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**ABSTRACT**

The paper develops a suggested model of process space for the Input, Process, Product, and Impact (IPPI) model of vocational education. Part 1 presents the need; Part 2 develops a schema for classifying process variables (human, physical, and organizational); their interactive nature is reflected in a dual classification system which enables users to get at process variable information in two ways: each variable in the process space is referenced by a causal decisional factor and a learning-occurrence factor. A total of four hierarchical process levels (State, and three local levels) are identified for discussions of these factors. In summary, the process space is conceived of as an interactive two-dimensional entity divided vertically into three columns of process factors and horizontally into four hierarchical levels. In Part 3, the use of a numbering system for process space is explained, and in Part 4, a system is suggested for classifying and storing process information. An index to be compiled for users of the system, for retrieval of process information, is described in Part 5. Most information contained in the model will be provided by a representative sample of vocational education schools and programs; census data will also be included, minimally. (Author/AJ)

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THE CONCEPT OF PROCESS SPACE AS IT  
PERTAINS TO THE IPPI MODEL OF EDUCATION

Elizabeth Weinberger

February 7, 1972

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## PART I

### THE NEED FOR A MODEL OF "PROCESS SPACE"

In light of the fact that the IPPI model of vocational education was conceived of, in large part, as a means of providing a continuous information feedback system for vocational education, the methods by which information are stored, classified and retrieved, are an exceedingly important aspect of the model's functioning.

The information contained in the model will be provided for the most part by a representative sample of Vocational Education schools and programs. (Census Data will also be included, but minimally where process variables are concerned. Many uses and users are planned for this information:

1. USE OF THE INFORMATION BY LEA's: It is hoped that local educational areas can use this information -
  - a) to compare their own programs to those of the sample
  - b) to revise their programs according to the information provided by the sample in order to obtain desired results, etc.
2. USE OF THE INFORMATION BY EDUCATIONAL RESEARCHERS:
  - a) to reveal statistically significant differences - i.e., between different teaching strategies
  - b) to create hypothetical situations by manipulating the obtained information, etc.
  - c) to isolate the significant variables (i.e., correlational studies), etc.

### 3. USE OF THE INFORMATION BY EDUCATIONAL MANAGERS:

- a) to make decisions about the most profitable way to allocate funds..
- b) to use as a source of continuous information, etc.

The process part of the IPPI model is undoubtedly one of the most difficult to deal with from the standpoint of information processing and retrieval because of the overwhelming number of variables involved in the educational process. The logical approach to dealing with the problem of process space was to develop a schema for classifying process variables; the ideal solution was to develop a model of process space such that the exact location or address of any process variable or combination of variables could be specified within that space. It is our opinion that the most important information about the educational process concerns the variables operating at the level of the instructional event (e.g., that part of the educational process involving the interaction of the student and the teacher in the actual learning process). Therefore, the focus of our model will be to deal with information at that level (e.g., descriptions of the actual learning process). For example, the types of information that we would be most concerned with classifying as variables and locating within the process model might be: a) the way in which students are grouped; b) the type of teaching approach used (e.g., teacher vs. pupil oriented); c) the amount of control that students feel they have over the learning situation; and d) descriptions of the psychological and physical environment in which learning occurs, etc.

## PART II

### THE EVOLUTION OF A MODEL OF PROCESS SPACE

In an attempt to further delineate the part of the IPPI model which has been designated as "process", we found it useful to think of "process"

as an empty space. It then became our task first, to define what we mean by process space, and second, to determine how this space should be divided up and with which variables it should be filled. We tentatively defined process space as consisting of all elements of the educational experience which -

- 1) Impinge on learning, and
- 2) are [reasonably] manipulatable by educationalists at some level.

The task of dividing up process space was considerably more complex than that of defining it. In the course of attempting to determine which variables are involved in the educational process and what instruments, if any, are available for ascertaining the level at which these variables exist, we discovered that the process variables appeared to cluster into one of three process factors:

1. Human Factors - the characteristics, perceptions and behaviors of people involved in the educational process - e.g., what they are and what they do.

2. Physical Factors - inanimate elements in the process space. Two categories of physical factors were established.

- a) Instructional materials - e.g., pertaining to text books, equipment, etc.

- b) school structure - e.g., those things pertaining to land, buildings, classrooms, etc.

3. Organizational Factors - configurations of process elements and configurations of interactions among them. Three organizable elements of process space were identified:

- a) human factors - e.g., 20 students per classroom in the automotive mechanics program. (Note that whenever human factors are manipulated, the related variables are classified under "organization - human factors.")

- b) Physical factors - e.g., a laboratory attached to each classroom; number of square feet devoted to the automotive mechanics program in a given school.
- c) time factors - e.g., number of days in the school year.
- d) organizational interaction factors: the interactive organization of human factors, physical factors and/or time factors. An example of the interaction of human factors and time factors would be the number of hours students must spend in school each day.

It should be noted that within any process level, organizational factors encompass both human and physical factors in that all factors in the process space are subject to organization.

As previously mentioned, the human factors part of the process space is subdivided into three categories in our model:

- 1. personal characteristics - this category includes all information which describes the personal attributes of people involved in the process.

Classes of information in this category would be:

- a) biographical data - e.g., age, sex, years of teaching experience, personal and parental educational level attained, etc.
- b) personality data - e.g., scores on various personality tests.
- c) abilities data - e.g., verbal and non-verbal I. Q. scores, special ability scores.
- d) data on attitudes, interests, beliefs, etc.



2. perceptions - included in this category are any data which describe how the educational process (e.g., the environment, in which the process occurs) is perceived by those people who participate in it.

Such as:

- a) measures of social climate within schools or programs.
- b) measures of organizational climate within schools or programs.
- c) measures of press, within schools or programs.
- d) measures of needs of students and teachers, etc.

3. behaviors - descriptions of or data concerning those things done by persons involved in the educational process. Subcategories of behaviors are:

- a) decisional behaviors - the decisions which different role incumbents within the educational process make about process variables. In later papers, the relationship of role incumbents as decision makers will be extended to apply to all segments of system space in that the same role incumbents at the various hierarchical levels discussed at a later point in this paper are constant throughout the system. (The actual role incumbents will be discussed at a later point in the paper.) The decisions made by the human factors in the process space determine what the physical and organizational variables within the process space will be. For example, the decision to have a building of a certain size (physical factor) is determined by human factors involved in the educational process. Thus, human factors exert their influence upon and in fact determine all other factors within process space.

Three decision-types can be identified:

- 1) joint decisions - those which are made by more than one role incumbent and are subject to veto by all persons at any level who are involved in the decision making.
  - 2) decisions made with consultation - those decisions made essentially by one role incumbent who consults to some specified degree with another role incumbent at any level. (Note that only the actual decision maker can exercise veto power in this type of decision making.)
  - 3) decisions made without consultation - those decisions which are made solely by one role incumbent.
- b) operational behaviors - the acts performed by the various role incumbents in the educational process, e.g., making policy, administering policy, using a particular teaching approach, etc.

The interactive nature of the human factors part of the process space and the physical and organizational factors parts is reflected by the way in which variables are stored within the process space. Each process variable is stored in two parts of the process space: a) in the human factors part according to who (e.g., which role incumbent) made the decision which determined that variable, and b) in the physical or organizational factors part according to which of these two factors and whom (e.g., which role incumbent) the actual occurrence of that variable involves. (Note that each physical and organizational factor represents a decision; all information stored in process space is therefore connectable to human factors.) The human factors storage place of the decision

(e.g., who made it) is cross-referenced to the physical or organizational factor storage place of the decision (e.g., what and whom does it involve), and vice versa. This dual classification system enables the user to get at process variable information in two ways. He can get a picture of the decisions about variables made by a particular role incumbent by retrieving information stored in the human factors decisions category, and he can get at information about the occurrence of process variables by retrieving information stored in the physical or organizational factors categories.

Since human factors determine physical and organizational factors by virtue of their decisions, one can think of the human factors part of the process space as representing the unplanned part of the process, and the physical and organizational part of the process space as representing the planned process. In summary, each variable in the process space is referenced by a) a causal decisional factor - Who made the decision concerning the existence of that variable in the process space?---and, b) a learning-occurrence factor - Which part of the planned process does this variable occur in and whom does it involve? If a decision is made at one level but actually occurs at a lower level in the educational hierarchy, then it represents a "given" at the level at which it occurs in that the behaviors of the role incumbents at the level at which it occurs are constrained by this decision.

Once the major factors involved in the process space had been identified, it became evident that these factors could be discussed at different levels within the process space depending upon the particular role incumbents involved at each level and their behaviors. A preliminary breakdown revealed two major levels - state and local. We broke down the local level into three separate levels, leaving us with a total of four process levels. The levels are:

1. State Over All Schools (SOAS<sub>g</sub>) - the level which encompasses factors which occur at or effect all schools and programs within the state.

2. Local Over All Schools (LOAS<sub>g</sub>) - the level involving all factors which occur at or effect all schools in a given locality.

3. Local Over All Programs Within A School (LOAPWAS) - the level involving all factors which occur in or effect all programs within a school in a given local area.

4. Local Within A Program Within A School (LWAPWAS) - the level involving all factors which occur in or effect all programs within a school in a given local area.

It should be noted that this is a hierarchical arrangement of levels within the process space. Each level below the state level is actually a sub-unit of the state level, and each level encompasses all other levels below itself. As previously mentioned, decisions made by human factors across any level of process space act to constrain decisions made by human factors below that particular level. If no decision is made at a higher level (e.g., state level), then human factors at a lower level (e.g., local level) are not constrained in their decisions. The interactive nature of the process model as described in this paper is depicted in Figure 1.

Examples of the various role incumbents at each level are given in role 1. (Note that role incumbents within each level can interact; since there are 5 role incumbents at each level, there are 120 possible combinations of role incumbents at each level.) Combinations have been omitted for reasons of space, but the actual model does account for them.

In summary, we conceive of the process space as an interactive two-dimensional entity divided vertically into three columns of process factors

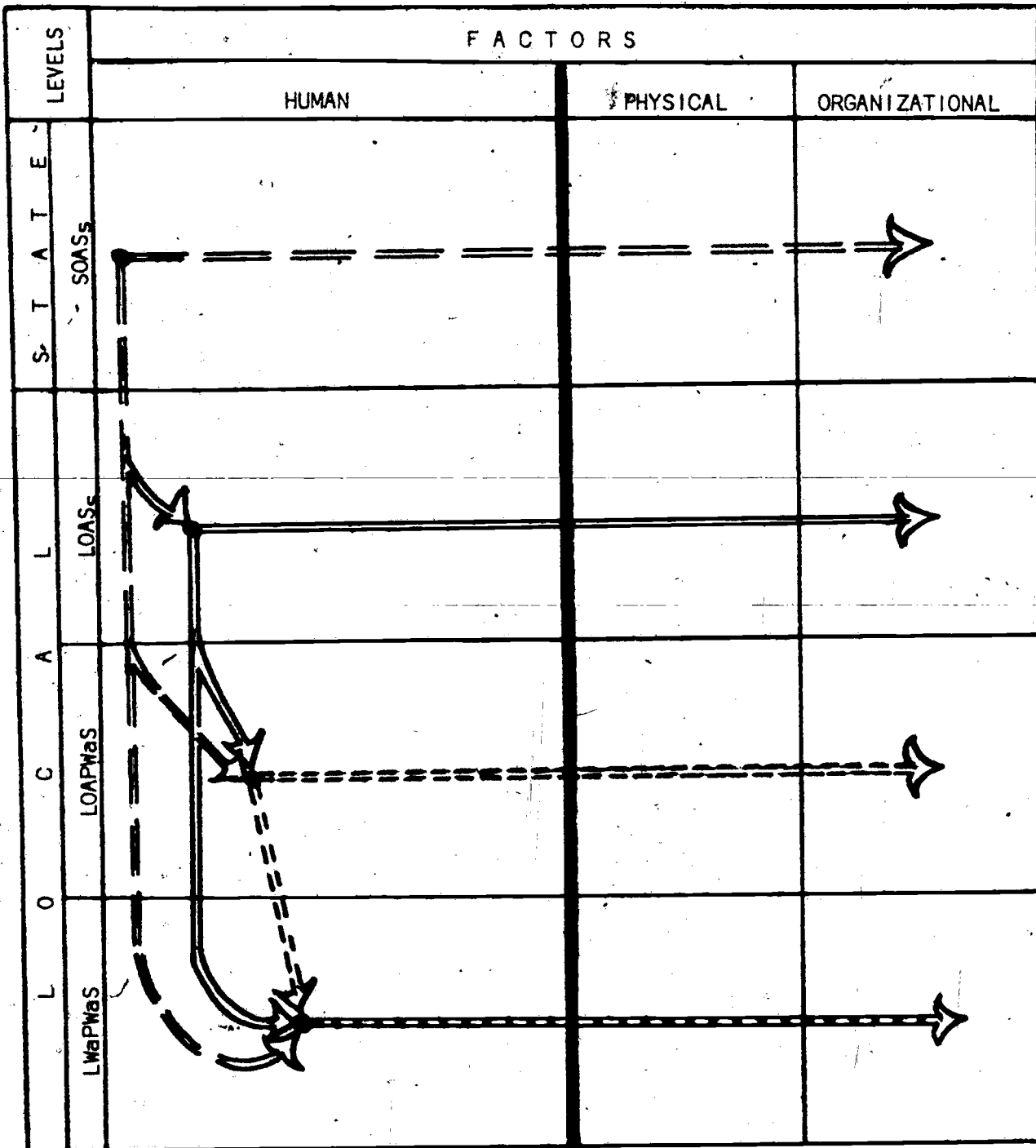


FIGURE 1: Interactive Patterns within Process Space (The arrows indicate the direction of the influences between and within process levels).

TABLE I-Hierarchical Levels in Process Space; Role Incumbent Titles and Examples at Each Level

LEVEL	ROLE INCUMBENTS AT A GIVEN LEVEL	EXAMPLES OF ROLE INCUMBENTS AT A GIVEN LEVEL
STATE	STATE OVER ALL SCHOOLS (SOAS <sub>s</sub> )	State Legislature; State Board of Education Division of Occupational Education State Advisory Committees Teachers In The State Students In The State
	LOCAL OVER ALL SCHOOLS (LOAS <sub>s</sub> )	Local Board Of Education Local Superintendent Of Schools Local Advisory Committee Teachers In A City, Region Or Town Students In A City, Region Or Town
LOCAL	LOCAL OVER ALL PROGRAMS WITHIN A SCHOOL (LOAPWAS)	Local Board Of Education School Superintendent; School Principal Guidance Counselors Teachers In A School Students In A School Guidance Counselors And School Faculty
	LOCAL WITHIN A PROGRAM WITHIN A SCHOOL (LWAPWAS)	Head Of The Automotive Mechanics Program Advisors For The Automotive Mechanics Program Teachers In The Automotive Mechanics Program Students In The Automotive Mechanics Program Students And Teachers In The Automotive Mechanics Program



and horizontally into four hierarchical levels. The model of process space described in this paper is depicted in Figure 2. In the next section of the paper, the use of a numbering system for process space will be explained.

### PART III

#### A SUGGESTED INFORMATION-ADDRESS SYSTEM FOR STORING CLASSIFYING AND LOCATING INFORMATION IN THE PROCESS SPACE

The model of process space was set up basically to provide an efficient method for dealing with process information. It would be most efficient to be able to store or retrieve a bit of process information by knowing exactly where in the process space this bit of information belongs (e.g., its "address"). In order to attain this level of efficiency within our model, a suggested numbering system has been set up so that a seven digit number fully describes any location within the process space (see Table 2). The first number in the address specifies the process level (e.g., 2 = local over all schools level). The second, third, and fourth numbers specify the particular role incumbent at that level (e.g., 002 - Administrators). The fifth number specifies the particular process factor involved (e.g., 1 = Human Factor). The sixth number refers to a category within that factor (e.g., 3 = Behaviors). The seventh number in the address specifies which subcategory, if any, within that factor is involved (e.g., 2 = Operations). (Note that only the Human Factors category "behaviors" is divided into subcategories. The absence of a subcategory is indicated by a "0"). Thus, address #2002132 specifies the location of information concerning the operational behavior of administrators at the local-over-all schools (LOAS<sub>S</sub>) level; this address would be used to either store or locate that particular type of information. All variables located in "Givens" addresses in Figure 2 are variables which have been decided at a level above where they actually occur. Thus, if an administrator at the state

LEVELS	PROCESS										FACTORS				
	1. Human					2. Physical		3. Organizational			4. Time & Physical Factors	5. Time & Human Factors	6. Human & Physical Factors	7. Time, Human & Physical Factors	
	1. Charac- teristics	2. Per- ceptions	1. Decisions	2. Operations	3. Behaviors	1. School Structure	2. Instru- ctional Material	1. Time Factors	2. Human Factors	3. Phy- sical Factors	4. Time & Physi- cal Factors	5. Time & Human Factors	6. Human & Physi- cal Factors	7. Time, Human & Physi- cal Factors	
1. L0A5	001 P	100110	1001120	1001131	1001132	1001210	1001220	1001310	1001320	1001330	1001340	1001350	1001360	1001370	
	002 A	1002110	1002120	1002131	1002132	1002210	1002220	1002310	1002320	1002330	1002340	1002350	1002360	1002370	
	003 S <sub>b</sub>		1003120	1003131	1003132	1003210	1003220	1003310	1003320	1003330	1003340	1003350	1003360	1003370	
	004 S	1004110	1004120	1004131	1004132	1004210	1004220	1004310	1004320	1004330	1004340	1004350	1004360	1004370	
	005 T	1005110	1005120	1005131	1005132	1005210	1005220	1005310	1005320	1005330	1005340	1005350	1005360	1005370	
2. L0A5	000 Given					2000210	2000220	2000310	2000320	2000330	2000340	2000350	2000360	2000370	
	001 P	2001110	2001120	2001131	2001132	2001210	2001220	2001310	2001320	2001330	2001340	2001350	2001360	2001370	
	002 A	2002110	2002120	2002131	2002132	2002210	2002220	2002310	2002320	2002330	2002340	2002350	2002360	2002370	
	003 S <sub>b</sub>	2003110	2003120	2003131	2003132	2003210	2003220	2003310	2003320	2003330	2003340	2003350	2003360	2003370	
	004 S	2004110	2004120	2004131	2004132	2004210	2004220	2004310	2004320	2004330	2004340	2004350	2004360	2004370	
005 T	2005110	2005120	2005131	2005132	2005210	2005220	2005310	2005320	2005330	2005340	2005350	2005360	2005370		
3. L0A5	000 Given					3000210	3000220	3000310	3000320	3000330	3000340	3000350	3000360	3000370	
	001 P	3001110	3001120	3001131	3001132	3001210	3001220	3001310	3001320	3001330	3001340	3001350	3001360	3001370	
	002 A	3002110	3002120	3002131	3002132	3002210	3002220	3002310	3002320	3002330	3002340	3002350	3002360	3002370	
	003 S <sub>b</sub>	3003110	3003120	3003131	3003132	3003210	3003220	3003310	3003320	3003330	3003340	3003350	3003360	3003370	
	004 S	3004110	3004120	3004131	3004132	3004210	3004220	3004310	3004320	3004330	3004340	3004350	3004360	3004370	
005 T	3005110	3005120	3005131	3005132	3005210	3005220	3005310	3005320	3005330	3005340	3005350	3005360	3005370		
4. L0A5	000 Given					4000210	4000220	4000310	4000320	4000330	4000340	4000350	4000360	4000370	
	001 P	4001110	4001120	4001131	4001132	4001210	4001220	4001310	4001320	4001330	4001340	4001350	4001360	4001370	
	002 A	4002110	4002120	4002131	4002132	4002210	4002220	4002310	4002320	4002330	4002340	4002350	4002360	4002370	
	003 S <sub>b</sub>	4003110	4003120	4003131	4003132	4003210	4003220	4003310	4003320	4003330	4003340	4003350	4003360	4003370	
	004 S	4004110	4004120	4004131	4004132	4004210	4004220	4004310	4004320	4004330	4004340	4004350	4004360	4004370	
005 T	4005110	4005120	4005131	4005132	4005210	4005220	4005310	4005320	4005330	4005340	4005350	4005360	4005370		

FIGURE 2: An integrated model or process space consisting of three factors and four levels. The numbered boxes indicate the addresses of certain information in the process space.  
Note that the model includes addresses of combinations of role, incumbents but this has been omitted for the sake of space.



TABLE 2: A Suggested Numbering System For The Model Of Process Space:  
An Information-Address System For Process Space.

Ordinal Position Of Number In Address	Process Element Described (See Figure 2)	Number Used To Describe Process Element(See Figure 2)	Digits Required* To Describe Process Element.
1st Number	Level Of Process Space	1 - 4	1
2nd, 3rd & 4th Numbers	Role Incumbent(s)	1 - 120	3
5th Number	Process Factor	1 - 3	1
6th Number	Category Within A Factor	1 - 7	1
7th Number	Subcategory Within A Factor	0 - 2	1

\*Note that any address in process space can be fully described by a seven digit number.

level decides that all students in a given local area should attend school for five hours per day, the variable "number of hours students attend school each day", (an organization of human and time factors variable) would be located in the learning-occurrence address #2003350; this address would indicate that this variable represents a "given" at the LOAS<sub>5</sub> level. By looking at the "givens" category at any level one can get an idea of the constraints on decisions at that level.

#### PART IV

##### A SUGGESTED SYSTEM FOR CLASSIFYING AND STORING PROCESS INFORMATION

The information stored in the process addresses depicted in Figure 2 would consist of the process variables which were investigated in the sample. For purposes of computer storage, it is suggested that each variable be identified by a number (e.g., variable #24 might be the number of students working on a clutch). A number would also be assigned to each variant of a variable; one student per clutch might be identified by a number 1, two students per clutch by a number 2, and 3 or more students per clutch by a number 3, etc. Thus, variable 24-2 would refer to the variable "two students working on a clutch." (An index of all the observed variables and their variants in the sample data would be compiled for users of the system. This index will be more fully described in Part V.) This variable, having been observed in the sample, would then be stored in the two separate, cross-referenced process addresses discussed in Part II; 1) a human factors decisional behaviors address indicating which role incumbent at what level determined that variable; and 2) a physical or organizational factors address indicating which physical or

organizational factor and which role incumbent(s) at what level the occurrence of that variable involves. (Note that all human factors variables, excluding decisional behaviors, are stored only in human factors addresses and serve mainly to describe role incumbents). Each recorded variable would be subscripted with the other address in which it is recorded, the type of decision that determined it and a profile code identifying the school, program, block and unit in which the variable was observed. (Most of these items have been provided with OE code numbers). If particular behavioral objectives are related to this variable, these would also be identified in the code.

A simple example would be that during the collection of sample data an investigator observes that in the automotive program in Country<sup>1</sup> Vocational High School--the power train block of this program, the clutch unit--there are two students working on a clutch, (a policy determined solely by the head of the automotive mechanics program), and the behavioral objective to be achieved is that the student be able to assemble the clutch. The investigator would then store variable 24-2 (two students per clutch) at the following addresses (see Figure 2 and Table 2).

- 1) address #4002131 - indicating that this variable was determined by the administrator at the LWaPWaS level. (Variables stored in decision category addresses would also be subscripted with a code indicating how the decision was made--e.g., a decision made without consultation might be identified by a #3).
- 2) address #4003360--indicating that this is an organization of human and physical factors variable and it involves students at the LWaPWaS level.

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<sup>1</sup>This is a hypothetical High School.

The investigator would then consult listings of identifying codes for schools<sup>1</sup>, programs, blocks, units and objectives. Country Vocational High School might be High School #06; the automotive mechanics program #17.0302; the power train block #01; the clutch unit #04; clutch assembly might be behavioral objective #01. (See Figure 3 for an example of classification at the within schools level of process space.) The investigator would also note that a decision made by one role incumbent without consultation is classified as a decision-type #3. The information that he would store at the two addresses described above would then be--1) the variable number, 2) a subscript containing--a) an identifying profile code, b) the alternative address for this variable, and c) the type of decision that determined this variable. For example, the type of information stored at address #4002121 (administrators' decisions at the LWaPWaS level) might be as follows:

<p>24-2</p> <p>06:17.0302:01:04:01:4003360:3</p>	<p>Input data addresses</p>	<p>product data addresses</p>	<p>Impact data addresses</p>
--	-------------------------------------	---------------------------------------	--------------------------------------

The variable number is subscripted with an information profile. The first 14 numbers are the identifying profile code--school, program, block, unit, behavioral objectives; the next 7 numbers give the alternative process address of this variable; the last number indicates the type of decision that determined this variable. Other information stored at this process address would indicate linkages between this process variable and related input product and impact data. Intersystem linkages are more fully discussed in Occasional Paper #3.

<sup>1</sup>The question of the confidentiality of information pertaining to a particular school is as yet an unresolved question which will require further thought.

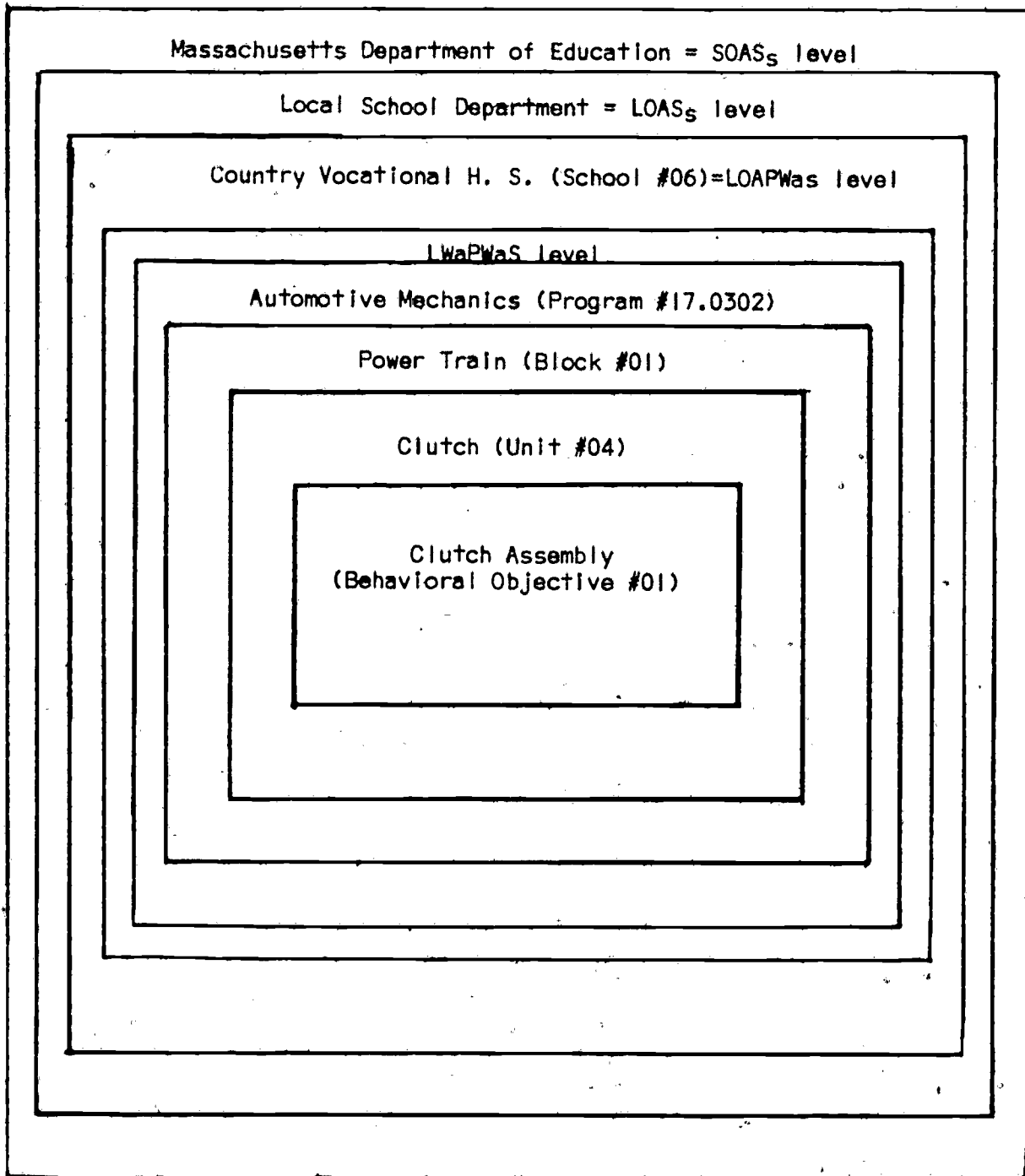


FIGURE 3: Classification within the LWaPWaS level of process space (with identifying code numbers).

## PART V

### A SUGGESTED SYSTEM FOR RETRIEVAL OF PROCESS INFORMATION

#### A. The Process-Space Index

Once information from the sample has been stored in process addresses, a system must be developed which allows someone who wishes to use the system to get at this information. For this purpose, it is suggested that an index to the system be developed. As previously mentioned, it was suggested that process variables be stored in a dual classification system according to--1) the role incumbent who determined the variable, and 2) the physical or organizational factor and role incumbent that the actual occurrence of the variable involves. It is suggested that the reference index be divided into two sections. The first section would list all of the role incumbents at each of the four levels and the addresses at which information concerning their personal characteristics, perceptions and behaviors is located. This section of the index might resemble the Human Factors section of Figure 2. Also, this section of the index would enable users of the system to--1) get information about the characteristics and perceptions of the role incumbents whose decision making is responsible for process variables, 2) obtain a read-out of the entire array of process variables which a particular role incumbent decided. (Each role incumbent would be identified by a four digit code number, the first digit specifying level; the second, third and fourth digits specifying role).

The second section of the process-space index would contain a list of all of the variables and variants of these variables investigated in the sample. (The variables and variants might be catalogued according to the program in which they were observed. Within each program variables might be further catalogued according to whether they involved physical or organizational

factors.) Next to each variable would be the learning-occurrence address (e.g., physical or organizational factors address) of that variable and its variants.

In order to retrieve information from the system, a user would have to fill out a form specifying the particular information which he is interested in. The form might be set up as illustrated in Table 3. (Note that along with the process-space index, the user would have to be provided with lists of code numbers for sample schools, programs, blocks and units as well as a list of code numbers for behavioral objectives). The information on the Process Variables Profile Form would then be keypunched onto computer cards and fed into the computer. The computer would contain a program which would match this variable profile to a similar profile in the computer. All of the information contained in the matching variable profile would be printed out for the user. (The type of information stored at the various process addresses was explained in detail in Part IV). Provisions will be made for the user to indicate the extent of the information which he wants. For example, by filling in a zero for any of items 3 through 7, the user might indicate that he is not specifying any particular information code and therefore would receive all information at the process address which he specified (e.g., if the user wanted information about a particular variable in one program throughout all schools in the sample, he would fill in item 3 in the Process Variables Profile Form with a zero and specify the code for the particular program which he is interested in. By filling in a + sign, the user might indicate that he does not want the information for that item reported to him. At this point, it is essential to note that this is a suggested system for information storage and retrieval; the actual system will be developed by Mr. Breslow at a future point.

TABLE 3 - A Suggested Process Variable Profile Form to Accompany  
The Process Index  
(Exemplary Responses Haven Been Provided.)

ITEMS

I. Fill in either Item a or Item b:

a) If you are interested in information about a particular role incumbent, use the first section of the Process Index to fill in the following:

- 1) role incumbent identification number (e.g. 4002 = administrator at LMAPWAS level )
- 2) human factors category and subcategory number (e.g. 31 = decisional behaviors )

b) If you are interested in information about a process variable, use the second section of the Process Index to fill in the following:

- 1) variable identification number (e.g. 24 = variable "No. of students per clutch" )
- 2) variant identification number (fill in "0" if none) (e.g. 2 = "two per clutch" )

2. Specified Process Address for Item #1 a) (LMAPWAS administrator's decisions (4002131) )

b) (Two per clutch (4003560) )

For Items 3 - 7, please consult the appropriate listing of identifying codes:)

- 3. School Code Number(s) (e.g. 06 = Country Vocational High School )
- 4. Program Code Number(s) (e.g. 17.0302 = Automotive Mechanics )
- 5. Block Code Number(s) (e.g. 01 = Power Train )
- 6. Unit Code Number(s) (e.g. 04 = Clutch )
- 7. Behavioral Objective Code Number(s) (e.g. 01 = Able To Assemble Clutch )

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## B. Examples of the Use of the Suggested Process Index

For the sake of simplicity, the same type of practical example that has been offered throughout the paper will be used to illustrate how the process-index system might actually be used. Suppose that the administrator in a particular LEA has limited funds for purchasing equipment for the automotive mechanics program throughout his area. He had previously established the policy that only one student at a time will be allowed to work on a clutch in order to achieve the behavioral objective of clutch assembly. However, now, due to limited funds and rising enrollment, the administrator is considering changing this policy so that two students at a time will work on a clutch (rather than purchasing more equipment). He would like to know all of the information accumulated in our sample data about the variable "two students per clutch;" he is particularly interested in knowing whether students trained in this manner are capable of achieving the same behavioral objectives as students who worked individually on clutches. He would use the second section of the Process Index (the list of variables and their process addresses) to fill in the Process Variable Profile Form. After the form was processed, he would receive a printout of all information with a matching process profile. The LEA administrator could then make a decision about the number of students allowed to work on a clutch on the basis of this information. (Note that because of the dual classification system of information processing, the administrator would also be provided with the address of information concerning the role incumbents in the sample who made decisions about the variable "two on a clutch", and the information about the variable "two on a clutch" would also include the address of the role incumbent who determined this variable.)

This same LEA administrator might also be interested in comparing

his role as a decision maker to that of administrators in sample school districts similar to his own. In order to obtain this type of information, he would consult the first section of the Process Index (the list of role incumbents at each of the four process levels with corresponding process addresses) and fill out the Process Variable Profile Form. The computer would supply him with the information matching the specified process profile at the specified process address. The LEA administrator could then use this information to form comparisons between his role as an administrator and the role of others in a similar position.

#### PART VI CONCLUSION

It is hoped that the suggested model of process space developed in this paper can adequately deal with the process section of systems space. The measurement of process variables (instrumentation) will be dealt with in Occasional Paper #11. At this point, we are working on a system for keying instruments into the process model. Economic aspects of process space will be discussed by Dr. Downey in Occasional Paper #5. In addition, Occasional Paper #5 will deal with the static delineation of the rest of systems space (input, product and impact space). The dynamic aspects of systems space will be discussed in Occasional Paper #6.

## GLOSSARY OF SELECTED TERMS

1. Decision-Type - classification of a decision according to one of three ways in which the decision was made.
  - a) joint - decision made by two or more people all with equal power in the decision-making process.
  - b) with consultation - decision made primarily by one person, but with consideration of the opinion of another.
  - c) without consultation - decision made by one person only.
2. Givens - those variables which have been decided at a higher level in the educational process but actually occur at a lower level and therefore represent constraints on the role incumbents at the lower level.
3. Instructional Event - that part of the educational process involving the interaction of the teacher and student in the actual learning process.
4. LEA - local educational agency.
5. Process Factor - one of three factors involved in process space.
  - a) human factors - characteristics, perceptions and behaviors of persons involved in the educational process.
  - b) physical factors - inanimate elements in the process space: school structure and instructional material elements.
  - c) organizational factors - configurations of process elements (process factors and time) and configurations of their interactions.
6. Process Level - one of the four hierarchical levels within process space.

- a) State Over All Schools (SOAS<sub>S</sub>) - the level which encompasses all factors which occur at or effect all schools and programs within the state.
  - b) Local Over All Schools (LOAS<sub>S</sub>) - the level involving all factors which occur at or effect all schools in a given locality.
  - c) Local Over All Programs Within A School (LOAPWAS) - the level involving all factors which occur in or effect all programs within a school in a given local area .
  - d) Local Within a Program Within a School (LWAPWAS) - the level involving all factors which occur in or effect all programs within a school in a given local area.
- 7. Process Space - that part of the IPPI model of education dealing with instructional events and the people involved with them.
  - 8. Role Incumbent - an individual who operates in a specified manner within one of the hierarchical levels of system space.
  - 9. Process-Space Index -a two-section index used to retrieve information stored in process addresses.
  - 10. Process Variable - anything within the process space which can be quantified.