INFORMATION CAREERS IN THE OFFICE OF THE FUTURE

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ABSTRACT

The trend towards the Office of the Future (OOF) has sparked many technology efforts, but little work has been done in terms of information-related jobs which will become important in the OOF effort. Several new kinds of information-using and -providing careers will open up, providing opportunities and challenges. Some of these careers are the following:

- Information broker, to locate and reformat information;
- Communication network programmer (for mixed real and store-and-forward voice + data communication);
- Decision-support programmer;
- Office information manager, to schedule the routine, flow, and disposal of generated information.
- Information quality control supervisor.

A discussion of the sources of training and career impetus for these jobs is presented, along with an information-provision model specific to the office.

DES CARRIERES D'INFORMATION DANS LE BUREAU DU FUTUR

RESUME

La tendance du Bureau du futur (OOF) fait naître plusieurs efforts en technologie mais peu de travail a été accompli en termes d'emplois en information, ce qui deviendra important dans les efforts du OOF. De nombreuses carrières différentes vont s'ouvrir pour ceux qui fournissent et ceux qui utilisent l'information, ce qui apportera de nouvelles opportunités et défis.

Voici quelques-unes de ces carrières:

-- courtier en information, pour localiser et reformuler l'information

- programmeur en réseau de communication (pour un mirage de voix et de données en communication);
- programmeur de soutien de décision;
- gérant d'un bureau d'information, pour céduler l'acheminement, le volume et la disposition de l'information générée;
- superviseur du contrôle de la qualité de l'information.

Une discussion sur les sources de formation et sur le potentiel de carrières pour ces emplois est présenté avec un modèle d'information spécifique à ce bureau.

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GENERAL

In several guises, the Office of the Future (OOF) is upon us. Apart from the obvious economic and managerial challenges engendered by the importation of communication and data-processing technology into the office, there will be a longer-term trend towards the reshaping of jobs and job structures, particularly as these relate to information-handling tasks. This paper is an attempt to define opportunities, to prognosticate trends and to lay out a plan of action for forecasting individual careers in an office slightly automated now and increasingly automated in the future.

Current thought on OOF is that if OOF is to succeed, the human values of the office (in particular, those relating to communication) must not be subordinated to those of information processing. While superficially self-evident, this statement goes beyond ideology and actually paraphrases a theory of office process. This theory is that office process consists of activities which are of a communicative rather than exclusively information-processing nature and that these natures differ demonstrably. They include confirmation, disclosure of self, leadership, persuasion, coalition-formation, group identification, and organization, among others. Each of these has an information component; however, the transformation of information is at least as much in the service of interpersonal processes as it is in the creation, dissemination, and storage of coded data.

An implication of this view is that successful OOF ventures will create communication jobs which have only a nominal information transmission and processing function. While such jobs may be given information-related names, they will essentially act to assure the communication of meanings among office populations and only coincidentally the transmission and processing of information.

NEW PURPOSES

In another sense, new information-related jobs in OOF will be heavily involved with communication simply because the automated

system will be so very capable of information processing and transmission that attention can be put elsewhere. Certain questions now on the lips of managers concerning their information will be more-or-less trivialized in OOF. Consider how important the following will become:

- When will I get the report on the Smith account?
- Will the arithmetic be correct in this report?
- Who else got the report?
- When can I tell Jones about the Smith report?
- Who worked on the Smith Account Report?
- Can I get Table 1 done this way or will it take too long to retype it?
- Can I get copies with J.B.'s signature on them?
- What do you mean, "It's in the mail"?
- How soon can we get together to discuss the Smith report?
- Can I get copies of the non-confidential parts of the Smith report to Adams and Baker by tomorrow for their comments
- Has Carpenter read the Smith Account Report yet?
- Is Carpenter going to read the Smith Account Report?
- What did Carpenter think about the Smith report?
- Can I get the latest update on the Smith report?

The answers are "unimportant" because even relatively immature OOF's should be able to deliver accurate answers to these and more complex questions quickly. Data about information (if I may mix a few terms together), especially data on information distribution, is trivially maintained within the OOF system itself. With the use of OOF office-ware languages[1] OOF can literally flood the user with data on office processes.

Of more critical importance will be communication factors concerning the receipt of information which has passed from individuals through an OOF system. Compare the following list with the previous one:

- Why do I have to wait 15 minutes for the report on the Smith account?
- Can we really trust the figures in the Smith Account Report
- How do I go about telling Jones about the Smith report?
- How can I get Davis to work on the Smith report (I've never met Davis -- but I know he's the best and he's out there in the OOF somewhere)?
- How do I make good, convincing tables and why can't I make them this way?
- Is this really J.B.'s signature on these copies?
- If it's not in my out box, has it been read?
- How can I appear sincere in a teleconference over video?
- Is this all the report or are there parts I can't see?
- Who should read this report?
- Are these really Carpenter's comments -- they sound so stiff and formal?

- How can I be sure that there's no newer information on the Smith account?

Note that the major difference between this set of concerns and those which will be automated in the OOF is that the person asking them doesn't distrust the system per se but rather its rationale, its honesty and value. That the system will work will be taken for granted much as we assume that the telephone and our computer terminals will work technically correctly.

In other words, the functions needed to complement the technical capabilities of the OOF will be provided by units which can provide confirmation, leadership, persuasion, contact with others, a feeling of belonging, and a trust that the OOF user will not be overly exposed by trusting the system. These are the new opportunities of the OOF.

CLASSIFICATION

There are two kinds of functions which people will provide and in which OOF employees will find careers. The first kind is a transparent, technical function of keeping the wheels turning within OOF itself. These "office mechanics" will grease, repair and tune OOF in a variety of manners. The second kind is supervisory, maintaining systems of people within OOF much as office managers work now. In contrast with today's systems, however, office structures will be so fluid that common supervisory techniques will be useless. OOF makes it possible for work to be managed, resources to be shared, fashions unheard of ten years ago. Literally only the chair one is seated in is "owned" and then only momentarily. Degrees of ownership of files, reports, projects, employees and discretionary power as well as control of physical space and equipment will certainly be diluted.[2]

A MODEL

Figure 1 illustrates both the two types of functions as well as their organizational roles. "Within" OOF, technicians function as part of the mechanism of the Office. Outside OOF system, users and managers utilize the tools provided by the system as a whole. At each level, the entirety of the following tree is considered an integral whole. It is possible for others to see each office as a system, too, therefore transparent to the work to be done. Thus each officer imagines that there is an OOF available which transparently includes programs, models, task descriptions, decision-support entities, information and invisible clients and customers. Whereas this is not precisely a new way of seeing things (in fact it is the charge of depersonalization that trips most

easily off the lips in the face of a bureaucracy), the degree of transparency afforded by OOF technology makes the whole system a new conceptual experience -- a matter of such degree that it is a new type. In the figure, only three levels of OOF (OOF-I, OOF-II, and OOF-III) are illustrated since we are speaking only of the activities bounded between the persons of office manager and the object of the office's activities (clients, customers, and cases). That offices may be seen as components in larger-level systems (say, OOF-0) is axiomatic; that entities such as "cases" may actually be representations of systems (which, in fact a case file is) is also instructive.

TECHNICIANS

Within the first class of careers we will find the communication network programmer, the decision-support programmer, the physical resource manager, and the office function analyst. These individuals contract to produce a flawlessly-running system (we speak here only of ideals, of course). Users of the system will never see these persons in the course of their work, as they are mechanics who keep it going. On those rare occasions when the system malfunctions or needs to grow, contact with the mechanics will necessarily be an odd thing. Since the mechanics are not "officers", one can expect that (1) there will be a strong need for them to learn about office functions in order to speak the language of office function with their customers (Remember the first time you had to have your "universal joint" replaced? Could you understand a word of what the mechanic said?) and (2) this need will not be satisfied. I suspect the same problems which pertain to all mechanics will continue in OOF.

The office network programmer (ONP) will utilize a language such as LAMP to create protocols through which communication will take place in the OOF. Whether ordered in advance for initial installation or periodically reviewed and renewed by an office function analyst, the ONP will labour tirelessly to formalize existing and desired office interactions. The decision-support programmer (DSP) as discussed by Sprague[3] will create and run models which join a decision support system (DSS) with OOF[4]. It is assumed that the term "model" goes beyond numerical simulations into gaming and interactive meetings through which decisions may be made.

The office resource administrator (ORA) maintains physical control of office resources of a computerized and non-computerized nature. In particular, terminals, terminal aids, access codes, physical location of printers, devices orders stocks of supplies, new protocols, interfaces of particular OOF's with non-OOF equipment (retro-fitting of semi-automated office equipment already paid for will be a major task over the next twenty years) and certain software resources such as workspaces, languages and so forth will

take up much of the ORA's time.

The office function analyst (OFA) will generate new office functions, maintaining control of office procedures through the capabilities of the OOF. In addition, the OFA will design and maintain the systems aspects of office data bases and initiate and perhaps conduct user training (some of which should be ongoing, conducted through the OOF system itself. These tasks are similar to those now performed by a DP systems analyst. The task of the OFA will also resemble that of the manager of a library. To the extent that library procedures remain transparent, reading can proceed unincumbered by the technology needed to get to the information. However, a major benefit of OOF will be to the personalization of common procedures. The OFA therefore will have to maintain a variety of systems, perhaps a very large number, as well as design and promulgate the use of a common system to achieve easy communication.

SUPERVISORS

In contrast with these "invisible minions", information-related supervisory personnel will manage people and tasks that comprise the office function itself rather than the system through which that function is performed. They are the office information manager (OIM), the quality control supervisor (QCS) and the office information broker (OIB). Each of these individuals will utilize the office resources created and maintained by the ONP, DSP, ORA and OFA.

The office information manager (OIM) will have overall responsibility for information networking, quality control, storage, retrieval, and external interfacing. We can anticipate that jobs in the OOF will be information-driven rather than oriented toward specific physical results (such as the typing of pages, approval of forms, filling out of forms, adding of columns of numbers, reformatting of information). The OIM will assign work in information units, through the mechanism of the OOF, and individuals will, perhaps, bargain for the responsibility of completing it. The shepherding of information from place to place, the maintenance of records and analysis of information activities will be the responsibility of the OIM. Since the OIM will interface with individuals who may not be directly known or whose work habits (but not products) are unpredictable, it will be the OOF which will in a sense "supervise" the employees. The OIM will have responsibility, however, for the work. Obviously before the job of OIM can develop, measures of productivity in grid-managed, information-driven work need to be researched and verified. The OIM will generally replace the office management as we conceive of it now.

One function of the OIM which will be unique is to act as the

input location for extra-office information which may have to be bargained for. For instance, imagine that a sales office (-of-the-future, of course) is preparing sales projections for 1982. Information is available only from the marketing group who have done their own projections which, naturally, are not public knowledge. The OIM will locate the appropriate information, perhaps paying some price for it, and get it scheduled into the sales OOF. By "scheduled" I mean something like the following:

- Arrange for information to be transferred inter-system and the costs covered;
- Notify the quality control supervisor (QCS) of the impending arrival of the information, its source, its destination, expected kinds and intensity of use, disposal procedures, and particular quality control procedures to be recommended.
- Schedule the flow of this information through various nodes of the OOF, including QCS, sales officer, and information broker, through to disposition (if any).

The quality control supervisor will be responsible for maintaining the "quality" of the information in the system. While it is difficult to discuss now precisely which qualities will need to be maintained, some come to mind from concerns expressed in the literature.

- Code-integrity (making sure the electronic representation of a message remains faithful to its original);
- Item integrity (making sure that no data is lost or transposed);
- Relational structure (making sure that related messages remain related according to the specified relations, recorded perhaps in other messages);
- Temporal structure: the relationship between messages and events -- an example is a bring-forward file;
- Cryptography -- the encoding of messages so that inadvertant distribution will appear as nonsense;
- Disposition -- all copies collected and disposed of.

The QCS will have the responsibility of maintaining messages intact, both upon entry to the OOF as well as during its lifetime. The QCS will also "bury" the information, disposing of it in appropriate ways.

The office information broker (OIB) will handle information requests through the OOF much in the fashion that a reference librarian does now; in addition, the OIB will have to engage in transactions in order to get to the information, much of which will be available on public data networks.

For instance, the OIB will take specifications of needed information and attempt to locate the data either within the OOF

system or within other connected OOF systems. When the data is located, the OIB will attempt to acquire the data within the constraints imposed by the two OOF's concerning budget, timing, volume, completeness specificity, and technical considerations of code, format and speed. In this the OIB works with the OIM although the OIB may not actually be an employee of the OIM. In fact, it is easy to foresee the OIB as an independent agent outside all OOF's who arranges supplier-user "meetings" electronically. The users will by OOF OIM's.

CAREERS

Notice that there are two distinct mind-sets required for these tasks: one is the ability to image a virtual office complete with individuals one has never met, information whose physical appearance is unknown, work structures which are not static or even necessarily apparent. The other is a specialized view of the control of OOF itself. In essence, the first mind-set is that of the manager. In this case, however, the manager manages resources which are not in proximal grasp and which have little "real" existence. The office is data about the office, apparent only through the OOF. The second mind-set is that of the technician for whom the system is real and the data within the system only incidentally represents the "office".

One wonders whether or not these jobs are merely generalizations of existing managerial and clerical vocations already in the office or really new ways of working. Certainly the trend in both management and clerical work is away from hardware-bound, solid resource activities (such as typing, talking to actual employees face-to-face, supervision by eye of physical work and so forth) towards the representation of these activities through an information system (such as WP, project control programs, forecasting and so forth). Given this trend and the increasing actual reliance upon technological skills, several of the jobs projected can indeed be built upon skills already available as a result of today's training. Managers do know about, if not how to use, computers. Secretaries do receive terminal, if not programming, training. Many of the OOF facilities are merely mechanizations of existing processes, anyway.

On the other hand, the management of people is far from automated and few managers and office technicians receive any training in the representation and manipulation of office process through computer models. It is likely that persons who would move into these jobs will require additional training and may well come from non-office business disciplines. Since studies have shown that programmers and managers have quite different skill and attitude profiles, one wonders what the blend of the two requirements will produce[5].

In a way the trend in DSS towards having aides who do the programming for managers who make the decisions (See Sprague's article) may well provide the impetus for entry into OOF careers. In Sprague's framework, a manager will contract with a model-builder to put together a series of models to be used for decision-making. The model-builder is not a decision-maker in the executive sense and the decision-maker is certainly not a programmer. Such teams will have to be built and it is not clear now that success will be guaranteed, but the team approach seems the most likely path since it requires no retraining of employees.

For certain of the tasks projected, OOF promises merely mechanization of existing work and a shift in emphasis from information processing to the planning of information movement within a network of decision-makers. The jobs of information broker and office information manager are generalizations on existing jobs, with a shift from maintenance and routine processing of data to emphasis upon locating and shepherding information.

Careers in the OOF will, however, be problematic. As Kraft[6] points out, the career of programming is far from a sure thing as programming skills can be trivialized and the work routinized. With this warning, the future of work in the OOF remains cloudy. Consider that unlike today's office in which there is essentially one level of work and one level of supervision, in the OOF, there are many levels of work sandwiched between supervisory levels which use the OOF itself as an aid or sole channel of supervision. "A" uses OOF to manage the work of "B" who uses the OOF to manage the work of unknown people who use OOF to do work. Will it be possible for the denizens of the OOF to develop additional skills, to learn larger world-views, to come to understand the organization, to understand their co-workers, to grow in general through their work within a narrow confine of the OOF? Or will OOF itself provide a fine training vehicle for individual growth? In a sci-fi scenario, OOF takes over all supervision, leaving the tables turned -- OOF uses people to accomplish the goals of the organization as OOF understands it! Which future will pertain is guesswork now.

BIBLIOGRAPHY

1. Licker, P. "Lamp: Language for Active Message Protocols," Human Factors in Computer Systems Conference, March 15-17, 1982, Washington, D.C.

2. Licker, P. "Six Trends in the Future of the Office," Association for Computing Machinery, Special Interest Group on Computer Personnel Research Conference, May 1981, Washington, D.C.

3. Sprague, Ralph H. Jr. "A Framework for the Development of Decision Support Systems", Management Information Systems Quarterly, 4(4):1-26, 1980.

4. Licker, P. "Decision-Support in the Automated Office", Working Paper, Faculty of Management, University of Calgary, October, 1981.

5. Cooke, Lawrence H. Jr. and Campaniollo, Joseph, "The Programmer/Analyst is an Endangered Species", Computerworld, In-Depth 1-8, September 8, 1980.

6. Kraft, Joseph, Programmers and Managers: The Routinization of Computer Programming in the United States, New York: Springer-Verlag, 1977.

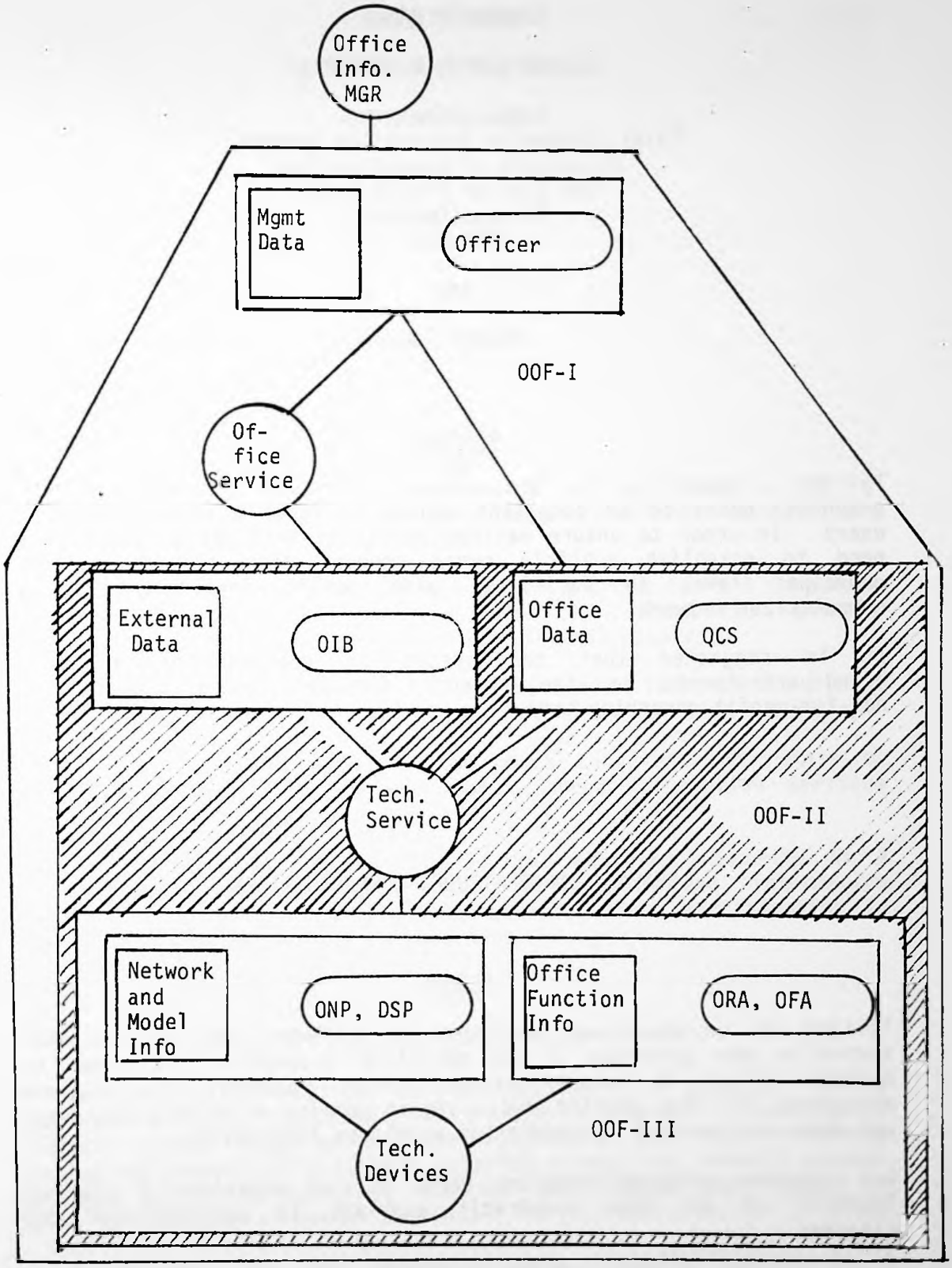

FIGURE 1. LAYERS OF OOF