

Office Procedure as Practical Action: Models of Work and System Design

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The design of office technology relies upon underlying conceptions of human organization and action. The goal of building office information systems requires a representation of office work and its relevant objects. The concern of this paper is that although system designers recognize the centrality of procedural tasks in the office, they tend to ignore the actual work involved in accomplishing those tasks. A perspicuous instance of work in an accounting office is used to recommend a new line of research into the practical problems of office work, and to suggest preliminary implications of that research for office systems design.

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1. INTRODUCTION

The design of office technology relies upon, and is a material expression of, underlying theories about human organization and action. The goal of building office information systems requires a representation of the work and its relevant objects. The unwieldiness of the office setting in all its detail, however, makes it impracticable as a template for system design. Constructing a representation of the work relevant to design purposes demands an appropriate analytical framework. Grounded in the analytic practices of their own discipline and in the now commonsense assumptions of traditional organization theory, computer scientists look for a particular underlying structure behind the actual detail of the office events they observe. Whether they represent that structure as “knowledge,” or “information flow,” the representation serves as the actual basis for design.

While analyzing the office is essential to software design projects, the organizing framework provided by knowledge-base and information flow representations constrains the analyst's view. The case reported here deliberately preserves the circumstantial detail necessarily ignored by analysts interested in finding a

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presupposed underlying structure in actual office events. The case suggests that the procedural structure of organizational activities is the *product* of the orderly work of the office, rather than the reflection of some enduring structure that stands behind that work [1]. Attention to the detail of the actual work that produces organizational structure indicates a new direction for office research.

1.1 Traditional Basis for Design: The Procedural Model of Office Structure

A central concern of current office research and system design is the representation, specification, and automation of office procedures. That concern is based on the view that office work is essentially procedural in nature, involving the execution by office workers of a prescribed sequence of steps [5]. In this view the structure of the office is determined by the adequacy of procedural specifications and by the compliance of employees hired to carry them out.

Locating the structure of the office in the prescriptions of office procedure is supported by longstanding tradition in organization and management theories. Frederick Taylor's classic *Scientific Management* (1911) argues for the separation of planning and execution, allowing their "rational" reintegration via the systematic specification of policy and procedure [7]. Since Taylor, the managerial plan is treated as a principled blueprint, the procedure as the means for its realization. More recently, computer scientists working on office systems design have found, in this understanding of structure in terms of procedures, a "natural" affinity between computer and management science. As a consequence, the procedural paradigm continues to dominate research efforts to understand the organization of office work.

Affiliated with the procedural paradigm are certain persistent troubles, however, that appear in management and computer science alike. For organization theorists these troubles are located in the elusive domain of "informal" or "unstructured" activities [2,6,8]. Management science dictates that insofar as these activities are not amenable to procedural specification, they must to some extent undermine the organizational objectives of rationality and control. For computer scientists doing office research, these troubles result from the stubbornly ambiguous properties of office procedures when compared to the step-wise instructions of computer science. As a consequence of this imprecision, implementation of a procedure in a given instance is a problematic enterprise.

1.2 Toward an Alternative Model: Office Work as Practical Action

Rather than attempting to do away with the incompleteness of procedural specifications (an endless task), the research begun here views the problematic nature of procedural implementation as an irremediable fact. In this view, the uncertain relationship of procedural specifications to the work required to "carry them out" is a special case of the general relationship of any normative rules to the actual occasions of their use. The topic for study is the process of finding the "definite meaning" of office procedures as a constituent feature of the work of getting them done. The work of finding the meaning of organizational plans in actual cases is referred to as *practical action*. The structures of the office, accordingly, are located in the organization of practical action, rather than in procedural specifications *per se*.

In this paper the problems of procedural implementation and their solution are demonstrated in an example drawn from observation of an accounts payable auditing procedure. The research recommended by this case would examine how the evidence provided by documents, coworkers, and clients is used, in conjunction with knowledge of the accounts payable procedure, to generate a record of action "according to procedure."

2. THE STUDY

The study reported here was completed during the summer of 1979. The study began from the observation that specification of even the most routine clerical work as a schema of procedures is an unsolved problem in automated office systems design [3]. The difficulty seems tied to the "softness" which characterizes the representations of office procedures provided by those who actually work in offices. While for computer scientists "procedure" has a very definite technical sense, for practitioners of office work the term has some other more loosely formulated meaning and usefulness. The distinction is something like that of a predetermined and reliable succession of step-like operations versus an unelaborated, partial inventory of available courses and desired outcomes.

The underlying research question was: What are "procedures" for *practitioners* of office work? The question was approached via a case study of an actual episode of work in an accounting office. The immediate objective was not an abstract formalization of what the work came to, but a detailed treatment of how the work was organized in the course of getting it done. As a preliminary study, the treatment was intended to be suggestive rather than exhaustive.

The case presented here is drawn from episodes of office conversation that were recorded on audio tape and then transcribed. This way of working captures, for repeated examination, the organization that is lost when the way that things actually happen is reconstructed, "cleaned up," or otherwise rearranged for purposes of presentation or analysis. Many studies of natural settings rely heavily on interviews, in which people's reconstructions of what they do are elicited by the researcher. But while interviews may be used either quantitatively or anecdotally, only direct observation, in conjunction with a faithful record-making procedure, can make available the actual course of an event.

The setting for the study is an office (referred to below as the Accounting Office) charged with maintaining controls on cash disbursements for several facilities of a large corporation. Record-keeping is a feature of all office work [4,9,10] and, not surprisingly, the assembly and maintenance of records is of particular importance to the work of accounting. The requirement of insuring proper "internal controls" over the organization's financial resources, and the continual possibility of audits by outside agencies, means that Accounting Office files must be readable at any time, by critical strangers, as evidence for the orderliness of prior business transactions.

As a consequence, members of the Accounting Office show a prevailing concern with consistency and completeness in their record-keeping practices. And in contrast to, for example, the records of a psychiatric clinic or a welfare office, criteria of adequacy for assembling accounting records are both remarkably explicit and closely tied to the use of methodic procedures.

3. THE CASE: AN ACCOUNT PAYABLE

3.1 The Procedure

The Accounting Office is responsible for the orderly payment of money due to outside organizations supplying goods and services to the facilities in its charge. Orderly payment is documented through the Office's record-keeping, and accuracy is monitored by the auditing of invoices against records of requisition and receipt. In the "smooth flow" of paper on a given purchase the following sequence occurs:

- (1) The facility's procurement office issues a purchase order (P.O.). Three copies are distributed: one each to the supplier, the shipping/receiving department of the facility, and the Accounting Office.
- (2) The Accounting Office copy is filed in a temporary file.
- (3) As the items ordered arrive at the receiving department they are marked off on the receiving department's copy of the purchase order (the receiver), a copy of which is in turn sent to Accounting.
- (4) Invoices issued by the vendor arrive in the Accounting Office via the U.S. mail. On arrival they are matched with the waiting P.O. and receiver.
- (5) With the P.O., receiver, and invoice in hand, the audit of price, quantity, sales tax, account numbers, part numbers, and so forth, can be done.
- (6) On completion of the audit, with no discrepancies encountered, the work necessary to a generation of payment (not treated here) begins.
- (7) When the payment is issued, the invoice, P.O., and receiver are attached behind a copy of the check and filed away in the paid file.

One routine complication should be mentioned here. It may be the case that the items on a given P.O. are received and billed in separate installments over an extended period of time. Again, if all goes smoothly, the items marked off on the receiving report from Shipping/Receiving correspond to those on the invoice from the vendor. The P.O., receiver, and invoice are matched and audited. The payment for the items received is recorded by margin notes on the P.O., which is then returned to the temporary file to wait for the next shipment and billing. Only after all bills have been received and paid is the completed P.O. filed permanently in the paid file.

3.2 Making the Procedure Work

The data on this case are constituted principally by a lengthy session of collaborative work between the accounts payable auditing clerk, K, and the accounting supervisor, R. K's work on the case begins with the arrival of a past due invoice in the mail. As a claim of money owed by the facility, the arrival of any invoice from an outside supplier initiates action. As a claim of payment overdue, a past due invoice is a formalized notice of trouble.

If a past due invoice were taken at face value, payment could simply be issued without delay. But before making payment the Accounting Office must establish the legitimacy of the vendor's claim. A review of past actions taken on the order, as recorded in Accounting Office files, is the primary resource for that task. In this case, however, the record of what happened presents its own troubles.

Up to the point in the work where we come to the transcript, a search of the files has produced the following discrepancies:

- (1) The original purchase order is missing.
- (2) A completed receiving document is found. There are eight items listed on it, all of which have been marked as received. But the two invoices found in the paid file show only items 3 and 8 as paid. There is no invoice or record of payment for items 1, 2, 4, 5, or 6 and 7, yet the vendor reports that the transaction will be completed with payment of the past due invoice for items 6 and 7.
- (3) Two packing slips and a receiving document show items 1, 2, 4, and 5 received with item 8, but the invoice to which they are all attached shows item 8 only.

It appears, then, that there are in fact *six* items whose payments are due (1, 2, 4, 5, and 6 and 7.) At the same time, the vendor reports that the past due invoice (for items 6 and 7) is the final payment, and the receiving department reports all the items received. At L256-57 of the transcript, on the basis of their work together to this point, K and R agree that there must be, somewhere, another record of payment for items 1, 2, 4, and 5 (see the Appendix for an explanation of transcript notation).

Sequence 1

L255 | R: There's another purchase order some-
 L256 | I mean there's another payment somewhere?
 L257 | K: Yea, there's got to be another.
 L258 | R: There's another payment somewhere,
 L259 | now where is that? Is the question.

R and K agree here that there is a missing record of payment on items 1, 2, 4, and 5; the location of that record becomes, accordingly, the question to be answered and the direction for a search.

Sequence 2

L260 | K: The only thing I can think of is that it's:
 L261 | R: Where's their (paid) folder.
 L262 | K: Let me go get the whole folder,
 L263 | R: Why don't you.
 L264 | K: and maybe if I: go through the control numbers
 (inaudible)-
 L265 | *((she goes to paid invoice files))*
 L266 | R: Yea, that's what we're gonna have to do
 L267 | we have to look at that whole folder.
 L268 | K: *((returns with folder))* The only thing I really was goin' on
 L269 | was the P.O. number, cause I didn't have any invoice numbers,
 L270 | (or really) any dates, to go-
 L271 | to find out when it would have been paid
 L272 | R: *((looking through folder contents))*
 L273 | What purchase order are we dealing with?
 L274 | K: 36905.
 L275 | *((pause while R leafs through folder))*
 L276 | K: What's wierd is, though, the girl was telling me
 L277 | this number that comes after this, *((number on the past due invoice))*.
 L278 | That tells you this is the third invoice,
 L279 | for this like P.O.

- L280 | [
 L281 | R: billed on that P.O.
 L282 | K: But if that's true, this is one (*invoice for item 3*), that's two (*invoice for item 8*), and this is three: (*past due invoice for items 6 and 7*)
 L283 | Then there might not *be* another bill.
 L284 | R: (*inaudible*) Is that (*the missing P.O.*) in that problem pile up there anywhere?
 L285 | K: No, I don't recall seeing it, but I'll double check on it
 L286 | (*getting stack from upper shelf*)

At L272, R begins what proves to be an extensive search of the record of past payments to the vendor, while K re-examines the set of documents already in hand. At L276-83, informed by her talk with the vendor, K pulls out one detail that seems somehow related to the question of the record's completeness. R's completion of K's remark at L281 demonstrates that he is listening, but at L284 R leaves K's comment without remark and continues with a new question which temporarily brings K away from the invoices and back to the missing purchase order.

Their work is proceeding along two more or less independent lines, with R searching the record of past payments while K continues to study the documents already pulled from the file, when K makes a discovery:

Sequence 3

- L333 | K: Huhuh.
 L334 | R: Hmm?
 L335 | K: Look at (*invoice for item 8*) missing page 2.
 L336 | R: Where do you get that at?
 L337 | K: Page 2.
 L338 | R: Page 2? It's a two page pur- two page, uh invoice?
 L339 | K: Oh no, oh no. (You're not gonna like this.)
 L340 | R: I know I'm not gonna like it.
 I already don't like it,
 L341 | K: Okay,
 L342 | R: I'm having to look at it, that's making me not like it.

In spite of the split in their attention, which begins with R's search of the paid folder, K and R are each continually producing comments that, as assessments of what each is finding, allow the other to monitor their joint work. An interesting feature of this monitoring is that it allows for the possibility of either collaborator "knowing better" the sense of what the other is finding than the other does herself. And K and R's continual monitoring of each other provides for their respective searches, at any point, to develop into concerted attention to any of a number of findings. In the exchange that follows that shown above, K offers a possible explanation for a complaint from R about the order of check control numbers in the paid file. Their discussion of this trouble continues through L367, at which point K is briefly sidetracked by someone coming into the office with a question. It is not until L414-43, with her return, that K and R turn back to K's finding of the missing page:

Sequence 4

- L414 | K: Okay,
 L415 | R: Now then tell me what you see there.

- L416 | Now I've got that in order (*the paid file*), then we don't have to look.
 L417 | K: This is page two (*invoice for item 8*),
 L418 | R: Mm hm.
 L419 | K: Okay. We got three of these items (*8*) for \$156,
 L420 | but all of the tax on them does not equal \$117,
 L421 | so the page one items: (*items 1, 2, 4, and 5*) go with this invoice (*for item 8*).
 L422 | That's why (*the vendor*) says this (*invoice for 6 and 7*) is the last item.
 L423 | R: But you don't have page one.
 L424 | K: No. (*pause*) Page one isn't there.
 L425 | R: Thi-this one (*for item 8*) is already paid?
 L426 | K: Yea, this one's paid.
 L427 | R: And that's the check for it?
 L428 | K: Yea, that- these two: packing slips (*for items 1, 2, 4, 5, and 8*) were attached
 to the receiver.
 L429 | So that was- according to them, we've paid the full amount (*for items 1, 2, 4,*
5, and 8),
 L430 | R: We've paid the full amount,
 L431 | K: but we don't: (*laugh*)
 L432 | [
 L433 | R: But we don't know where page one is.
 L434 | K: Cuz this, times tax, just don't: equal up.
 L435 | R: Mm hm, mm hm.

At L428-9, K shows how the missing invoice page works to explain why there are two packing slips with the invoice for item 8, one being for items 1, 2, 4, and 5, and R agrees at L430. R immediately offers a next action:

Sequence 5

- L435 | R: Mm hm, mm hm. I want you to call that lady
 L436 | and tell her you want page one. Of this invoice.
 L437 | K: Now at least we have a number to go on,
 L438 | [
 L439 | R: Tell her that you're gonna do her something (*pay for items 6 and 7*)-
 L440 | we're gonna do her something, we want her to do us something (*provide the*
missing invoice page for items 1, 2, 4, and 5).
 L441 | We need page one for this invoice. Alright?
 And then that-
 L442 | that explains why all those other things (*1,2,4 and 5*) are not there.
 L443 | K: Okay.

Standard procedure is constituted by the generation of orderly records. This does not necessarily mean, however, that orderly records are the result, or outcome, of some prescribed sequence of steps. Workers in the Accounting Office are concerned that (1) money due should be paid, and (2) that the record should make available both the warrant for payment and the orderly process by which it was made. In this case, once the legitimate history of the past due invoice is established, payment is made by acting as though the record were complete and then filling in the documentation where necessary. The practice of completing a record or pieces of it after the fact of actions taken is central to the work of record-keeping.

Standard procedures are formulated in the interest of what things should come to, and not necessarily how they should arrive there. It is the assembly of orderly records out of the practical contingencies of actual cases that produces evidence of action in accordance with routine procedure. This is not to say that workers "fake" the appearance of orderliness in the records. Rather, it is the orderliness

that they construct in the record that constitutes accountability to the office procedures.

4. IMPLICATIONS FOR SYSTEM DESIGN

This preliminary observation indicates that the “smooth flow” of office procedures is an outcome to which practitioners orient their work—it is not the work itself. The operational significance of a given procedure or policy is not self-evident, but is determined by workers with respect to the particulars of the case in hand. Their determinations are made through inquiries for which both the social and material make-up of the office setting serve as central resources. This view recommends an understanding of office work that attends to the judgmental practices embedded in the accomplishment of procedural tasks. The question, finally, is how the structure of these judgmental practices is important to the design of office information systems.

System design can be premised on two alternative views of procedural office work:

(1) The designer can treat the work *as if* it conformed to the traditional view of office procedures as the execution of step-wise instructions. In this case, interpretive and problem-solving work, because it is essentially ignored, must be done in preparation for rather than by means of the system. Advantages over existing work methods are only the promise of greater standardization, and quantitative improvements in the efficiency of routine word and data processing.

(2) Alternatively, the designer can recognize the judgment required in the accomplishment of actions according to procedure. The goal in this case is to design a system whereby the actual work involved in carrying out procedures, specifically the ongoing inquiries of which it is comprised, is accomplished through the system itself. This is not to say that the work is taken over by the system; given the work’s embeddedness in real world contingencies, full automation is neither possible nor desirable. Rather, the intent of the system is to facilitate the work demanded by the particulars of actual cases, and *qualitatively* enhance worker’s methods of research and analysis. The goal of such a system is to serve as a tool for the work of accomplishing procedures, rather than a “black box” that accepts the product of that work as input, and requires that the work essentially be done in advance of its entry.

In practical terms, the recommendation is that only a rigorous program of disinterested study can guide the long-term development of technologies more genuinely supportive of the work that actually goes on in the office. Basic research on human organization and action is relevant to office information systems insofar as innovation in design is tied to innovation in the underlying conception of the activity that the design supports.

APPENDIX

Transcript Notation

Notations used are as follows:

- (1) *((Something inserted in double parens, in italics))* indicates comments added by the transcriptionist.

- (2) (Something inserted in parentheses, no italics) indicates transcriptionist's best guess as to what was said at points where record is faulted.
- (3) [Indicates overlapping utterances.
- (4) :, ::, :::, etc. Indicate extension of the sound or syllable they follow.
- (5) *Italicized words* indicate speaker's emphasis.
- (6) - Indicates break, cut-off, or catch in ongoing utterance.

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