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Winning the Paper Chase: Operational Applications of Computer Output Microfiche

Key to the introduction of any change in the operations of an organization is an active, continuing dialogue between the data organization and users of the proposed system. Elemental to this dialogue are feasibility studies, concept briefs, specification writing, and systems testing.

While the Computer Output Microfiche (COM) system is not new technologically, it can save space, time, and money if creatively applied to operational organizations. In A23 alone, $16,311 per year, 294 square feet, as well as 140 man-hours per month, were saved by conversion of daily paper direct delivery point (DDP) and hardcopy product runs to microfiche. While "total automation" may not be an achievable or even desirable organizational goal, COM returns far exceed the required planning and implementation investments. If program evaluation review and standard distribution measurement techniques are used, an accurate estimate of implementation time and material requirements can be made.

CONCEPT

In August 1980 the already cramped A23 work spaces were faced with shrinking floor space, bulging file cabinets, and a daily fanfold paper input of automatic data processing (ADP) hardcopy that literally filled three shopping carts to the point of overflow. Additionally, 35 man-hours per week were spent in breaking out paper traffic to appropriate analysts.

Attempts to ease the strain through consolidation, reorganization, and equipment turn-in yielded only minimal improvement. Following an equipment utilization study, executive ADP and production branch surveys were conducted.

The executive survey was written with the totality of ADP analytical applications in mind. The following questions were submitted for management comment:

Perception of ADP Roles

- Satisfied/dissatisfied with overall ADP performance?
- Is communication between the ADP organization and users periodic and effective?
- Is there a scheduling process for implementation of new ADP applications? Are they on schedule?

Concept of ADP Support

- Is an increased emphasis on centralization (decreased span of control) of ADP functions desirable for our organization?
- Are ADP planning, operational support requirements, project development, and user support procedures clearly documented and systematic?
- Where does our data support organization see us with regard to ADP in one year, two years, three years? What intra/interoffice coordination/discussion/idea sharing has occurred? Is planned? When?

In addition to the questions posed, a brief summary of the history of ADP usage within our organization was included. Basic ADP skills required, affiliated training programs, operations, production, and dissemination procedures were covered. Finally, the need for a

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systematic approach to ADP support planning was addressed. The survey recommended the writing of an organizational Standard Operating Procedure aligned against the following topics: documentation (all files, programs); coding standards (structural programming for ease of maintenance, debug, and continuity); training (both ADP specialist and selected analytic branch personnel); production accountability and control (processing priorities, pull requests, program development requests, suspense files, etc.); and operations (procedural approach outlining specific functions, tasks, and responsibilities).

The production branch survey explained that a feasibility study was being conducted to consider readily available analysis and production machine aids. Outlined also was the requirement to take stock of current branch hardcopy (paper), 35mm film, and microfiche holdings using NSA form 02214 (Annual Summary of Record Holdings/Records Measurement Guide). An internal storage statistics worksheet was designed to aid in space computations by subdividing holdings into machine listings (SELLARS, SOLIS, and SPECOL), and all other hardcopy material (technical reports, product, collateral documents, and various traffic compartments).

While it was recognized that the long-range data systems plan for the division called for a near-paperless environment, it was equally clear that procurement, installation, and training cycles would stretch implementation of such plans to FY86. Consequently, a broad range of ADP hardware and software was considered to meet stated work and filing-space objectives while sensitizing division analysts to the use of machine aids. Analysis of available systems that could meet our operational and procurement requirements indicated that the Computer Output Microfiche (COM) system was most suited to our needs.

COST/BENEFIT ANALYSIS

The results of our executive and operational branch surveys clearly verified management's desire for practical, automated aids coupled with immediate operational need for space savings. COM trade-offs were space, cost, ease of access, and update savings versus inability to write on microfiche, viewing limitations (one page at a time), and the requirement for special viewing equipment. Using planning figures from T1432 it was determined that our 200 letter-size drawers (40 file cabinets) of material could be held in one 9-drawer microfiche cabinet. Floor space saved should these cabinets be turned in was calculated by comparing space taken by the 40 cabinets (300 square feet) to space taken by microfiche storage devices for the same amount of material (6 square feet). In addition to working file storage savings, the following hardcopy savings were realized.

HARDCOPY/COMPUTER OUTPUT MICROFICHE COST COMPARISON

Category	Paper	COM
Copying	50 copies = $974.00	$12.24
Printing	100K lines = $11.75	100K lines = $1.30
Bursting* (break-out to analyst)	34/week	0
Binding/boxing*	1/week	0
Office storage	300 square feet	6 square feet
Transportation/mailing archive storage	$35.00/carton	14 fiche = $1.82

Immediate Division Savings

Space	294 square feet
Man-hours	35/week
COM vs. paper	$13,944.80/year
Archive storage	$ 2,366.70/year
Total	$16,311.50/year

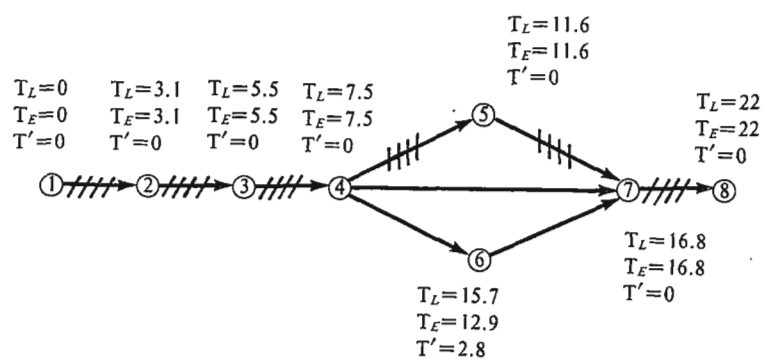
Source: T1432, T541

*Man-hours

In order to fully support the needs of our division, one microfiche viewer per key analyst and one viewer per key management element were required. In addition, a minimum of one viewer-printer was required to produce limited paper-copy backup. Based on initial cost savings alone, all COM equipment could be amortized in 18 to 24 months. To minimize implementation delays and facilitate organizational planning, Program Evaluation and Review Technique (PERT), critical path, and normal curve distribution probability techniques were applied. This allowed us to project the jobs or activities critical to completion time with subsequent rescheduling, resource reallocation, and progress estimates being made as required.

COM COST ANALYSIS

Begin Event	End Event	Activity Description	a	m	b	te	$(b-a)^2$
1	2	Write concept feasibility study	2	3	5	3.1	9
2	3	Conduct cost/benefit analysis	3	4	7	2.4	16
3	4	Brief management/develop concept	1	2	3	2	4
4	5	Select and order hardware	3	4	6	4.1	9
4	6	Write required fiche specifications	4	5	10	5.4	36
4	7	Train analyst in system operation	1	3	5	3	16
5	7	Convert paper to fiche	2	5	10	5.2	64
6	7	Install hardware	1	1	2	1.1	1
7	8	Brief management/test systems	2	5	10	5.2	64
						Σ $(b-a)^2$ =	166



Critical path = 22 weeks (most likely project completion time)

Where:

$$t_e = \frac{a+4m+b}{6}$$

$$T' = T_L - T_E$$

t_e = expected (average) completion time

a = optimistic completion time estimate

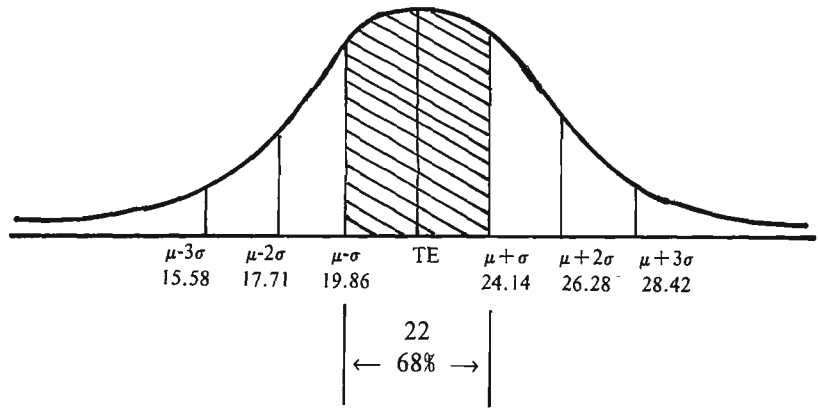
m = most likely completion time estimate

b = pessimistic completion time estimate

T' = slack for the event

T_L = latest time for the event

T_E = earliest time for the event



$X = 19.86$

$\sigma = 2.14$ $\qquad \therefore \sigma^2 = \dfrac{(b-a)^2}{36}$

$\mu = 22$ $\qquad \sigma = 2.14$

$Z = \dfrac{x-\mu}{\sigma} \dfrac{19.86-22}{2.14} = -1$ $\qquad = -.3413 = .5000-.3413 = 15.87\%$ chance of success prior to 20 weeks

Where:

- X = desired completion time
- σ = standard deviation for the critical path
- μ = T_E for last event (overall expected completion date)
- Z = values for area under the standard normal curve when the mean equals zero

TRAINING

COM-experienced analysts of A22 and B21 were consulted regarding the perceived COM disadvantages outlined above. Lessons immediately applicable to working needs centered around looking at the way analysts do their daily tasks. In lieu of notes on paper traffic, for example, continuity notebooks are kept by B21 analysts, who are able to cross reference and update files simultaneously when using microfiche. Bimonthly, monthly, and quarterly summary fiches keep daily entry carry-forwards to a minimum. Continuity on an entire military district can be kept in one notebook once the system is implemented. Should additional copies of the fiche be required, they can be made at the cost of two cents, and provided automatically with the daily fiche or within 24 hours of the request. With the proper number of viewers available, conversion to paper is rarely (if ever) required.

Training analysts was an essential part of the effort. Again B Group was a help, providing a senior supervisory analyst and two operational-level analysts as briefer/trainers. The division chief, deputy chief, and all branch chiefs were briefed by the analysts at a division staff meeting. Pros and cons of fiche usage and base-line operational tips were discussed by the briefers. During the discussion period, each branch chief was given a viewer and fiche, providing a hands-on dimension. Later in the week demonstrations and question/answer periods were held for all operational analysts throughout the division. Working-level, "lesson-learned" sessions were given, saving man-weeks of learning time while providing meaningful exchange at the analyst level. The training "curve" was a

relatively long one when the COM viewers and viewer-printer were initially introduced, but as new arrivals enter the branches they learn their jobs using COM from the start. Paper-copy usage is shrinking monthly.

SPECIFICATION AND PROCUREMENT

Concurrent with concept development, cost-benefit analysis, and training development processes were systems operation and hardware procurement. Fortunately the Agency had introduced the COM system in 1971, eliminating the need for precedent-setting delays in submission of procurement requests and supply requisitions. No reader/printers of the dry-process type (overall the best because of low maintenance and optimum copy quality features) were available through the supply system, necessitating a procurement request. An NSA procurement request Form J135, routed through the A2 operations staff (A204), the Group A operations staff (A043), R42, N22, L1 to L4 was submitted on the reader/printers with the understanding that a six-month acquisition cycle was currently the norm.

SYSTEM START

The procedure required to connect an operational organization to the COM system is relatively simple. Like any good data system the quality of the output is directly related to the quality of planning done prior to converting to that system. COM utilization studies were initiated by operations personnel and user/analysts early in the feasibility study phase to insure that the fiche program was supporting the user rather than increasing new system trauma.

In our case as an A Group division, face-to-face coordination was made with A635 (Computer Applications) and T1412 COM (through T1432). Once requirements were specified A635 was sent a serialized memorandum outlining the intent to convert several categories of daily paper hardcopy traffic to microfiche (in our case daily SELLARS and SOLIS listings). An additional requirement for monthly summaries was also identified. A635 now produces tapes instead of routing our material to a printer. The N33 Management Information Systems Control Officer (MISO), located with T2135, assigns a MISO authorization number via NSA Form 09978 (Microform Service Request Source Document Material), and the conversion process is complete. Should problems arise with tape production or the COM system, paper backup is available to the user within the same day. Future planned-for applications of COM are working aids, activity logs, and training material support to the field.

CONCLUSION/RECOMMENDATION

Computer Output Microfiche (COM) is a welcome addition to the organization that approaches it from user-oriented, cost/benefit analysis perspectives. While the technology of COM is not new, it can save space, time, and money if creatively applied to operational organizations. Our division alone realized savings that included $16,311 per year, 294 square feet, and 180 man-hours per month.

An essential first step to realizing such savings was the involvement of analysts, operators, and management in the process of problem identification. The perception of ADP roles and concept of ADP support surveys served to highlight the space constraints while focusing on present and projected time and dollar costs. As follow-on cost/benefit analysis was conducted, it built on the findings of the surveys. The result was enthusiastic support for the proposed COM applications. Particularly useful were the normal curve and PERT (critical path) analytic techniques. They served to consolidate a large volume of data,

presenting it with clarity and attention to detail. Management support eased the implementation of the training and acquisition processes as well. A mutually beneficial exchange of ideas by analysts of two operational groups occurred, and a logistic procedure that normally took twelve months was reduced to six.

Critical to the entire COM process was the cooperation of A Group and T Group data systems analysts. Their expertise and well-orchestrated procedures made the COM conversion process relatively simple. Initial COM application centered around increasing the efficiency of the analytic effort while realizing DDP paper savings. As predicted, follow-on applications have been found as analysts gain experience in using COM.

This article can serve as a guide to anyone wishing to explore the use of Computer Output Microfiche. With very few modifications, the techniques presented here can serve a variety of organizational needs.

STATUTORILY EXEMPT

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