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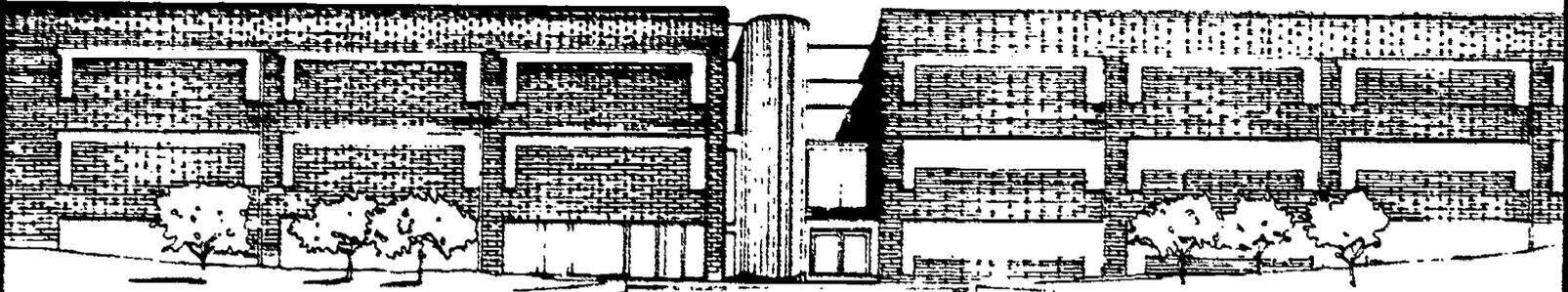
ABSTRACT

A model of program development and evaluation was developed at Genesee Community College, utilizing a system theory/process of deductive and inductive reasoning to ensure coherence and continuity within the program. The model links activities to specific measurable outcomes. Evaluation checks and feedback are built in at various levels so that program changes can be made without redesigning the whole program. The model consists of the following six steps: (1) define the purpose of the course or program; (2) identify three to six general activities which will achieve the defined purpose; (3) break down each activity to three to six more specific activities, making sure that the outcomes remain consistent; (4) continue to breakdown the activities to new levels of specificity until all activities are clearly defined and understood; (5) identify all input and output at each level of activity; (6) determine relationships among the activities; and (7) identify constraints, such as attitudes, policies, and funding, which influence outcomes. The completed model should be checked to ensure that activities and outcomes are properly matched at each level and that all outcomes are clearly defined in measurable, behavioral terms. Graphic depictions of these steps are appended. (WJT)

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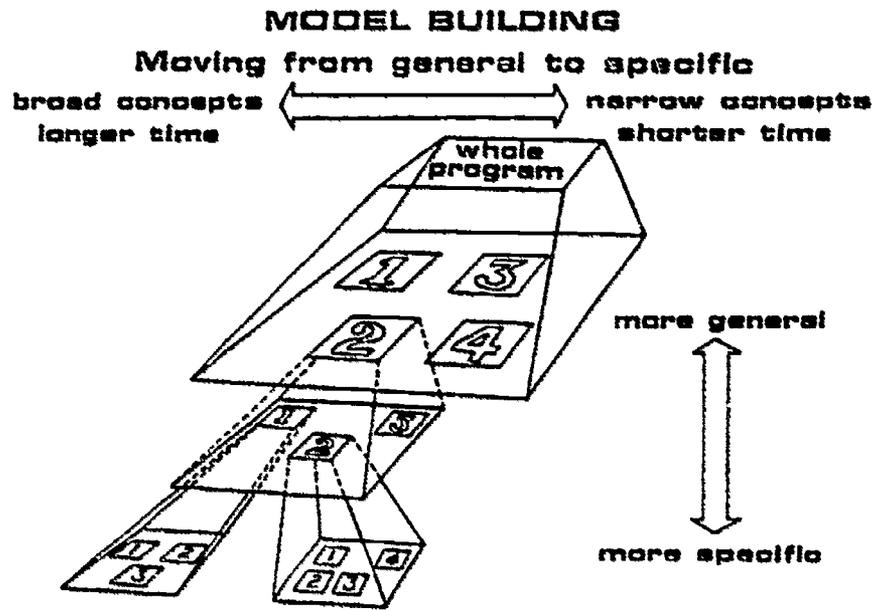
PROGRAM DEVELOPMENT AND EVALUATION: A MODELING PROCESS

This model uses a system theory/process of deductive and inductive reasoning with built in checks to ensure coherence and continuity. The development process builds in evaluation checks at various levels in the form of feedback so that changes in the program can be made without redesigning the total program. The model links activities to specific outcomes and stresses measurability of outcomes. The logical format of the model makes it appropriate for use in large programs (complex) as well as individual courses.

When considering program inputs (in this case students), various levels of inputs must be considered in relationship to each other and to the whole model. Many times, outcomes for certain transactions, or combinations of outcomes become the input for subsequent transactions.

Considerations should be given to the power of each transaction in relation to complexity, time allotted for the transaction, input, and constraints. Each level of transactions defines clearly a context of activity. The relationships between and among transactions on the same level must be clearly defined in the same way as the relationships between and among levels of transactions. The major concerns with outcomes include measurability and logical fit with the characteristics of the input (i.e. skill level of students) and the power of individual transactions (i.e. ensuring that a one hour lecture has not been identified as causing major behavioral changes).

*This paper and the illustrations are adaptations of Structured Analysis and Design Technique (SADT). The application of this technique to social and behavioral sciences was developed by Gary Borich (1982).



Beginning the Modeling Process

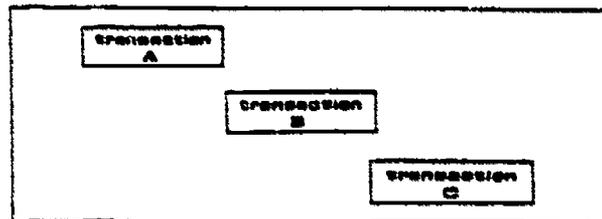
The first step is to define the purpose of the course or program. The goals/objectives are very general at this level. This first step will provide the most general context encompassing all program activities. The purpose is to clearly define the final outcome of the program from which specific subsequent activities and outcomes will be developed (see figure 1).

FIGURE 1

STEP 1
DEFINE PURPOSE OF WHOLE PROGRAM

- i.e. Competent legal assistants**
 - Students competent in automated manufacturing tech.**
 - Competent Dental Lab Assistants**
 - A phrase that concisely states purpose**
-

STEP 2
IDENTIFY THREE TO SIX GENERAL ACTIVITIES

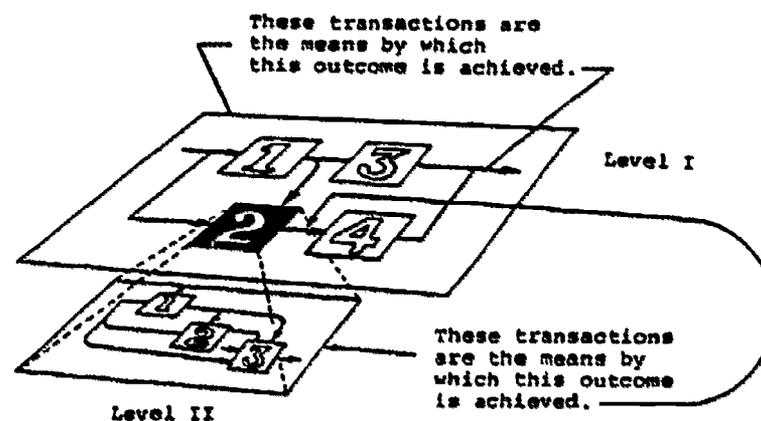


At the same level of generality, choose three activities which will bring about the purpose defined earlier (more activities/transactions may be

added if needed). These activities are very general at this time. They are to be arranged to provide continuity and coherence within the program. The transactions will be stated as verbs. Look to ensure that the outcome of these transactions is the same ending outcome as the previous level (see figure 2). Define the inputs and note all variables which have impact upon the input. These variables may constitute important constraints upon the identified transactions and therefore should be noted early in the model.

FIGURE 2

NOTICE that the outcome of number 2 Level I is the same as the outcome of Level II

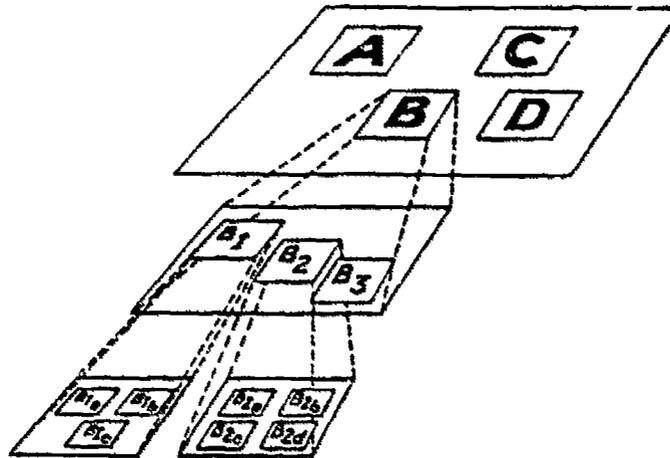


The next step is to break down each of the three activities (transactions) into three more transactions. Remember that when breaking down transactions to a more specific level, that the outcomes must remain consistent, i.e. the ending outcome of transaction A is the same as the ending outcome of A_1 , A_2 , and A_3 (see figure 3).

After checking the relationships between and among transactions, make sure the output is at the same level of specificity as indicated by the

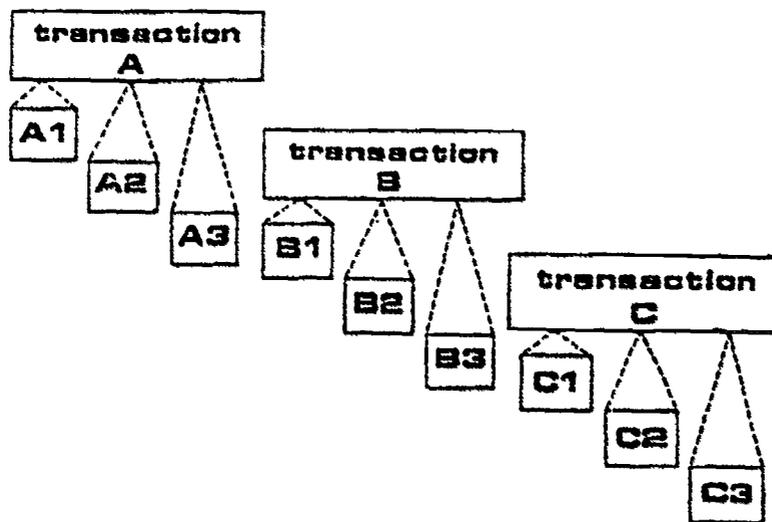
transaction (the intensity of activity should match the measurable outcome). Also, all outcomes must match as you move from level to level. Continue to break the model down until the activities and inputs are no longer meaningful or measurable.

FIGURE 3



Keep in mind the level of generality you're working with each time you go to a more specific level. Furthermore, the time commitment for each transaction becomes smaller as it is broken down into its functional components (smaller transactions). Interlock with a numerical code each transaction so you can identify its place in the larger model (see figure 4).

FIGURE 4

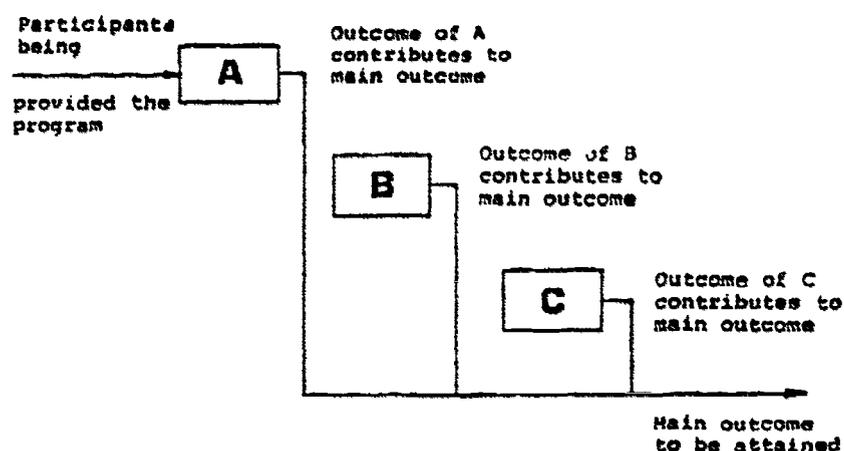


Checking the Model

Check to see that all inputs and outputs have been identified at each level and are congruent with the deductive level at each step. The outcomes should remain the same for clusters of transactions which are functional components of higher level transactions. State outcomes in measurable terms. The inputs at each level should remain consistent to its preceding level's output. Check to see that the proper outputs have become the proper inputs as the model moves toward more specificity.

Interrelationships among and between transactions on a single level must be indicated. Often there is no strong interrelationship among transactions (see figure 5). In this case, the three transactions provide activities

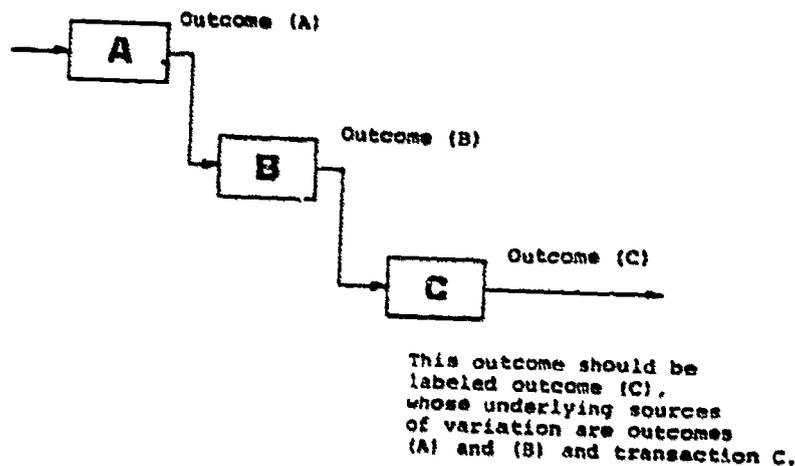
FIGURE 5



separately which cause a main output. If the transactions are to take place sequentially, make sure to note the sequence (see figure 6). This could be the case of taking beginning algebra before intermediate, or having composition I before composition II.

FIGURE 6

**IF TRANSACTIONS ARE IN SEQUENCE
THE MAIN OUTCOME IS THE SAME
AS THE LAST TRANSACTIONS**



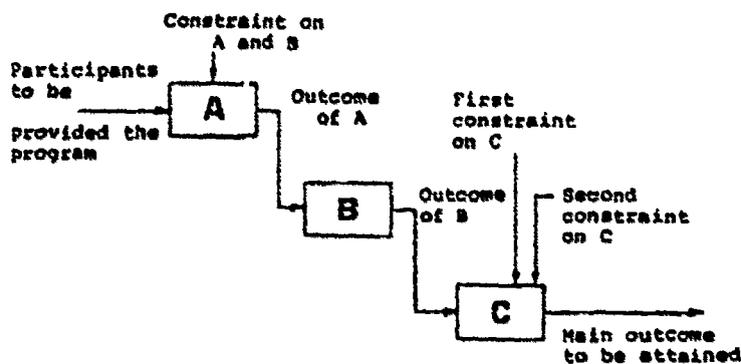
The next step is to identify constraints. Constraints may include variables which aid or hinder the transaction or outcome. Constraints should follow the level of generality or detail identified by the appropriate transaction. Constraints will be identified with each transaction at each level (see figure 7).

FIGURE 7

**IDENTIFYING CONSTRAINTS
(Those things that influence outcomes)**

**Attitudes Aptitudes Policies
Regulations Funding**

**label each constraint consistent with
the level of detail at which the trans
action is described**



There are often inputs which influence transactions and outcomes that have not been identified until later in the model. For example, these inputs can be additional materials or human resources. If additional inputs are added, they must be critical to the transaction and hence the outcome. These inputs become important during evaluation because the success of the output can be effected due to their absence.

Feedback

There are two main feedback mechanisms which can fit into the model. These mechanisms serve to ensure program success by noting outcomes and sending information back to the proper transaction for needed adjustments. One type of feedback occurs when an outcome has not been reached by a single participant. The participant, when identified, goes back through the transaction until the desired outcome is reached (competency based program). Another source of feedback occurs when information from one transaction goes back to a subsequent transaction in the form of a constraint. An example would be the later identification of material which effects the understanding of material presented earlier in the program in such a way to be confusing or the identification of information left out. This type of feedback may be used to identify additional inputs or constrains relating to prior transactions. An example of this may be the discovery of the need of additional workbooks, materials, knowledge or skills which logically fit into an earlier transition.

Also, if the total output of a higher level set of transactions proves to be less than what is desired, this information is routed to lower level transactions where program designs at very specific levels can be adequately altered.

In checking the completed model, careful attention should be paid in ensuring that transactions and outcomes are properly matched at each level and that all outcomes are clearly defined in measurable/behavioral terms. When the model is complete, consideration should be given to the qualifications needed by those conducting the transactions and to the transactional environment; including but not limited to needed resources, and physical and psychosocial environment. As a final note, specific skill levels, motivational levels, and psychosocial factors of beginning students should be addressed in the initial input phase and thereafter throughout the various levels.

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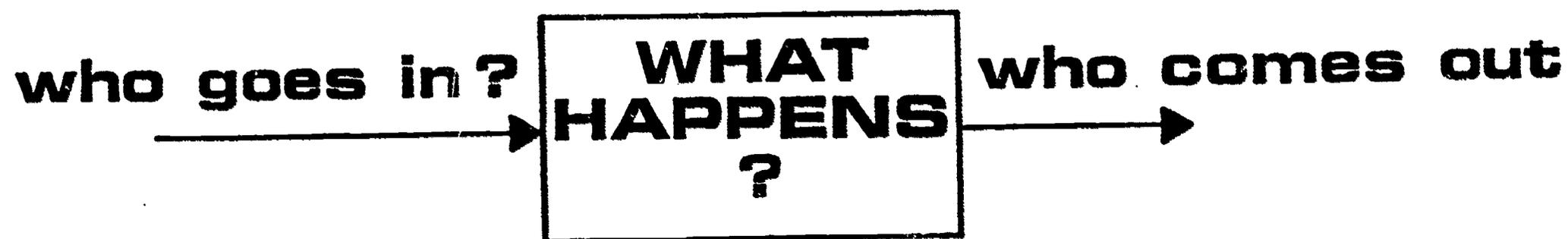
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PROGRAM DEVELOPMENT AND EVALUATION

**A GRAPHIC MODEL
WHICH WILL AID IN:**

- 1 CLARIFYING PROGRAM OBJECTIVES**
- 2 IDENTIFYING PROGRAM ACTIVITIES**
- 3 SPECIFYING PROGRAM OUTCOMES**

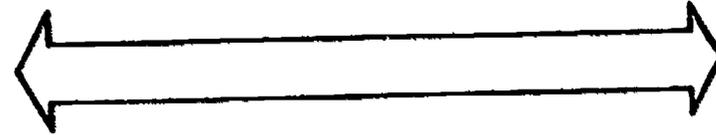
GENERAL SYSTEMS THEORY



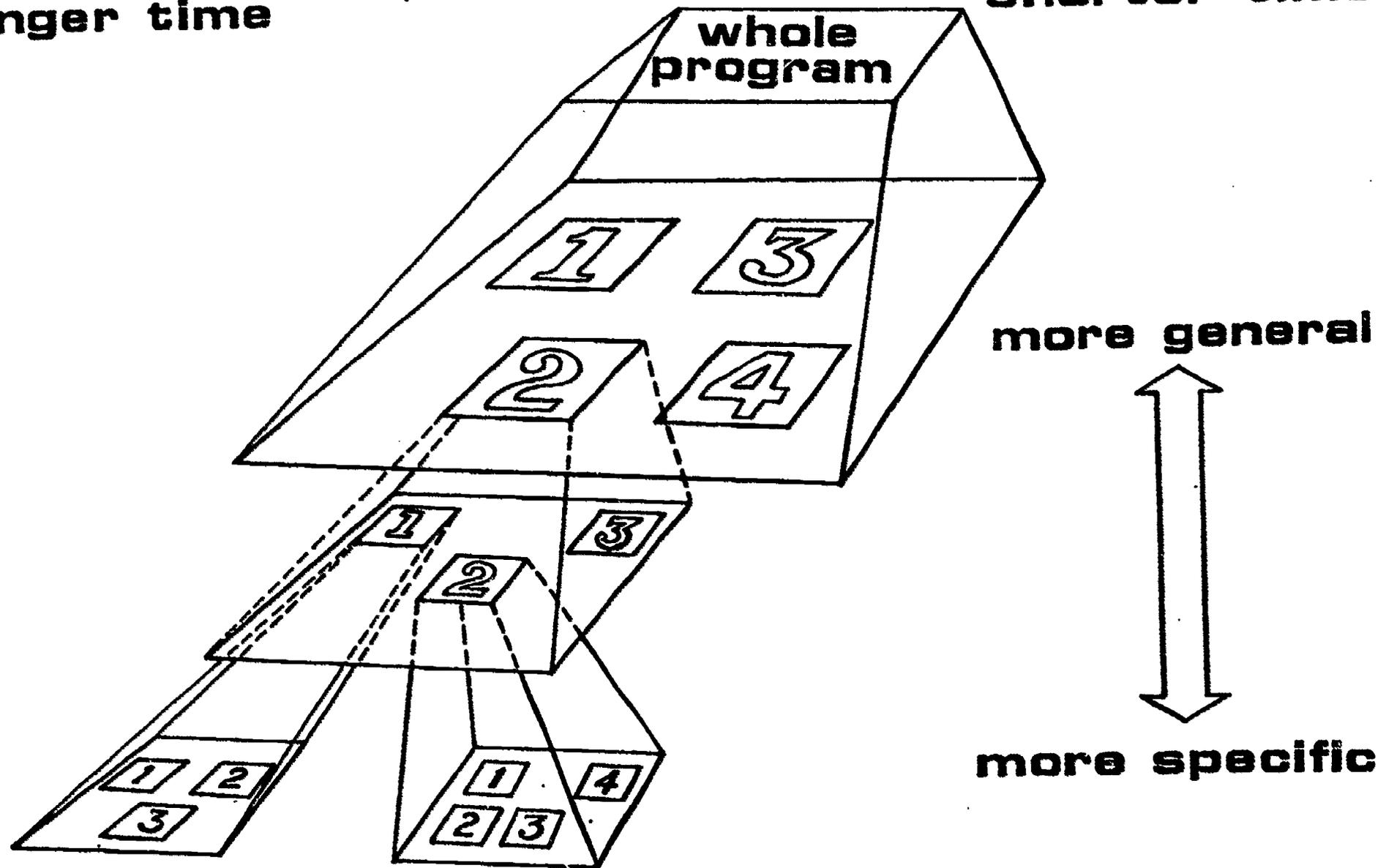
MODEL BUILDING

Moving from general to specific

broad concepts
longer time

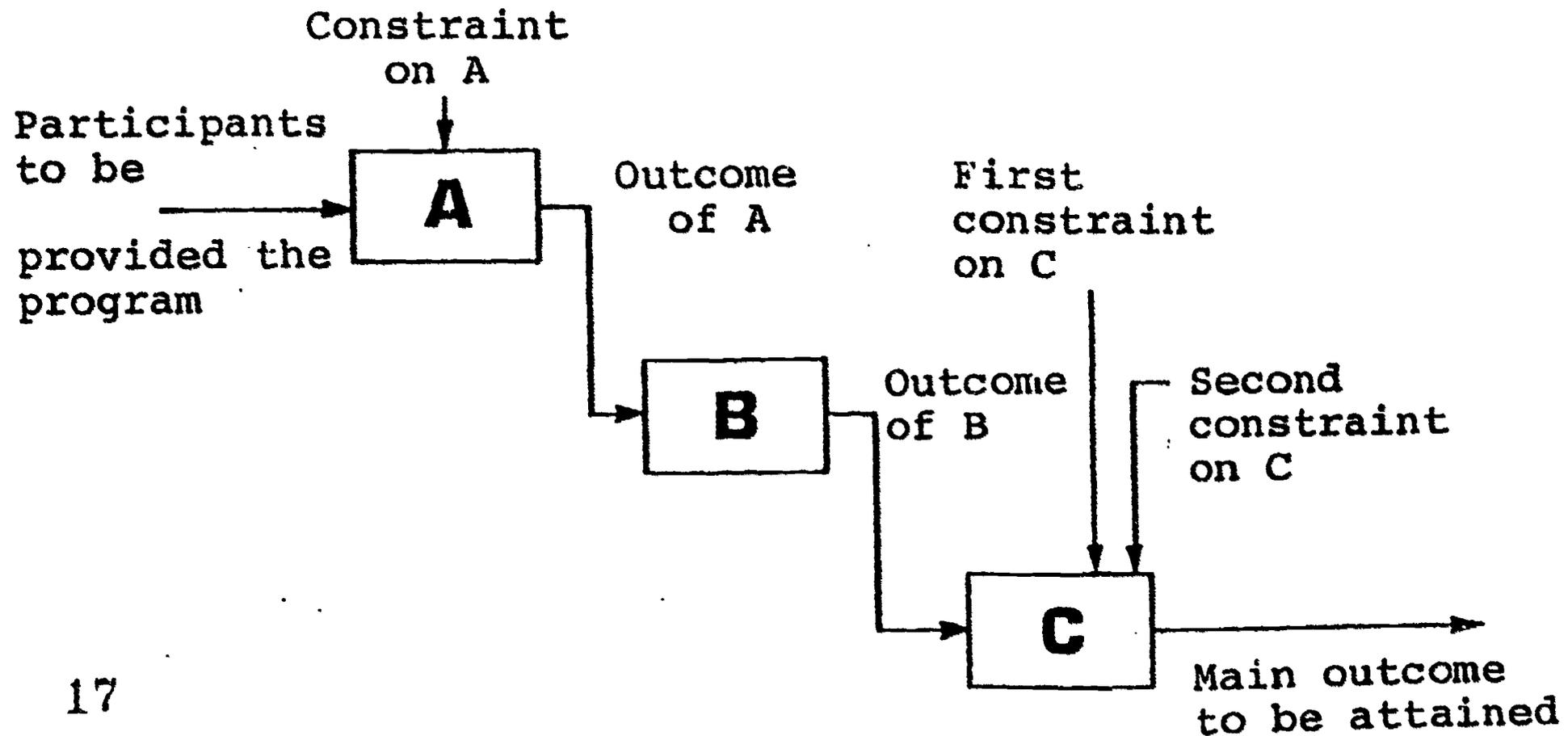


narrow concepts
shorter time



BASIC COMPONENTS

- I. TRANSACTIONS: Basic building blocks. Program activities--Labeled with ACTIVE VERB
- II. INPUTS: Activities act upon these things (STUDENTS, STAFF)
- III. OUTCOMES: Things "produced"--STUDENTS STAFF with certain skills
- IV. CONSTRAINTS: Things which influence outcomes.
(Funding, facilities, previous behaviors)



LET'S DO IT!

STEP 1

DEFINE PURPOSE OF WHOLE PROGRAM

i.e. Competent legal assistants

**Students competent in automated
manufacturing tech.**

Competent Dental Lab Assistants

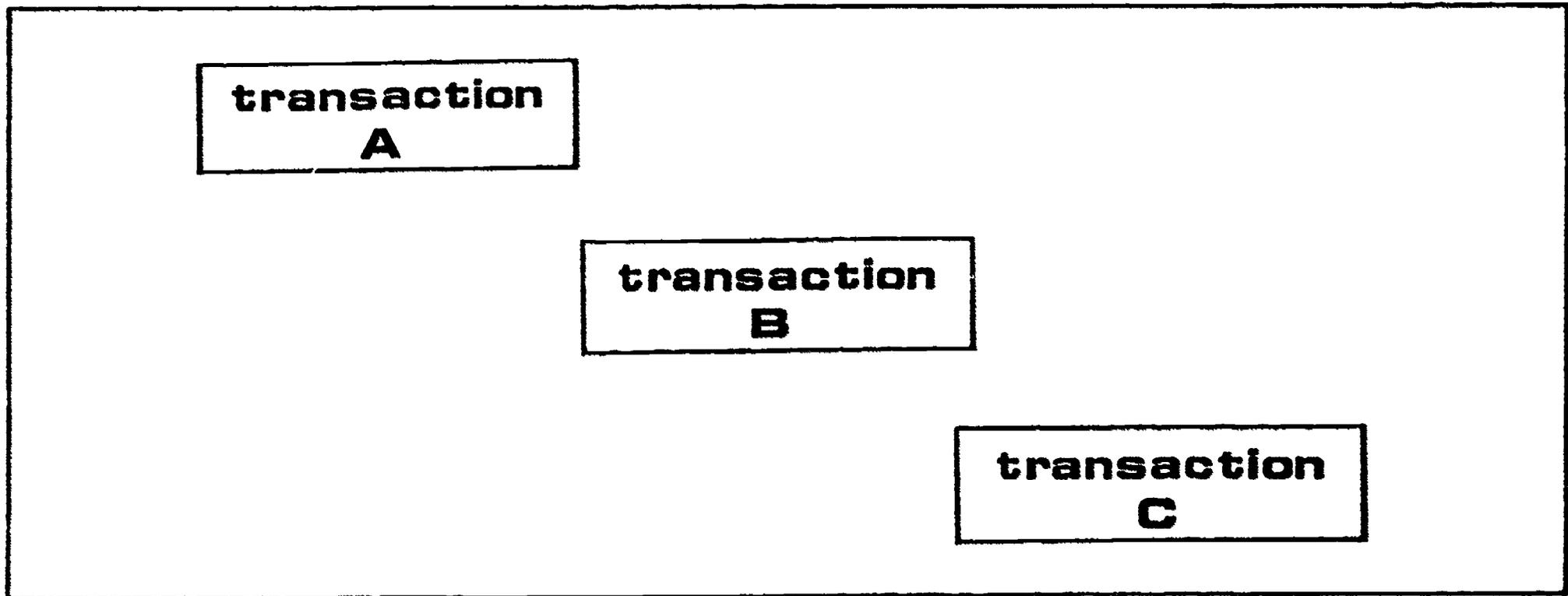
A phrase that concisely states purpose

"		"
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LET,S DO IT!

STEP 2

**IDENTIFY THREE TO SIX
GENERAL ACTIVITIES**



LET,S DO IT!

STEP 1

DEFINE PURPOSE OF WHOLE PROGRAM

i.e. **Competent legal assistants**

Students competent in automated manufacturing tech.

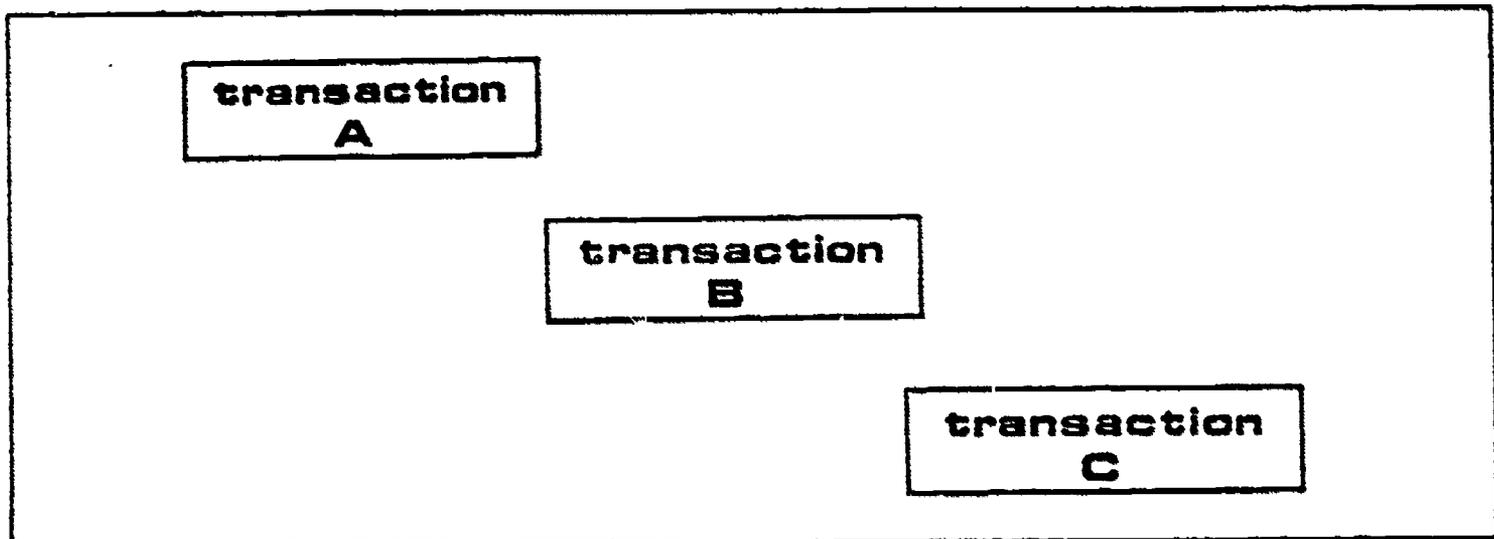
Competent Dental Lab Assistants

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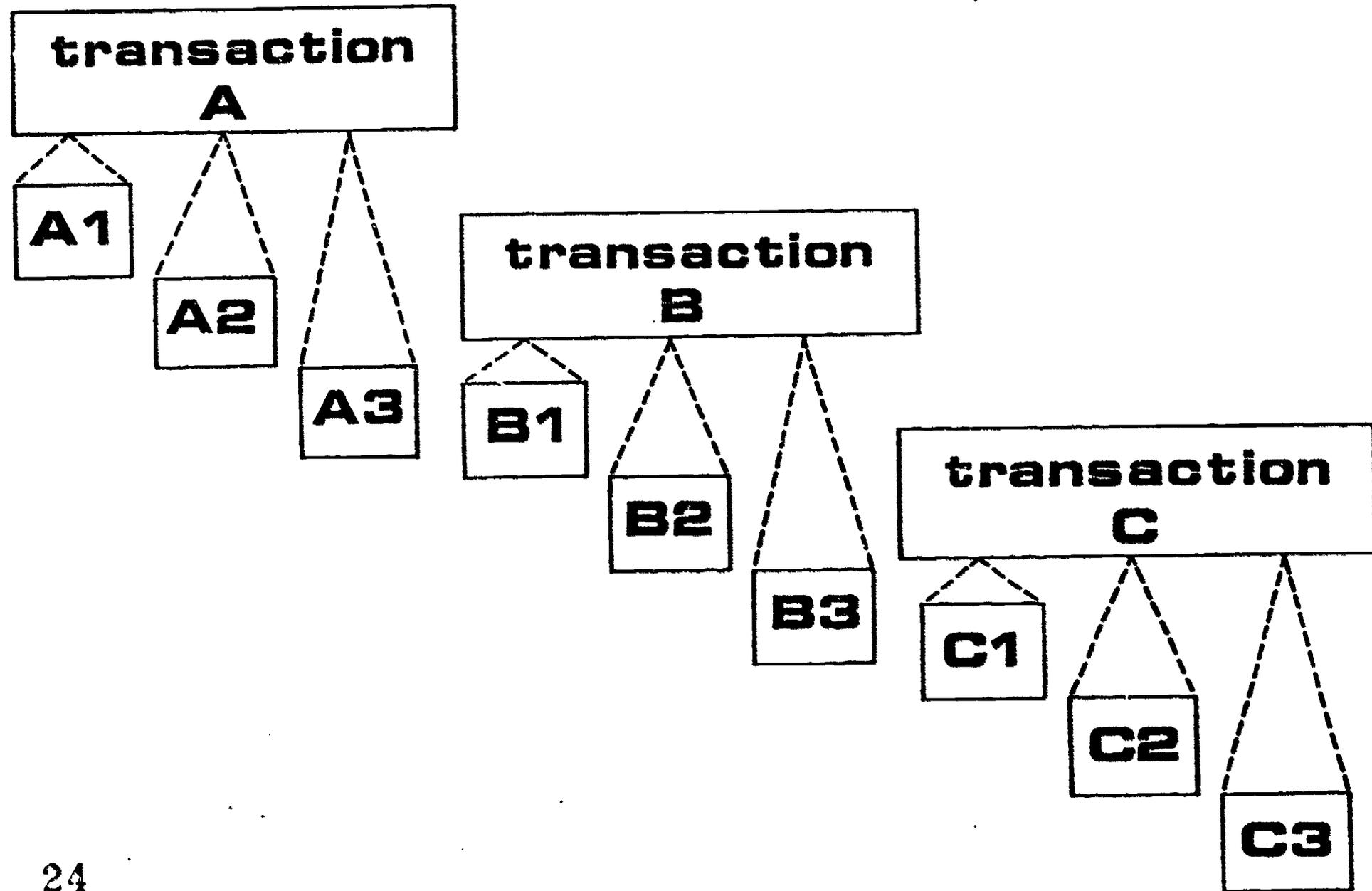
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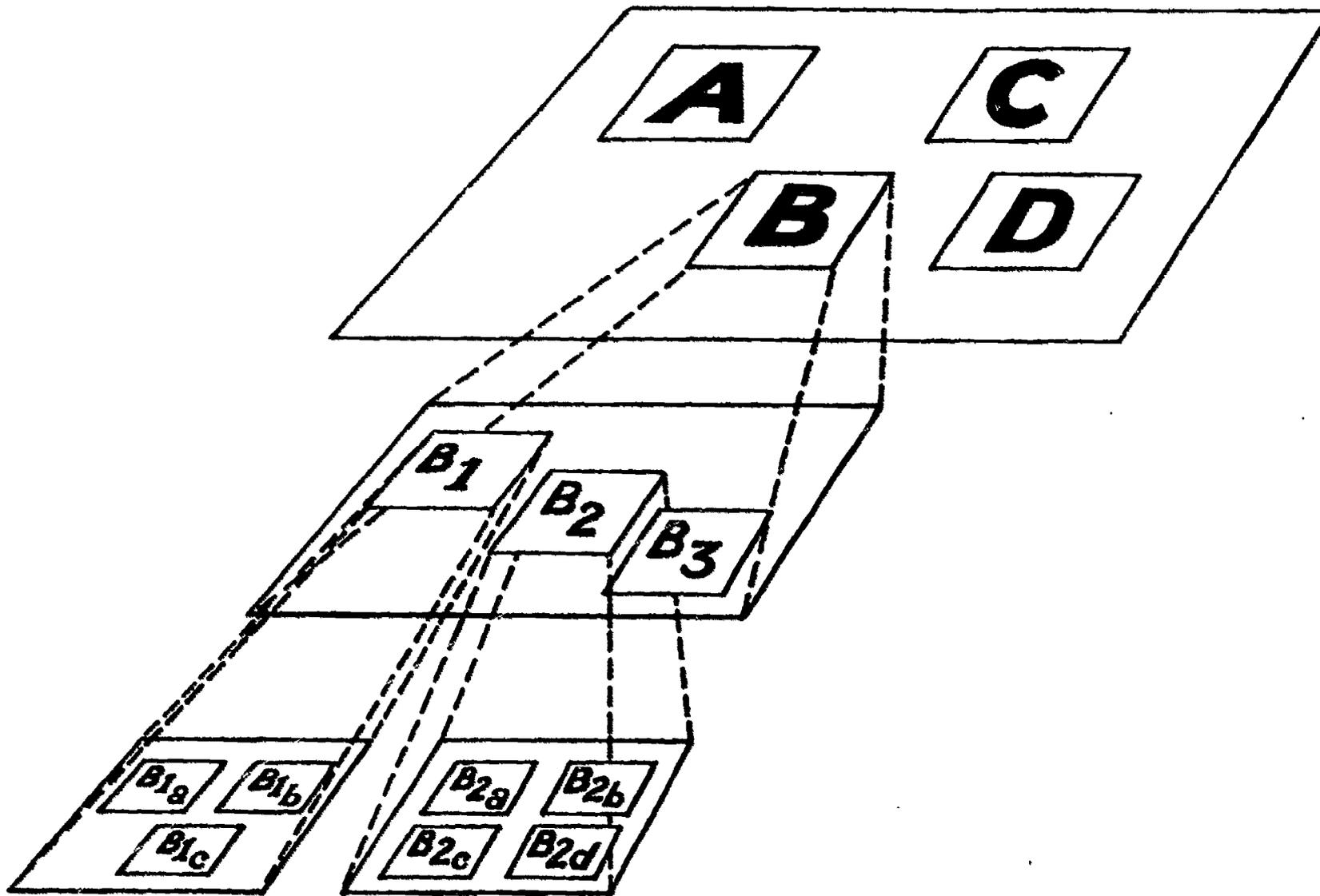
STEP 2

IDENTIFY THREE TO SIX GENERAL ACTIVITIES



3. TAKE EACH PREVIOUS TRANSACTION AND IDENTIFY THREE TO SIX NEW TRANSACTIONS FROM EACH





Continue to form new transactions until all activities are clearly defined and understood.

HOW SPECIFIC IS ENOUGH?

KEYS:

- 1. Your Models become hypotheses - If this, then that**
- 2. Time: Transactions take less time and become more clearly defined as you move down**
- 3. Stop the process when new transactions no longer contribute in meaningful ways to your stated terminal outcomes**
- 4. The breakdown should end when the transactions fail to produce measurable outcomes**

STEP 4. IDENTIFY INPUT AND OUTPUT ON EACH LEVEL OF TRANSACTIONS

(not each transaction)

Participants
being provided
the program



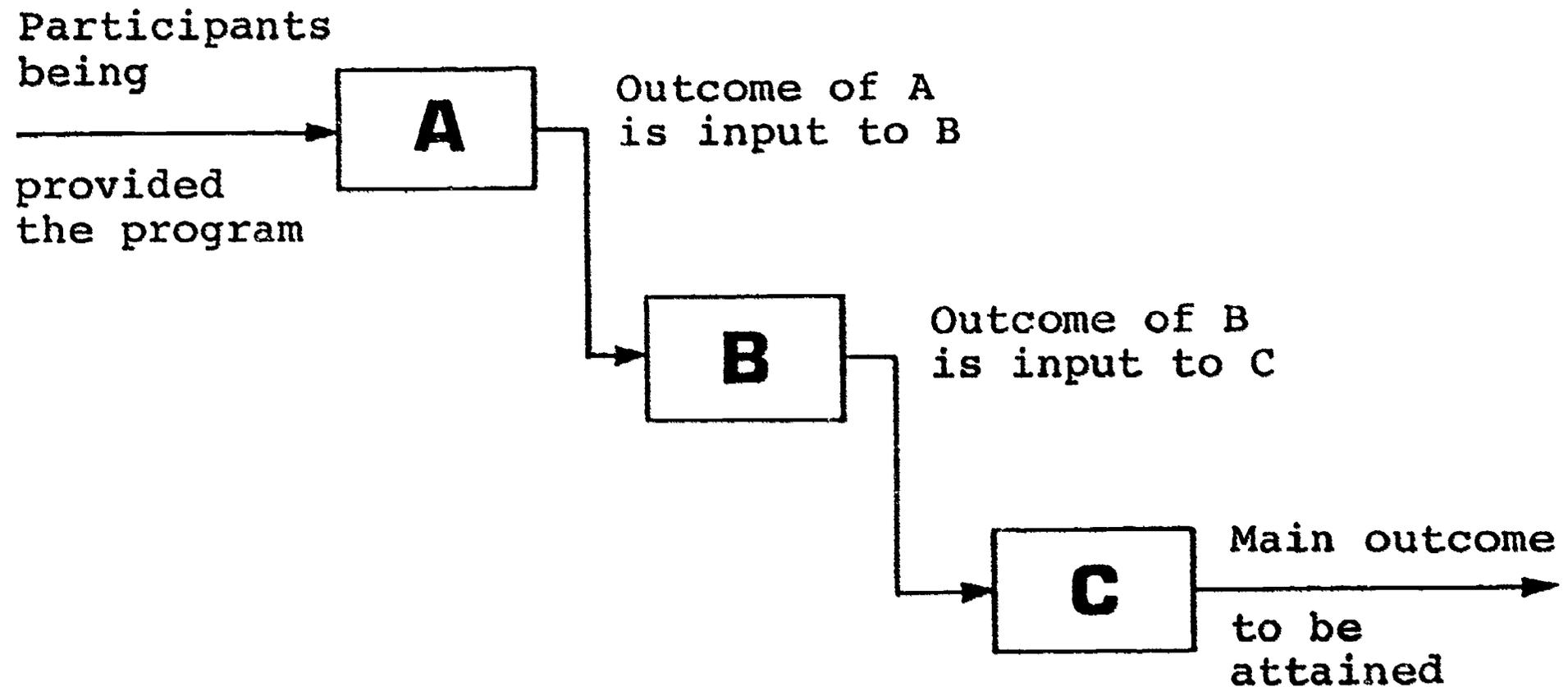
(Main input)



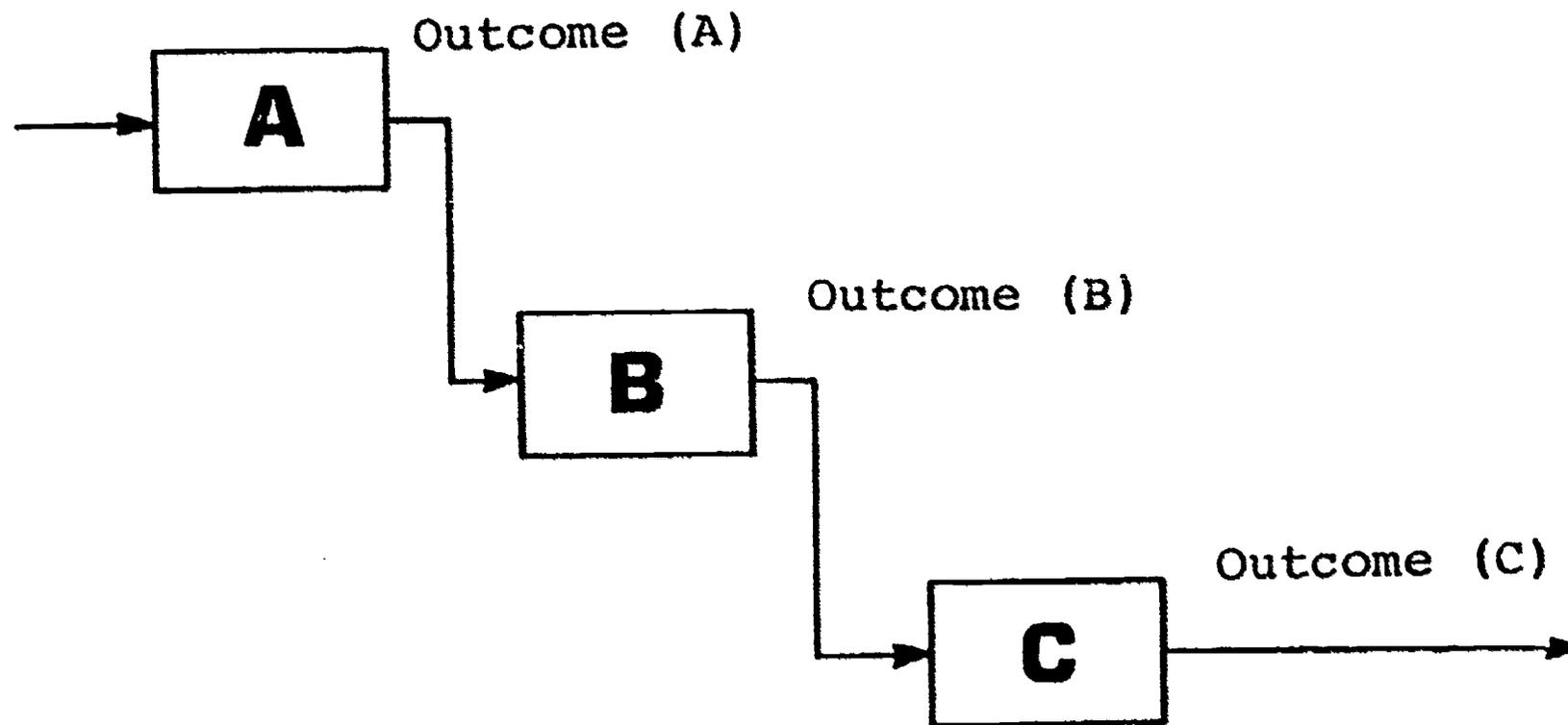
Behavior or
condition
participants are
expected to
attain (Main
output)

STEP 5. DETERMINE RELATIONSHIPS AMONG TRANSACTIONS

A. SEQUENCE

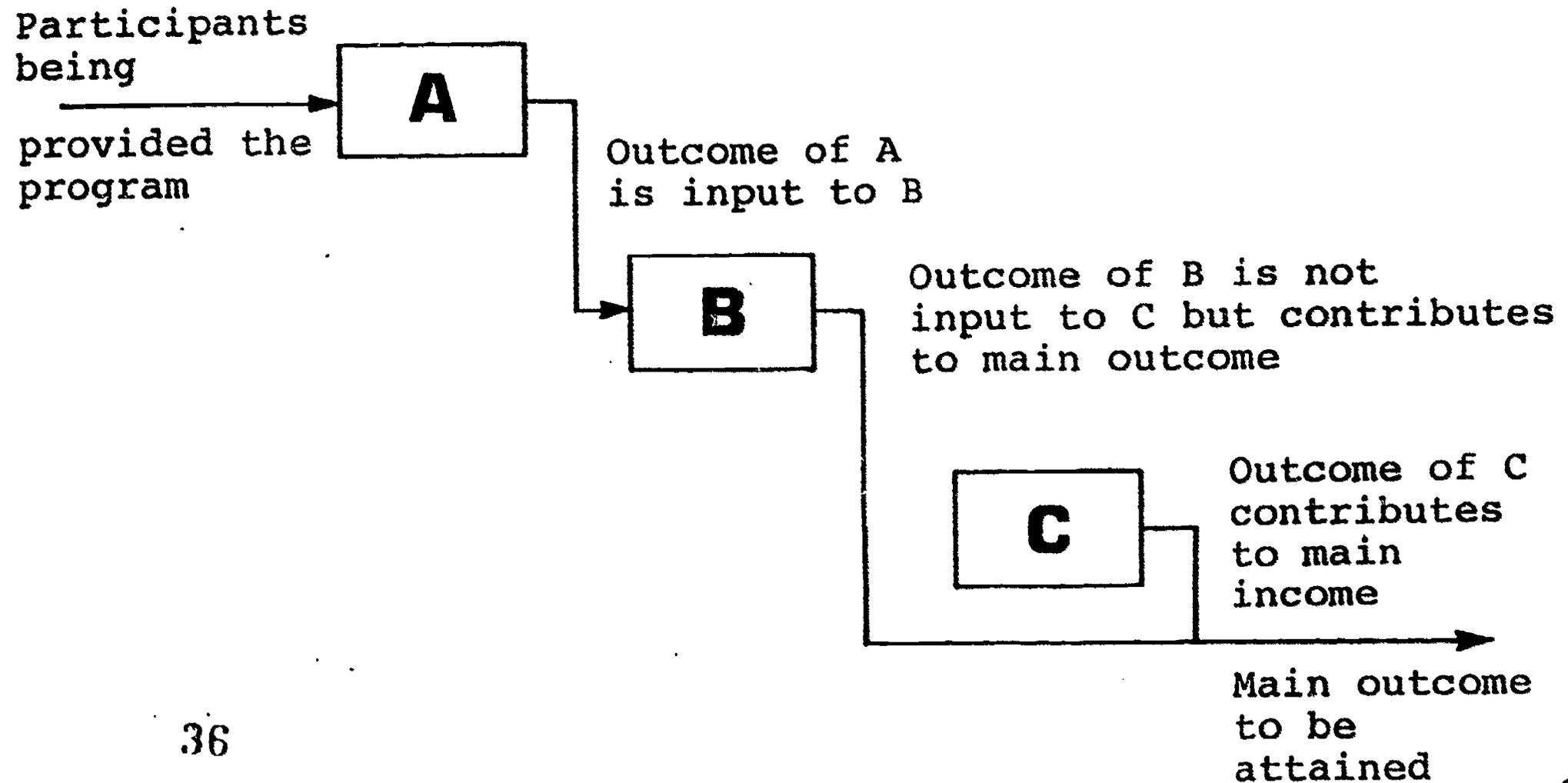


IF TRANSACTIONS ARE IN SEQUENCE THE MAIN OUTCOME IS THE SAME AS THE LAST TRANSACTIONS



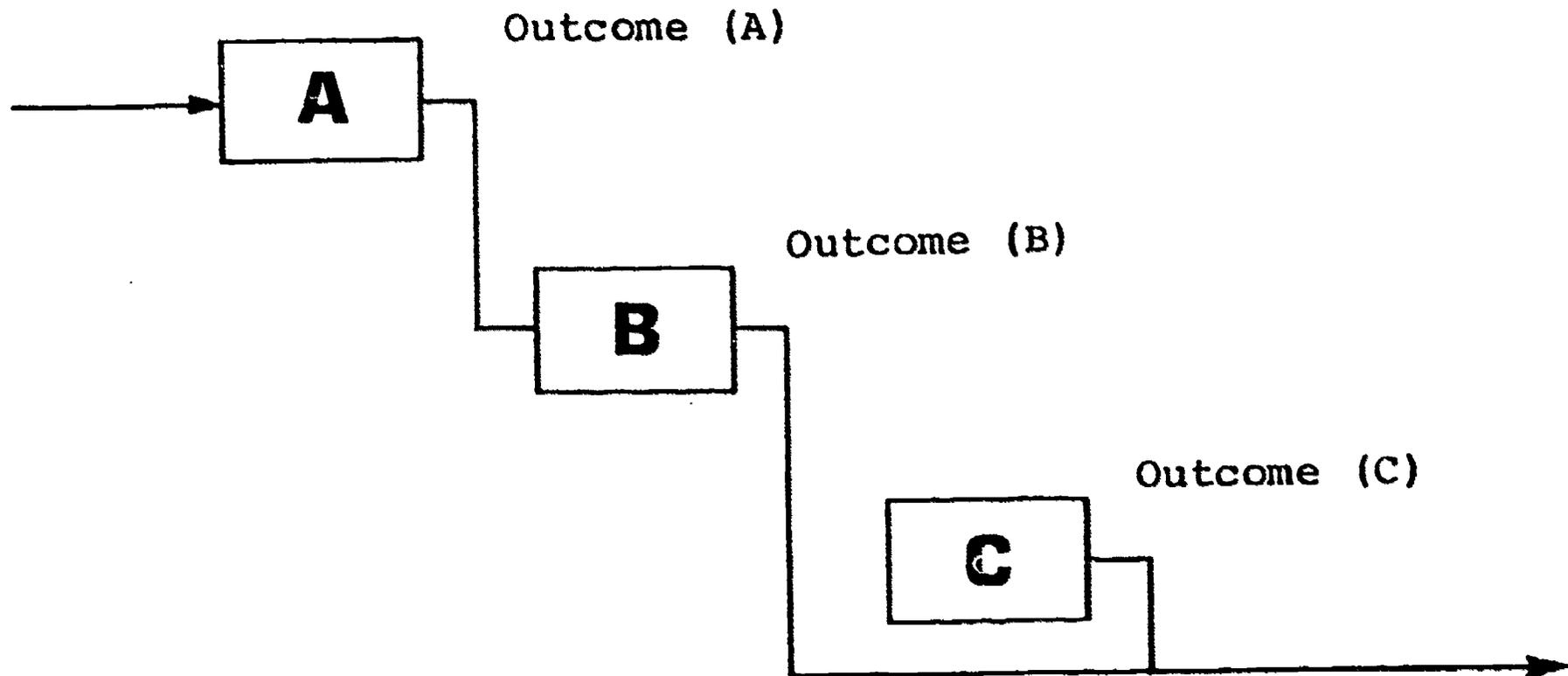
This outcome should be labeled outcome (C), whose underlying sources of variation are outcomes (A) and (B) and transaction C.

B. MIXED SEQUENCE



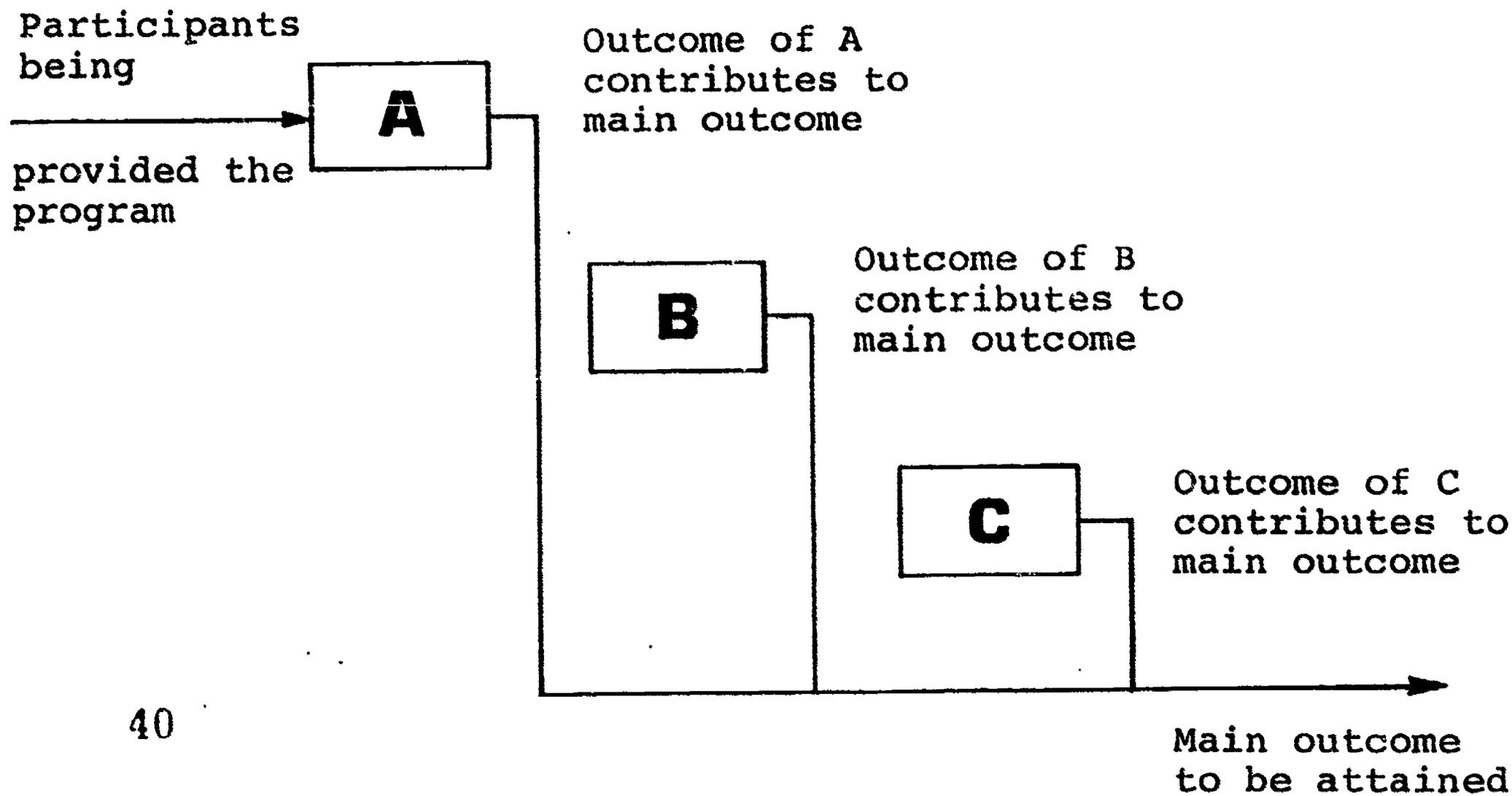
CHECKING OUTCOMES

When there is no sequence of transactions the main outcome is different from the outcome of the individual transactions:



This outcome should be labeled as a higher-order construct whose underlying sources are (A), (B), (C).

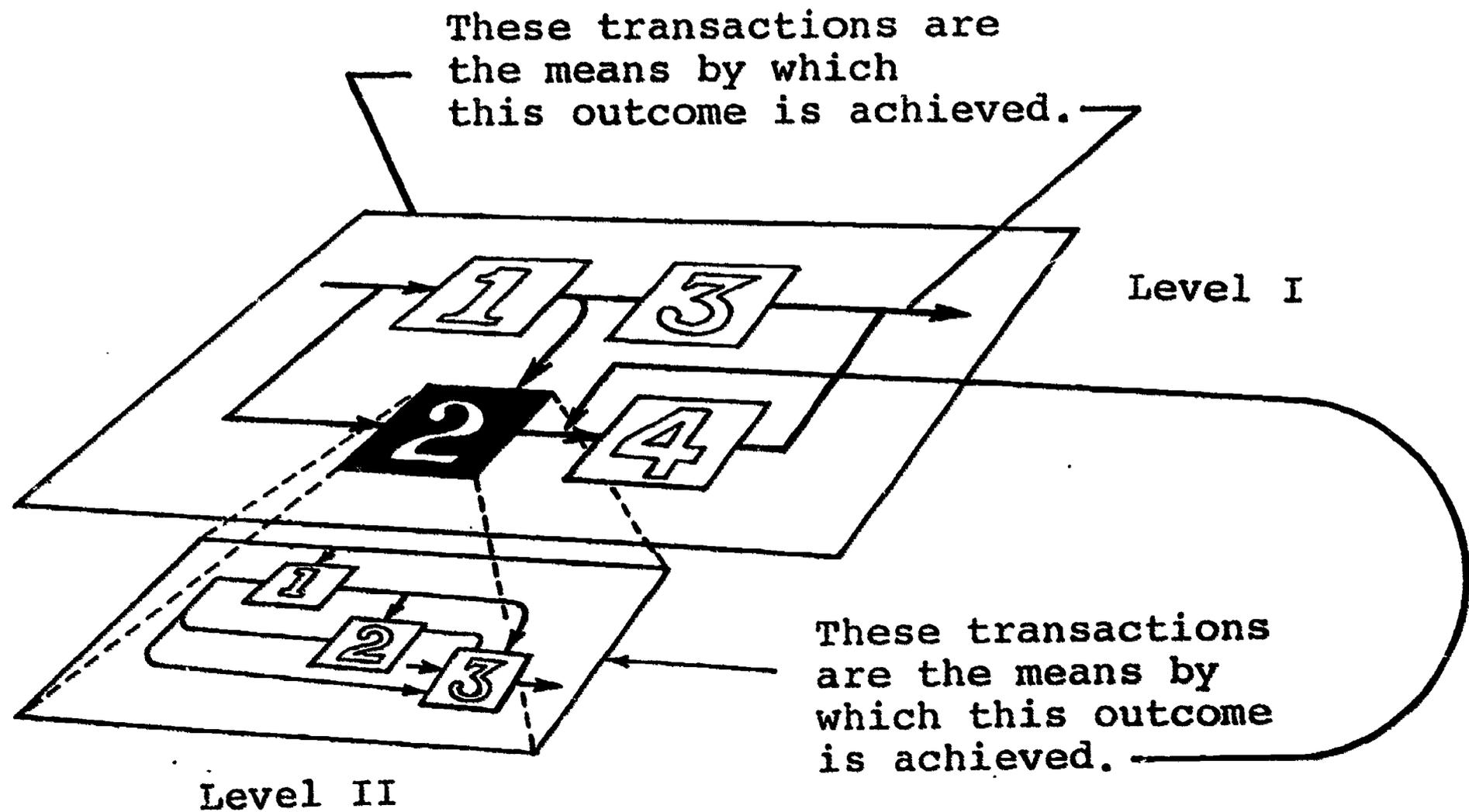
C. NO SEQUENCE



UNDERSTANDING CHECK

NOTICE the outcome of the first level

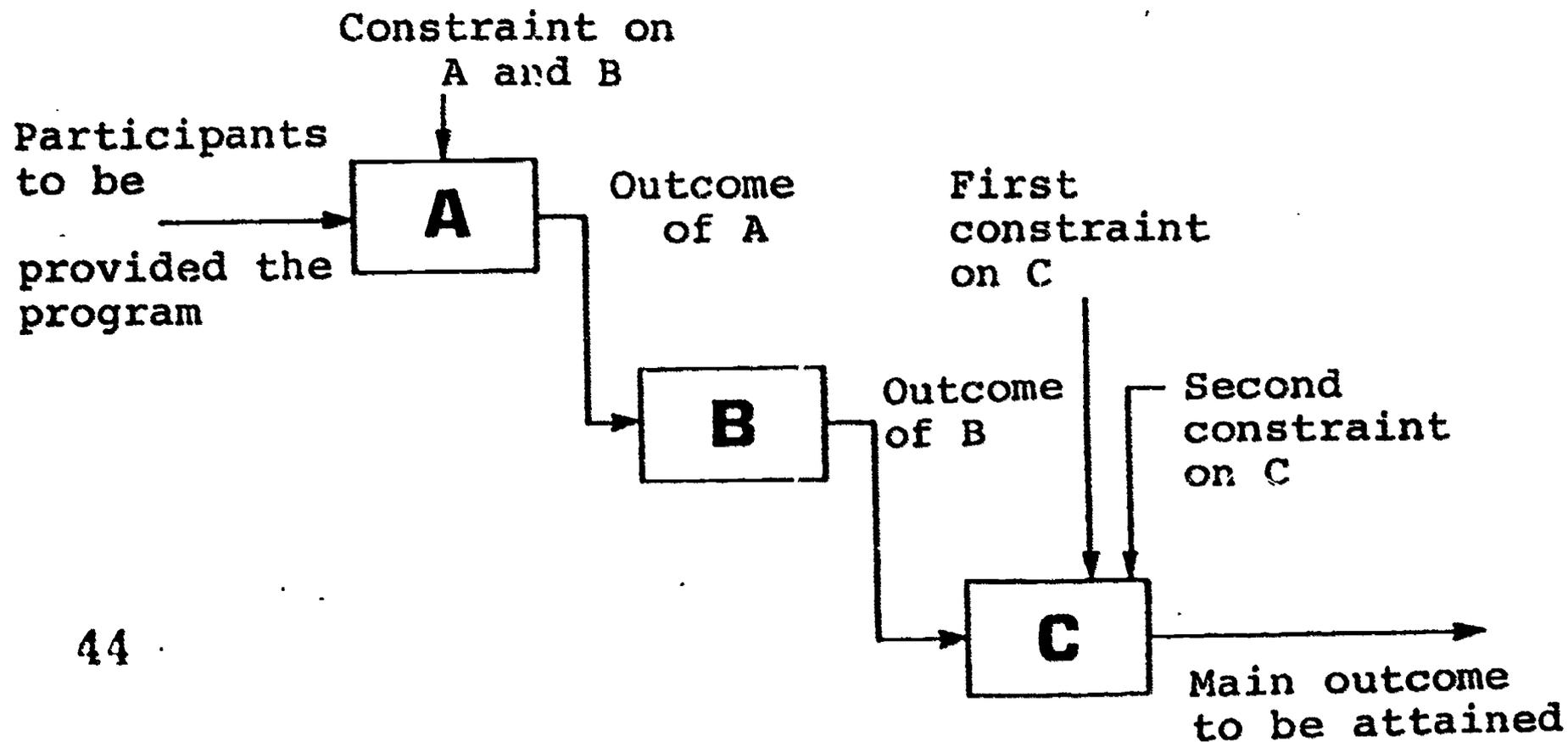
NOTICE that the outcome of number 2 Level I is the same as the outcome of Level II



STEP 6. IDENTIFYING CONSTRAINTS (Those things that influence outcomes)

Attitudes Aptitudes Policies
Regulations Funding

**label each constraint consistent with
the level of detail at which the trans
action is described**



CHECKING YOUR MODEL

- 1 Can each transaction be observed?**
- 2 Can outcomes be stated as operational definitions?**
- 3. Have all important constraints been identified?**
- 4. Are transactions and outcomes labeled consistently?**
- 5. Are there logical mismatches between transactions and outcomes?**

Activity implied by transaction too little to produce outcome?
Activity is more than what is needed?

- 6. Are there missing transactions or outcomes?**

More instruction needed?
Bridges in transactions?

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