

# Developments in Business Simulation & Experiential Exercises, Volume 12, 1985

## SOLUTIONS DIVERSIFIED: AN EXPERIENTIAL INTRODUCTION TO MANAGEMENT INFORMATION SYSTEMS

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### ABSTRACT

This exercise introduces some basic concepts of Management Information Systems for a class in Principles of Management or Introduction to Business. It addresses evaluating information on the basis of its quality (accuracy), timeliness, quantity, and relevance. It also helps students to recognize differing information needs for managers in different functional areas or at different levels of the organization. This paper discusses our use of the exercise in teaching these Management Information System topics.

### INTRODUCTION

Current Principles of Management textbooks [1; 2; 4; 5] and Introduction to Business textbooks [3; 5; 6; 7] typically include a chapter on Management Information Systems, Decision Support Systems, computers in business, or related topics. However, in-class experiential exercises on these topics are difficult to find.

The proliferation of personal computers and other innovations in information technology have reemphasized the need for managers to be familiar not only with the technology, but with the underlying concepts of information flow in organizations. Our exercise helps students to appreciate the potential complexity of information flow in organizations, why it is necessary to assess an organization's information needs, how to evaluate available information, and why managers at different levels of the organization have different information needs.

### EXERCISE

#### Objectives

At the conclusion of the exercise, the student should be able to

1. Appreciate the complexity of information flow in an organization.
2. Given an objective or decision criteria, identify basic information needs.
3. Evaluate information on the basis of its quality, timeliness, quantity, and relevance.
4. Explain why managers at different levels of the organization have different information needs.

#### Time Required

We have completed this exercise in 50-minute class sessions, but the debriefing and discussion is much more effective in a 75- to 90-minute session.

#### Materials Required

1. A copy of the initial description of Solutions Diversified, Inc., for each student.
2. A copy of the instruction sheet for each division (President, Inventory Control, Quality Control, SOLTECH, SOLGRAPHICS, and SOLART).
4. Report forms for SOLTECH, Inventory Control, and Quality Control.

5. Connect-the-dot puzzles (6 sets of 10).
6. Math problems (5 sets of 12).
7. Math solutions.
8. Crayons.

NOTE: Samples of report forms, puzzles, math problems, and solutions are available from the authors.

#### Group Size

The exercise works best with groups of 6 to 15 participants. The minimum number of participants is 6. In groups larger than 15, assign some students as observers, or operate several companies at the same time. (The potential for competitors in the environment adds the concept of external information sources to the exercise.)

#### Instructions

One lesson ahead, give each student a copy of the half-page description of Solutions Diversified, Inc. Reading it should be required preparation for class.

Before class starts, arrange the desks so each division has a distinct work space. Place the division name cards to identify these work spaces.

Assign the students to divisions so that you have one President, one in Inventory Control, one in Quality Control, and the remaining students approximately evenly distributed among SOLTECH, SOLGRAPHICS, and SOLART. (Allow the President to reassign people, but be sure to note it so you can discuss why she made that decision, what information she used from what sources to make the decision, and how she obtained the information.)

Assign a supervisor to any division with more than one person and give the supervisor the appropriate instruction sheet and materials (report forms for SOLTECH, Inventory Control and Quality Control; sets of puzzles and math problems to Inventory Control; and crayons to SOLART).

Remind the students to be alert for information issues and tell them to start. Be sure they are aware of the start time so they can use it as the basis for turning in periodic reports on schedule.

Allow the exercise to continue for 30 minutes (40 to 50 minutes if you have more than a 50-minute session; longer sessions will require additional sets of puzzles).

Each time Quality Control collects ten problems from SOLTECH, you will be expected to provide the matched solutions. Provide solutions only for problems attempted.

Some procedures are purposely left vague in the instructions. Be alert to how the group resolves issues of missing or confusing information. Avoid answering questions concerning their written instructions. Some specific issues that may arise are:

1. Restructuring the organization by combining func-

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- tions, creating new ones, relocating work spaces, reassigning people, etc.
2. Revising the various reporting procedures by changing the content or timing of reports.
  3. Specifying procedures with Inventory Control concerning the number of packs of puzzles that can be checked out at a time, whether finished goods inventory can be checked in individually or must be maintained in original packs, precisely how to fill in the Inventory Transaction Log, and whether or not/how to maintain control of goods-in-process inventory.
  4. Revising the economic batch size for Quality Control testing, adding a quality control step for the products of SOLGRAPHICS and SOLART, and determining if preliminary checking or feedback to SOLTECH with an opportunity for reworking problems would be appropriate.

### DEBRIEFING THE EXERCISE

During the remaining class time you can discuss the information issues that come up during the exercise. You might focus attention on issues concerning the objectives stated earlier.

#### Complexity of Information Flow in the Organization

Consider the volume of information that was generated during the exercise in various forms (written instructions and reports, verbal communication, possibly graphics, etc.) and with various content (probably mostly task oriented, but possibly social as well).

Recognize that typical organizations will also be faced with volumes of additional information, both internal (schedules, budgets, personnel records, etc.) and external (concerning customers, suppliers, competitors, legislation, the economy, etc.).

#### Assessing the Information Needs

To track progress toward the productivity objective, the President needs information on correct solutions generated per hour and some specific target. The information system ought to provide that information such that the President can use it directly with no further calculation or manipulation and perhaps on an exception basis when productivity levels differ significantly from the target. The target might be based on past performance, customer demands, competitor performance, etc.

The production divisions ought to be getting feedback on their productivity.

Should they have other information such as the status of goods-in-process inventory, categories of errors causing rejects, etc.?

#### Evaluating Information

Quality (accuracy)

1. If the organization assumes that products from SOLGRAPHICS and SOLART are correct when they reach Inventory Control, they have inaccurate information on productivity.
2. How accurate are the reports that exist?
3. What level of accuracy is appropriate?
4. The format of the Inventory Transaction Log makes that information difficult to use.
  - a. Math problems and dot puzzles come in different size packets, but that is not clear on the form.

- b. There is no clear sequence for entering data on the form, so raw materials and finished goods inventory and different product inventories could not be mixed in a series of entries.
- c. It is not clear whether finished goods are kept in packets or individually.

#### Timeliness

1. What is the appropriate timing for reports and feedback at various levels in the organization?
2. Does limiting the timeframe on the exercise have an impact on the appropriate timing? How would it be different in a functioning organization?

#### Quantity

1. Do the existing reports provide the right amount of information for decision making in the organization? Why or why not? (Recall the assessment of information needs above.)
2. Note that giving the Inventory Transaction Log to the President provides much data that the President doesn't need.

#### Relevance

The President tends to get details (especially with the Inventory Transaction Log) that are irrelevant compared to getting a productivity measure, which is not provided.

#### Different Information Needs at Different Levels of the Organization

Production level and staff activities need details in their areas of responsibility.

1. SOLTECH may recognize that the math problems fall in categories (probability, algebra, geometry, etc.), may have or ask for information on specific skills or preferences of the people in the work group, and may decide to specialize.
2. Inventory Control tracks details of inventory.
3. Quality Control has access to specific solutions to math problems.
4. Real organizations would similarly generate information in other areas (accounting, finance, personnel, marketing, etc.).

Top level managers need summarized information and more external information.

1. The President should only need the overall productivity figures (perhaps on an exception basis), not the details.
2. External information on customer needs, competitor actions, status of the economy, government decisions etc., would be necessary to put the internal information in perspective and to keep the company competitive.
3. Much of the President's information may be gathered informally (touring the plant, telephone conversations, *golf* matches, etc.) rather than through formal reports.

### REFERENCES

- [1] Carlisle, Howard N., Management: Concepts~Methods & Applications (SRA, 1952).
- [2] Donnelly, James, et al., Fundamentals of Management (BPI, 1954).

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- [3] Justis, Robert T., Dynamics of American Business (Englewood Cliffs, NJ: Prentice-Hall, 1982).
- [4] Kreitner, Robert, Management: Basic Concepts and Decisions (New York: Houghton-Mifflin, 1952).
- [5] Musselman, Vernon A., and Eugene Hughes, Introduction to Modern Business: Issues and Environment (Homewood, IL: Richard D. Irwin, 1953)
- [6] Poe, Jetty B., An Introduction to American Business Enterprises (Homewood, IL: Richard D. Irwin, 1983)
- [7] Rachman, David, and Michael Mescon, Business Today (New York: Random House, 1982).
- [8] Stoner, James A. F., Management (Englewood Cliffs, NJ: Prentice-Hall, 1982).

problems) and finished goods (completed problems) inventories; maintains log of inventory transactions; forwards log to you for review every 30 minutes.

**Quality Control** - checks solutions to math problems completed by SOLTECH; forwards correct solutions to Inventory Control for shipping; reports to you every 30 minutes on the number of rejects (incorrect solutions).

**SOLTECH:** Your job is to solve as many math problems correctly as possible. You may draw problems from Inventory Control in packages of 12. Forward completed problems to Quality Control. Every 10 minutes, report to the President on how many completed problems you have sent to Quality Control. Use the attached report form for these reports.

**SOLGRAPHICS:** Your job is to complete as many line drawings as possible. You may obtain projects from Inventory Control in packages of 10. You complete drawings by connecting the dots in numerical sequence. (On approximately one project in five you should expect to make an error by skipping a dot or otherwise connecting dots out of sequence. Do not reveal this error rate unless the President or Quality Control asks for it. Do not change the error rate unless the instructor tells you to.) Forward line drawings to SOLART as you complete them.

**SOLART:** Your job is to finish any line drawings you receive from SOLGRAPHICS by applying three colors to each drawing. The choice of specific colors is up to you. (Approximately one drawing in five that you receive from SOLGRAPHICS will be incorrectly drawn in that the dots will be connected out of sequence. Color these drawings anyway. In addition, on approximately one of five drawings [not necessarily the ones received in error], you should use two or four colors instead of the correct three. Do not reveal either of these error rates unless the President or Quality Control asks for it. Do not change your error rate unless the instructor tells you to.) Forward completed projects to Inventory Control.

**Inventory Control:** Your job is to maintain inventories of raw materials (math problems and connect-the-dot puzzles) and finished goods. The math problems come in packs of 12, which you should issue on request from SOLTECH. Connect-the-dot puzzles come in packs of 10, which you should issue on request from SOLGRAPHICS. Quality Control and SOLART will turn in completed math problems and completed connect-the-dot puzzles respectively for finished goods inventory. Log all inventory transactions on the attached form. Forward the form to the President after every 30 minutes.

**Quality Control** Your job is to check the accuracy of math problem solutions completed by SOLTECH. Since it is more economical to test in batches, the instructor will provide you with the correct solutions only after you have collected a set of 10 completed problems from SOLTECH. Forward only those problems with correct solutions to Inventory Control for shipping. Retain problems with incorrect solutions in your file for future reference. Report the number of rejects (incorrect solutions) to the President every 30 minutes using the attached report forms.

### APPENDIX

#### Student Handouts

**All Students:** Next lesson you will be participating as a member of Solutions Diversified, Inc. Generally, the company solves problems. The intent of the exercise is to observe the flow of information as an organization, so be alert to the content, form, and timing of information flow (and any other information issues) as the exercise progresses. You will receive more details next lesson, but the following job descriptions should give you a rough initial idea of what the organization does.

**President** - responsible for all normal management activities; especially concerned with productivity as measured by correct solutions generated per hour

**SOLTECH** - solves math problems

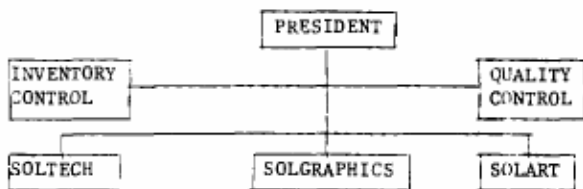
**SOLGRAPHICS** - completes line drawings

**SOLART** - adds color to line drawings completed by SOLGRAPHICS

**Inventory Control** - maintains both raw materials (unsolved problems) and finished goods (completed problems) inventories

**Quality Control** - checks accuracy of problem solutions

**President:** You are the president of Solutions Diversified, Inc., a company in the problem-solving business. The company's profit depends on the efficiency of generating accurate solutions, so you should be concerned about productivity as measured by correct solutions per hour. Your company is formally structured as follows:



**SOLTECH** - solves math problems received upon request from Inventory Control; reports to you every 10 minutes on the number of completed solutions sent to Quality Control.

**SOLGRAPHICS** - completes line drawings received upon request from Inventory Control; forwards completed drawings to SOLART.

**SOLART** - finishes line drawings by applying three colors to each drawing; forwards completed projects to Inventory Control for shipping.

**Inventory Control** - maintains both raw materials (unsolved