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Automated Office**

**CEO Publication
G 83-10 (41)**

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by

Allan Mohrman
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ABSTRACT

This paper uses actual results to show three ways in which new office technologies can change effectiveness; 1) they can simply change levels of effectiveness, 2) they can change the standards by which effectiveness is measured, and 3) they can redefine what is meant by effectiveness.

THREE TYPES OF CHANGE
IN THE AUTOMATED OFFICE

There is considerable interest these days in the impacts of office automation. The usual assumption is that there will be changes accompanying automation, but measurement of those changes, if any, is a difficult task. This paper illustrates some of the difficulties and presents a useful approach to measuring change. Most importantly it also illustrates the kinds of changes encountered in office automation and alerts us to the phenomena we can expect as more and more of our work lives become touched by the information revolution.

While office automation is expected to have impacts in many areas, of interest here is its impact on the effectiveness with which the technology enables the office activities to be done.

Three Types of Change

Recently, theorists have posited that three types of organizational change can occur: alpha, in which the change is along a constant scale of comparison; beta, in which the change involves a shift or recalibration of the scale; and gamma, in which the change involves a reconceptualization of the appropriate dimensions and scales to be applied (Golembiewski et al., 1980; Terborg et al., 1980).

Alpha change refers to changes in level of output while the type, direction, and criteria for evaluating the output remain constant. People who contemplate the productivity impacts of office information technology usually have an alpha change in pre-existing outputs in mind.

Beta change refers to situations where the direction and type of output remain the same but the criteria or the calibrations of the

scales used to measure and evaluate outputs change. In office technologies, for instance, one might expect the technology to open up new levels of output potential so that what used to be considered very high output using previous technologies would become moderate given the new technology. The technology would bring with it a new standard for evaluation output, although the kind of output might remain essentially the same.

Gamma change reflects changes in worldview and reality so that activities before and after change are not directly comparable. Not only are they done in different ways because of the technology, but also they come to seem different in nature, and are therefore evaluated in different ways.

Perceptual and Objective Measures of Effectiveness

The purposes of activities and evaluations of them are fundamentally determined by people. People choose objective measures to evaluate activities because they seem to reflect the goals or purposes of the activity. Alpha changes can be measured by pre-existing objective criteria and scales. Beta and gamma changes, however, would necessitate changes in objective criteria and scales. These would necessarily lag behind perceptual changes since it is the perceptual changes that force change in objective measures. The most immediate changes accompanying use of office automations will be in the perceptions of people performing the activities. This study therefore focuses on perceptual changes and assumes these will be followed by corresponding changes in objective measures.

The Study

In the study presented here, we measured changes in perceptions of activity effectiveness with questionnaires administered before and after the implementation of automated technology in an office. The technology consisted of freestanding workstations (word processors and professional workstations). It was made available to all employees (managers, professionals, secretaries). Most employees had workstations at their desks. The remainder used semipublic workstations scattered throughout the office.

On our Pre questionnaire, we collected perceptions of effectiveness held by the respondents at the time of implementation. Our Post questionnaire, one year later, asked perceptions of effectiveness at the later time, but also asked for the respondent's memories of what their perceptions had been at the time of the Pre questionnaire (we call these Post memories of the Pre situation "Then" perceptions).

In the questionnaire, we provided the respondents a list of job activities. The respondents indicated on a five-point scale ("very ineffective" (1) to "very effective" (5)) how effectively they felt they had done or were doing each activity. This was done for "Pre," "Post" and "Then" perceptions.

Results

If Pre, Post, and Then perceptions of effectiveness are all the same for an activity, then there is no change. If Post perceptions differ from both Pre and Then perceptions and if memories (Then) agree with Pre responses (i.e., Pre = Then), then one can conclude that alpha change took place (i.e., level of effectiveness has changed but the standard by which it is judged has not). If Then perceptions differ

from Pre perceptions, then Beta change has taken place (i.e., the standards by which effectiveness is measured have shifted so that the respondents later on judge their earlier activities using different criteria and therefore their evaluations of the same performance change).

Tables I, II, and III, respectively, show examples of no change, alpha change, and beta change that we found in our study.

Gamma change is more difficult to show. The Beta changes shown in Table III could have occurred either by scale shift alone or as part of a more fundamental reorientation. Worldview reorientation and recombinations of activities can only be judged by looking at the relationships among the activities and not at the activities alone. Such shifts in relationships can be shown by comparing the intercorrelations of Pre perceptions of activity effectiveness with the intercorrelations of post perceptions. Changes in correlations among perceived effectiveness of activities would indicate a change in the connections among the activities.

The same effectiveness data used for the activities in Tables I, II, and III were factor analyzed. (Factor analysis is a statistical routine that uses the patterns of their correlations to group items with one another. In the analysis done here, the factors are independent dimensions statistically inferred from the data. Activities are grouped in a factor because they are highly correlated with that factor and have low correlations with the other factors.) Each of the three sets of activity effectiveness data (Pre, Post, and Then) revealed five underlying factors. The factors were not the same in each case, however.

Table IV compares all three factor structures. The Pre factors (1-5) comprise the rows. The Post factors comprise the columns (A-E). Bold black outlines delineate the factors of the retrospective, Then, estimates. For example, "Calculating" and "Proofing" were in the same Pre factor, but "Calculating" is in the same Post factor as "writing," "reading," "creating," and "analyzing." With the Then data "Calculating" makes up its own factor.

The factor structures reveal partial stability from Pre to Post. If they were completely stable, all items would have been grouped along the diagonal elements of the matrix. Cells 1-A and 2-B reflect the most stability. These also remain stable in the Then data. The remaining activities show considerable shift. There is, to this extent, indication of Gamma change.

Those activities that respondents reported to be done most on a workstation have been indicated by asterisks (**, meaning more than 85% of the respondents use the workstation in this activity and *, meaning more than 33% of the respondents use the workstation). These activities appear only on Post factors C, D, and E. It is only in these technology-mediated activities that the gamma shift has occurred.

The three most heavily mediated activities ("Writing/Composing," "Preparing Presentation Material," and "Proofing/Correcting/Revising") are among those in Table II showing alpha change. These alpha changes can be explained two ways. First, these activities involve precisely those capabilities toward which the word processing technology is focused and for which expectations are aroused. Second, many of the respondents had already had some experience, direct or vicarious, with word processing. Our feedback interviews indicate that for these two

reasons, respondents had already redefined their criteria of effectiveness for these activities by the time of implementation. In other words, the respondents already knew what to expect from automated office equipment doing these activities and therefore used the same criteria for their judgments of effectiveness throughout the period of the two questionnaires. The same logic may hold for the alpha change revealed for "calculating," since most had known of and used computer based technologies for this activity.

The instances of beta change in the technology-mediated activities probably show that respondents were not previously familiar with and did not have experience with how the workstation could impact these activities. In fact, many instances of technology utilization for these activities are on-site innovations and idiosyncratic uses--four of the respondents had, for instance, used the technology to conduct face-to-face group meetings.

Cell 1-A is of interest because its existence seems to be threatened by the advent of new network technology implemented in the unit after the Post questionnaire. This technology provides for electronic files, electronic mail, and remote, electronically initiated copying. Interview sessions held after implementation of the network suggest its emerging conceptual and behavioral impact. The word "files," for instance, has come to have a new meaning in that it evokes images of electronic rather than paper files. Some secretaries, in addition, were conceiving of their role as not only to create and maintain electronic files, but also to make them accessible to the manager and professionals in order to reduce their dependency on the secretary.

Finally, note the closer congruence between Post factors and Then factors than between Pre factors and Then factors. This is indicative of an oft-noted phenomenon: that we tend to view the past through our present worldview. This tendency can mask the kinds of change one sees. In general, the respondent will only perceive alpha change within his or her present frame of reference. It is only through comparisons of Pre, Post, and Then worldviews that Beta and Gamma change are revealed. During interviews, our respondents repeatedly said things like "how well I do my job activities has changed a great deal but the nature of the activities I do has not." We believe this is true from their frame of reference at the time. What people seem to be blind to is the degree to which their frames of reference have changed.

REFERENCES

- Argyris, Chris. "Some Unintended Consequences of Rigorous Research" Psychological Bulletin 70(3), 1968, 185-197.
- Argyris, Chris. Inner Contradictions of Rigorous Research (New York: Academic Press, 1980).
- Ashby, W. Ross. "Variety, Constraint and the Law of Requisite Variety" (pp. 129-136) and "Principles of the Self-Organizing System" (pp. 108-118) in Modern Systems Research for the Behavioral Scientist: A Sourcebook. Walter Buckley, Editor (Chicago, Aldine Publishing Company, 1968).
- Golembiewski, R. T. and K. R. Billingsley. "Measuring Change in OD Panel Designs: A Response to Critics," Academy of Management Review (1980) 5:1, pp. 97-107.
- Lawler, E. E., II. "Adaptive Experiments: An Approach to Organizational Behavior Research," Academy of Management Review 1977, 2, pp. 576-585.
- Mankin, D., T. K. Dikson and B. Gatek. "The Office of the Future: Prison or Paradise" The Futurist 16:3 (June 1982) 33-36.
- Mason, Richard O. "Measures of Information Output," Information Systems Working Paper, 12-77, Study Center in Public Services Management and Policy and Information Studies, UCLA, 1977.
- Roberts, M. and J. Porros. "Progress in Organization Development Research," Group and Organization Studies 7:1 (March, 1982) 91-116.
- Schoderbek, P. P., A. G. Kefalas, and C. G. Schoderbek. Management Systems: Conceptual Considerations (Dallas, Texas: Business Publications, Inc., 1975).
- Strassman, Paul A. "Overview of Strategic Aspects of Information Management," Office: Technology and People (1982) pp. 71-89.
- Terborg, J. R., G. S. Howard, and S. E. Maxwell. "Evaluating Planned Organizational Change: A Method for Assessing Alpha, Beta and Gamma Change," Academy of Management Review (1980) 5:1, pp. 109-121.
- Uhlig, R. P., D. J. Farber, and J. H. Bair. The Office of the Future: Communication and Computers (New York: North Holland Publishing Company, 1979).

TABLE I

ACTIVITIES SHOWING
NO CHANGE IN EFFECTIVENESS

- Filing
- Searching, Pulling Files
- Mail Handling
- Copying, Collating, Sorting

TABLE II

ACTIVITIES SHOWING
ALPHA CHANGES IN EFFECTIVENESS

(Post Larger than Pre and Then Perceptions)

- Writing, Composing
- Proofing, Correcting, Revising
- Preparing Presentation Materials

- Calculating

TABLE III

ACTIVITIES SHOWING

BETA CHANGES IN DEFINITIONS OF EFFECTIVENESS

(Comparisons between Post and Pre Perceptions Differ from Comparisons Between Post and Then Perceptions)

Group 1: Shift but no perceived change (Post \neq Pre and Post = Then)

- Record Keeping (Post > Pre)
- Reading (Post < Pre)

Group 2: Shift and Perceived Change (Post = Pre and Post > Then)

- Creating, Designing, Conceptualizing
- Analyzing, Reviewing
- Scheduling, Keeping Calendars
- Planning, Organizing
- Using Telephone
- Conferring
- Meetings

TABLE IV

COMPARISON OF FACTOR ANALYSIS OF PERCEIVED ACTIVITY EFFECTIVENESS
 ILLUSTRATING GAMMA CHANGES
 (PRE, POST, AND THEN)
 POST FACTORS

	A	B	C	D	E
1	Filing Searching Files Mail Handling Copying, Collating, Sorting			*Recordkeeping	
2		Using Telephone Conferring Meetings	**Writing, Composing		
PRE FACTORS 3			Reading		
4			*Creating, designing conceptualizing *Analyzing reviewing	*Scheduling keeping calendars *Planning organizing	**Preparing presentation materials
5			*Calculating		**Proofing, correcting, revising

Then Factors

**Over 85% use Technology
for this activity

*Over 33% use Technology
for this activity