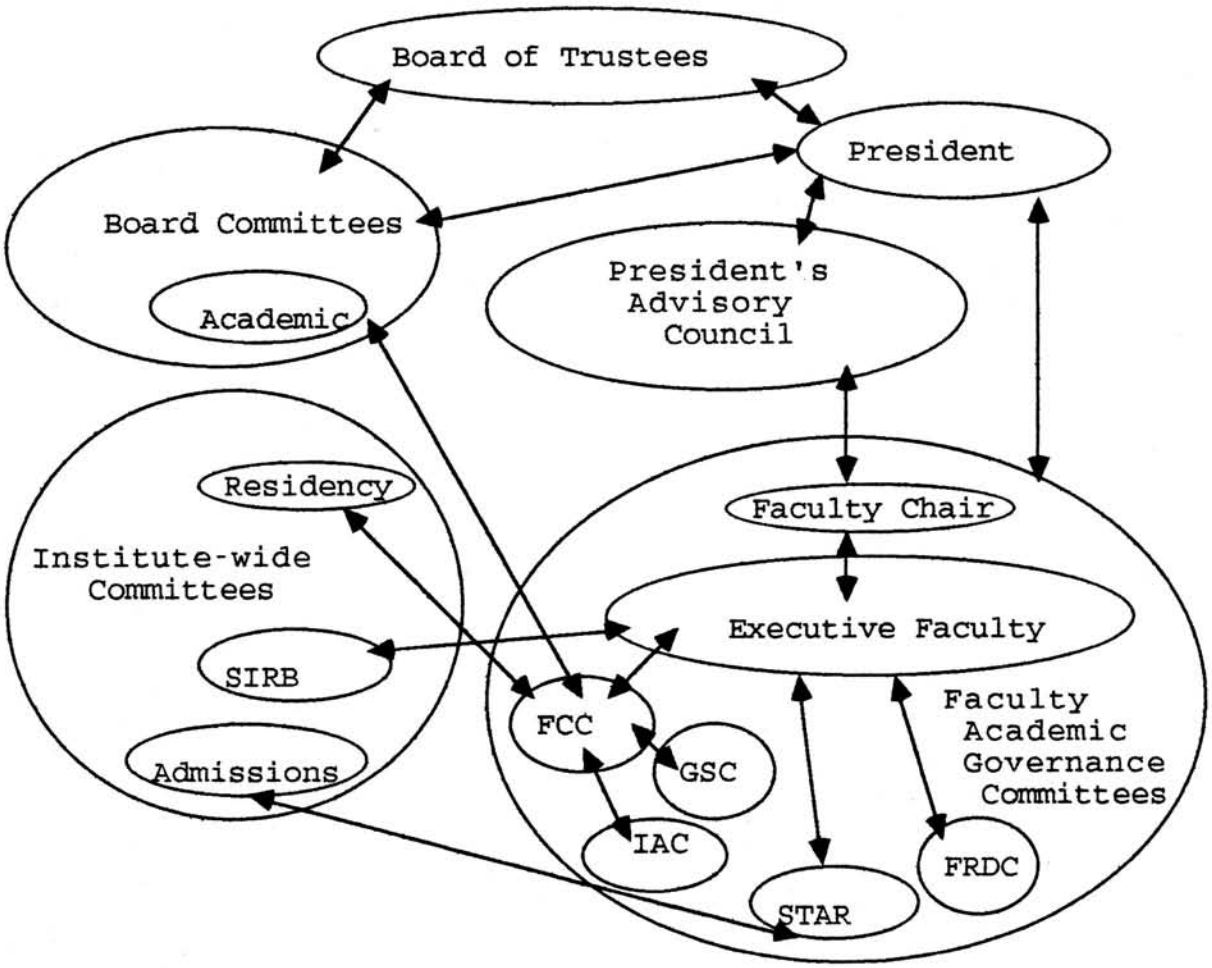
Figure 1

The Decider Subsystem of Saybrook Institute



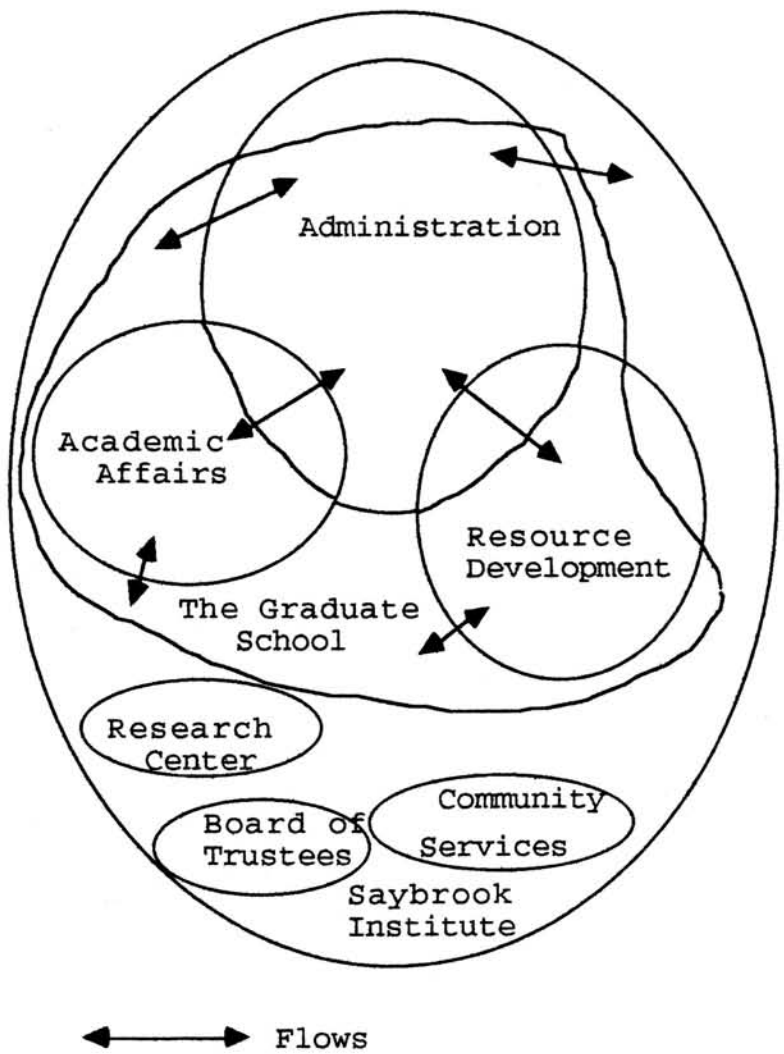
Step 5. Identify the functional areas of the system.

The organizational chart is one concise presentation of the formalized communication channels among divisions, departments, and positions. The chart reveals immplicitly many of the flows of matter, energy, and information within the system.

At Saybrook Institute, the major functional division of interest here is the Graduate School. Within it, there are three main subdivisions: Academic Affairs, Resource Development, and Administration. The Graduate School can be thought of as a subsystem of the organization, and the three departments can be thought of as subsystems of the Graduate School (Figure 2).

Figure 2

The functional areas of the Graduate School of Saybrook Institute



Step 6. Set the purpose, scope and goals of the LSPA.

There are two purposes of a LSPA. They are 1) to provide the organization with a description of its functioning in terms of the 19 critical processes, flows, and functional areas; and 2) to assess the organizational effectiveness of these critical processes and functional areas.

In practice, because of time, budget, and resource constraints, one can do only a very limited LSPA of those few critical processes and functional areas of greatest concern and interest to the organization. The realistic parameters of the LSPA must be set. To do so, it is helpful to answer several questions. How complex is the LSPA to be? How many critical processes? How many functional areas? How many flow indeces? What is the time frame?

In the case of Saybrook Institute, the purpose could be to provide a description of organizational functioning of the Graduate School, particularly its three functional areas in terms of selected critical processes. The goal could be to assess the organizational effectiveness of the Graduate School in contributing to the mission of the Institute. The scope could be limited to the three functional areas of the Graduate School, three critical processes of greatest interest to the President and Board of Trustees, and five flows of matter, energy, and information monitored over a six month period.

Step 7. Identify the flows of each subsystem.

A flow is the movement of matter, energy, and information into, through, and out of the system and its subsystems. Again, it is helpful to ask a few basic questions. What resources are needed for this area to perform or this process to occur? When performing successfully, what products come forth from the area or the process?

Table 3 begins to give us a general notion of these specifications for a LSPA of the Graduate School of Saybrook Institute. The table describes some possible flows through the three functional areas of the Graduate School in relation to the *Producer* subsystem (process), but note that the table is incomplete. This table would be extended in like fashion to include all the LST subsystems to be included in the LSPA, and it would state the resource inputs more explicitly.

Step 8. Define the indices.

Each flow must be defined in terms which enable the LSPA to yield information bearing on the quantity and quality aspects of resource utilization, productivity, organizational effectiveness, and other considerations of interest. There are numerous possible indeces of the general flows in a LSPA of Saybrook Institute. For example, the dollars spend in producing the catalog could be monitored and the judged quality of the drafts, meetings, the final product, and related activities for catalog production could be requested from staff.

Before proceeding to the next step it is essential that a strategy be stated for the examination of all information collected with the indeces. Unless there is a clear data analysis strategy, the LSPA could rapidly become buried under a mountain of information and confusion.

Step 9. Gather the data.

In conducting the LSPA, it is common to make use of information readily available, like records and accounts, and to conduct surveys and/or interviews. This step may also entail the

Table 3

General flows for LST subsystems combined with the functional areas of the Graduate School

Functional Area (Resource)	*Input*	*Throughput*	*Output*
Subsystem: PRODUCER			
ADMINISTRATION			
Materials	supplies	| Writing and	|
Services	consultation	| revising	|
Communications	memos	>policies	>Manuals
Money	expenses	| and	|
Personnel	Pres. staff	| procedures	|
ACADEMIC AFFAIRS			
Materials	supplies	| Student	| Student
Services	instruction	| writing and	| course
Communications	corresp, phone	>revising of	>papers
Money	expenses	| papers and	|
Personnel	faculty, students	| faculty feedback	|
RESOURCE DEVELOPMENT			
Materials	supplies	| Writing and	|
Services	meetings	| revising	| Annual
Communications	drafts	>drafts	>Catalog
Money	expenses	|	|
Personnel	VP staff	|	|
Subsystem: SUPPORTER			
ADMINISTRATION			
ACADEMIC AFFAIRS			
RESOURCE DEVELOPMENT			

construction and piloting of a questionnaire survey type instrument to be sure that the information generated is pertinent to the flow indeces.

Step 10. Analyze the system.

Typically, there are both quantitative and qualitative data to examine. Coding and computation via computer should be expected. Initially, there should be some check on the validity and reliability of the indeces. Descriptive statistics and frequency distributions can also be most informative. Build from simpler to more complex aspects of data analysis. Examine the flows of each critical process (subsystem) independent of others. Do likewise with each functional area. Then look at the flows through the combinations, such as Table 3, which represent the main interest of the LSPA. Finally, integrate the various component analyses toward a systemic view of organizational effectiveness. Although computations, tables, and graphs may be helpful in the earlier stages of analysis, schematics and flow charts will be more instructive in the later stages.

Step 11. Provide feedback to the system.

This step involves written and verbal reports to key members of the organization. Whenever possible, synthesize to assist personnel in getting a better grasp of global functioning. Formulate recommendations bearing on the improvement of organizational effectiveness. Strengths and weaknesses in the operations of the functional areas and critical subsystems (processes) will be of interest. Feedback on the accuracy and usefulness of indeces in monitoring the system will provide confidence in the findings of the LSPA and a basis for future analyses.

Step 12. Monitor the system.

At this time, LSPA gives only a snapshot of the system, but it need not. The time frame of data collection has been short in published studies (Ruscoe et al, 1985; Merker, 1985; Banathy and Mills, 1985). The intention of setting into motion a monitoring feature of the system, which would permit a periodic LSPA, represents more an idealist's dream than an established practice. However, the potential is obvious. It is likely that in the future more thought will be given to the initial LSPA as an important baseline for further examinations of the system.

CONCLUSION

LSPA is an important methodological tool for assessing organizational effectiveness. There are 12 general steps in the LSPA procedure. By studying the flows of matter, energy, and information into, through, and out of more traditionally defined organizational entities and the 19 critical processes (subsystems) of LST, one can attain a very rich and intricate description of organizational functioning. One day soon, it may be an established practice that LSPA is an ongoing inherent feature of organizational development, and the practitioner of this systems methodology becomes an active consultant to and advisor of the *Decider.*

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