Assistance: The Work Practices of Human Administrative Assistants and their Implications for IT and Organizations

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ABSTRACT
Assistance – work carried out by one entity in support of another – is a concept of long-standing interest, both as a type of human work common in organizations and as a model of how computational systems might interact with humans. Surprisingly, the perhaps most paradigmatic form of assistance – the work of administrative assistants or secretaries – has received almost no attention. This paper reports on a study of assistants, and their principals and managers, laying out a model of their work, the skills and competencies they need to function effectively, and reflects on implications for the design of systems and organizations.

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Administrative assistant, secretary, personal assistant, assistant, intelligent assistant, articulation work

ACM Classification Keywords
H.5.3 [Group and Organization Interfaces]: Computer-supported cooperative work, Organizational design, Theory and models; H.4.1 [Office Automation]: Time management (e.g., calendars, schedules), Workflow management; H.1.2 [User/MachineSystem]:Human factors, Human information processing; General Terms: Design, Human factors, Theory

INTRODUCTION

This paper is concerned with the work of assistance, work carried out in support of another's work. While it is quite common for one person to help another in passing – I might proofread a colleague's paper, or a friend might forward an article that she knows fits my interests – we are concerned with the case in which the majority of a person's work is in direct support of another person. Assistance in this sense is generally provided in the context of institutionally or culturally sanctioned roles, common examples being administrative assistants or, in the trades, apprentices.

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Assistance is relevant to information technology in several ways. Most obviously, it serves as a model and metaphor for human computer interaction. The concept of an "intelligent assistant" (also known as "intelligent agents," "personal digital assistants" and "electronic secretaries"), has been extant in the information technology literature for decades. While sometimes this use of language is no more than an empty if provocative metaphor, other times it represents real if visionary ambitions. Perhaps the best known example is Apple Computer's Knowledge Navigator video [1], starring "Phil," an intelligent agent who scheduled meetings, reminded his principal of events, and handled phone calls with aplomb. In a more staid example Gutierrez and Hidalgo [10] wrote about their aim to create an intelligent assistant that "w*ill remove much of the burden of administrative chores from its human user and provide guidance, advice, and assistance in problem solving and decision making.*" (p 126) More generally, any search of the information technology literature over the last decades will reveal a plethora of papers that describe "assistants" for programming, teaching, training, et cetera.

Assistance is also relevant to information technology in more literal ways. As its popularity as a model for human computer interaction attests, assistance is an important and pervasive type of human collaboration. The one-on-one form of assistance embodied by administrative assistants represents a common type, and is particularly interesting because its long term and in depth nature allows the development of collaborative practices and artifacts that are tailored to the particularities of a relationship and situation. More generally, viewed as a type of work, assistance plays a role in many forms of workflow which are not necessarily transactional, sequential or linear in nature, and in the structuring of work and communication processes at the organizational level. A better understanding of assistance at this level can offer insights to those charged with designing workflows, services and organizational structures.

However, in spite of the long history of assistance as a model for human computer interaction, and the importance of assistance in the daily life of organizations, there is, as we shall see, little research that focuses on what administrative assistants actually do or how they go about doing it. The goal of this paper is to redress this situation.

A better understanding of human assistance can affect work in information technology in two ways. First, it can better inform the work of those who wish to design systems that truly assist their users. What does it mean to be an assistant? What skills underlie effective assistance? What distinguishes an ordinary assistant from an extraordinary one? Being able to answer questions like these seems likely to offer insights to systems designers. Second, it can better inform the work of those involved in designing 'human systems' – services, business processes, organizations. To take one example, consider the issue of outsourcing assistance to a distant geographic area. What might be the consequences of this? To what extent does the ability to offer assistance rely on local knowledge? Or spatial proximity? Or a geographically bound social network?

This paper is structured as follows. After reviewing previous work on assistants, it describes the site studied, and the method used. Next we present results – a model of the work of assistants, followed by examples of their practices and the underlying skills and knowledge. Finally, we discuss the implications of our findings for design.

BACKGROUND

In this section we do two things. First, we review the existing body of empirical work on human assistance, establishing that the area is remarkably under-studied. Next we discuss research on other forms of apparently routine work, arguing that there are strong grounds for suspecting that the work of assistants is rich and nuanced.

Studies of Administrative Assistants

There appear to be no studies that *explicitly* focus on the work of administrative assistants in the HCI or CSCW literature. While other areas do look at assistants (e.g., gender studies, as in Truss [23]), they don't look closely at the nature of their *work*. What we *do* know about the work of assistants comes from field studies of specific activities: calendaring, task and email management, interruption management, and adoption. Most of these studies include only a few assistants, and if they focus on the assistants' work at all, it is with regard to that activity.

In the area of calendaring, a study of a group calendaring system that included 4 assistants among 16 informants notes differing usage patterns between managerial users (including assistants) and individual users [2]. An early study by S. Ehrlich [4] looks at 3 secretaries (among other roles), noting that their monitoring of incoming communications often made them the first to be aware of meeting conflicts. Grudin [8], in the most comprehensive study, draws on interviews with over 100 informants, an unspecified number of whom were assistants, and offers an insightful discussion of the differing ways calendaring technology is used by executives, managers and employees.

Another facet of the activity of assistants is covered in studies of interruption management, specifically the role of assistants in mediating physical interruptions of their principals. Two extended abstracts address this area. One provides a production-rule model of how administrative assistants prioritize interruptions, based on interviews with 6 assistants [3]; a second validates and extends the model based on interviews with 3 assistants [22]. Neither provides a detailed examination of the work of assistants.

A third facet is task and email management. Whittaker and Sidner's classic study of email overload [24] includes 2 assistants among its 20 informants, noting that both were among the "frequent filers" who tried to minimize their message queues. Harrison et al. [11] report on ethnographic studies of 27 people, some of whom were assistants. They provide a well drawn description of a single assistant, and her role as a filter, and a calendar- and task-manager for her principal. An extended abstract [9] lays out five categories of assistance – pre-processing, filtering and prioritizing, adding information, etc. – needed for an intelligent assistant for email, but provides no detail on the work of assistants. The most comprehensive study of this facet is Muller and Gruen's interviews with 16 assistants about how they and their principals handled email and tasks involving email [14]. Their focus is on the ways that a system designed for a single user was repurposed to support dyadic collaboration, although it also notes that assistants view their role as keeping things "running smoothly."

A final area in which assistants are mentioned is technology adoption. Studies from Wang Laboratories [4, 5, 6] make the point that a common glitch in the deployment of collaborative technologies is to overlook secretaries. They had to be added at the last minute because it turned out they played key roles in expediting processes the technologies were designed to support. Assistants are also important in supporting the diffusion of technology in organizations, a fact that Palen [15] drew upon to ensure distribution of a scheduling system: "*Catalyzed by distribution of the technology to specific employees – administrative assistants – who found the technology useful in conducting their jobs, awareness of Calendar Manager spread throughout the company laterally and from the bottom-up.*" (p22).

This completes our tour of prior work. What we've seen is a sort of "cubist" picture: fragmentary glimpses of assistants in the context of particular activities. Our aim in this paper is to move from this collage of fragments to a coherent picture of the work of an administrative assistant.

Studies of 'Routine' Work

So why hasn't research focused on the work of assistants? One reason might be that it is often seen as routine.

However, a common finding in the CSCW literature is that seemingly routine work is in fact complex, and requires considerable knowledge and expertise to carry out. Even the simplest tasks – making copies on an electronic copier [21], tracking purchase orders [20], doing telephone directory assistance [13] – are fraught with difficulty and unexpected events: machines jam, receipts are lost, rules

don't apply; errors and exceptions occur, interruptions happen, and creative work must be done to make things go as they ought. A nice example of this is Muller et al.'s study of telephone operators [13], which shows that operators draw on many types of knowledge when providing directory assistance. These range from local knowledge (translating "across from that big mall" into a street name), to technical knowledge about the directory database (e.g., knowing that "Saint," "Santa" and "San" are all abbreviated "ST"). As Rouncefield et al. [16] note in their ethnography of work in a small office, local knowledge is essential: *"The point we want to make about this local knowledge is not that it is an adjunct to the system of record keeping, or to the work activities, but that it is an integral feature of them. It is, briefly, understanding how it works, what its faults might be, what its inadequacies are, how they might be got round, what the flow of work is like day by day, what the frustrations of the system are, and more." (p 283)* So, in summary, the complexity of these seemingly simple tasks provides grounds for suspecting that assistance is not as straightforward as it might first appear.

THE STUDY

In this section we describe the site, and the ways in which we selected and studied our informants. We also discuss the factors behind the selection of our site and informants.

The Site, its Organization and its Technology

"Global Corp" is a large company with over two hundred thousand employees and offices world wide. Its activities are centered on the development and provision of information technology systems, services and support. The company is comprised of divisions such as Corporate Headquarters, Technical Support, Consulting, and Research & Development, the last being the locus of this study.

As one would expect, Global has a highly structured management hierarchy. For example, in the R&D division there are six levels of hierarchy: individual contributor, first line manager, second line manager, Director, Vice President, and Senior Vice President. Administrative assistance is allocated in line with this hierarchy beginning with second line managers. While an assistant may support a single principal, this is true only for executives (Vice Presidents on up); managers (Directors and below) share assistants.

As in most large enterprises, there is a standard technology base. Global Corp employees use a collaborative software application that provides email, shared databases and networked calendaring. The calendaring functionality, of special import to assistants, allows its users to view others' free time, and to send invitations for meetings that may be accepted, countered or declined by the invitees. While use of the calendaring functionality is not mandatory, most employees – including all those we interviewed – use it; the same is true of instant messaging. Finally, telephones – desk-based and/or mobile – are ubiquitous.

The Informants

We focused this study on assistants within a single division. There were three reasons for this. First, we believed that assistants sometimes collaborated with one another, and we thought we'd be most likely to see this within a division. Second, to understand assistants' work we also needed to understand the functions and processes of the divisions in which they worked, and that made it prudent to limit the number of divisions we examined. Third, assistants' time is not their own – it is a scarce resource; furthermore, higher level assistants are privy to very sensitive information. Thus, those who managed the assistants, and the executives in the divisions in which they worked, needed to agree to their participation.

The latter two factors also led us to our selection of R&D as the division to study. As researchers we already understood the functions and processes of R&D divisions. More generally, R&D employees – including the executives who would need to sanction our involvement – tend to be more accepting of research activities as opposed to, for example, seeing them as surreptitious attempts at evaluation.

In addition to assistants, we interviewed two other types of employee: the assistants' principals, and the assistants' managers (assistants are managed by personnel from a different division, not by those they support). When it came to selecting assistants, the politics of the situation required that we go through their management. In addition to the matters mentioned above, past reductions in the number of assistants left assistants and their managers sensitive to how the work of assistants is portrayed. As a consequence we selected assistants from a list provided by management; it would not be surprising if this list were confined to assistants deemed most effective and of the highest morale. As our aim was to uncover the work practices of administrative assistants, and the underlying knowledge and skills, we don't see this as a grave limitation. But nevertheless, readers should bear in mind that they are not seeing a portrait of the average assistant.

We began by selecting 10 assistants to interview. Because assistants varied in the number of principals they supported, we selected assistants who varied on this dimension, supporting from 1 to 7 principals. We also interviewed 5 principals, all of whom were supported by one of the set of assistants we interviewed; we took care to select principals from various levels of the hierarchy. Finally we interviewed 2 of the managers who manage assistants.

Method

We iteratively developed a semi-structured interview protocol for assistants, and then modified it for principals and assistant managers. Interviews were carried out by at least two people, one conducting the interview, the other taking notes. All interviews but one were recorded, with permission; at times recording was suspended if discussing sensitive matters. Interviews of assistants and managers lasted an hour; those of most principals half an hour.

Our analysis was straightforward. We worked through each interview to produce a summary, and then read through the entire set of field notes multiple times, iteratively identifying a cross cutting set of themes. In presenting the results, double quotes indicate a comment that has been verified against a recording; demarcation of a quote with tildes (~) indicates an excerpt from field notes not verified against a recording. Quotes are word for word, except where brackets ([]) indicate that names of people, projects, etc. have been elided to preserve confidentiality or privacy. Informants are designated as follows: (A#) for an assistant, (P#) for a principal, (AM#) for an assistant manager.

RESULTS AND DISCUSSION

The role of assistant is complex, particularly in regard to the knowledge, skills and resources needed to fulfill it. We begin by presenting a model of the work of assistance based on our observations. Like any model this is a simplified picture of reality, but it serves to provide a framework for our findings. After presenting the model, we provide examples to enrich this picture.

A Simple Model

The model contains three roles: assistant, staff, principal. Principal refers to the person(s) the assistant supports, and may be either an executive or a manager. An executive will generally have at least one dedicated assistant; managers share assistants, receiving only fractional support. Staff refers to technical or subject matter experts who report to the principal and can be called on to stand in for the principal in certain circumstances.

The stream of events shown in the model may be requests from others or activities initiated by the principal. They are a consequence of the fact that executives and managers in large organizations have a large span of influence and responsibility – over strategic decisions, over funding, over resource allocation, over operations, and so on. That is, after all, the rationale for their existence: someone must take on the role of making major decisions, and of gathering, understanding and weighing the information on which those decisions are based. This is in turn associated with events: requests for meetings, presentations, opinions, resources, decisions and so forth. Some of these events can be anticipated because they arise out of organizational processes such as the annual planning cycle. Others cannot – a reorganization, an acquisition of a new account – and must be dealt with as they occur. And regardless of whether they're anticipated, events vary in their urgency and importance.

Having established this background, let's turn to the model in Figure 1. At the left we see a stream of events directed towards or of interest to the principal. At the right is the principal and his or her staff. And interposed between the event stream and the principal is the focus of interest: the assistant. As events occur the assistant monitors them, makes decisions about how to handle them, and acts on them in a variety of ways. In parallel with handling events, the assistant maintains awareness of the situation (which helps in deciding how to handle the events), adds to (and draws on) his or her store of background knowledge, and records, organizes and consolidates information that will be useful when the principal goes to take up a particular task.

Handling Events

Now we'll walk through the model, illustrating its elements with examples. We'll start with the handling of events.

Monitoring and Deciding

Virtually all the assistants we interviewed spoke of monitoring events, particularly via skimming email and meeting invitations. "*~She gets tons of email. And I monitor it, especially when she's away. And when she's here I still monitor, because things might come in that she doesn't have a chance to see. If I didn't do that, I couldn't do my job the way I do it. Because I wouldn't know what's going on.*~" (A8) Another said: "*Even when she's here I* do *try to look at it at least a couple of times a day. And it helps to keep me aware of what's going on. It's not required that I read her mail, but the more time I have to do it the more*

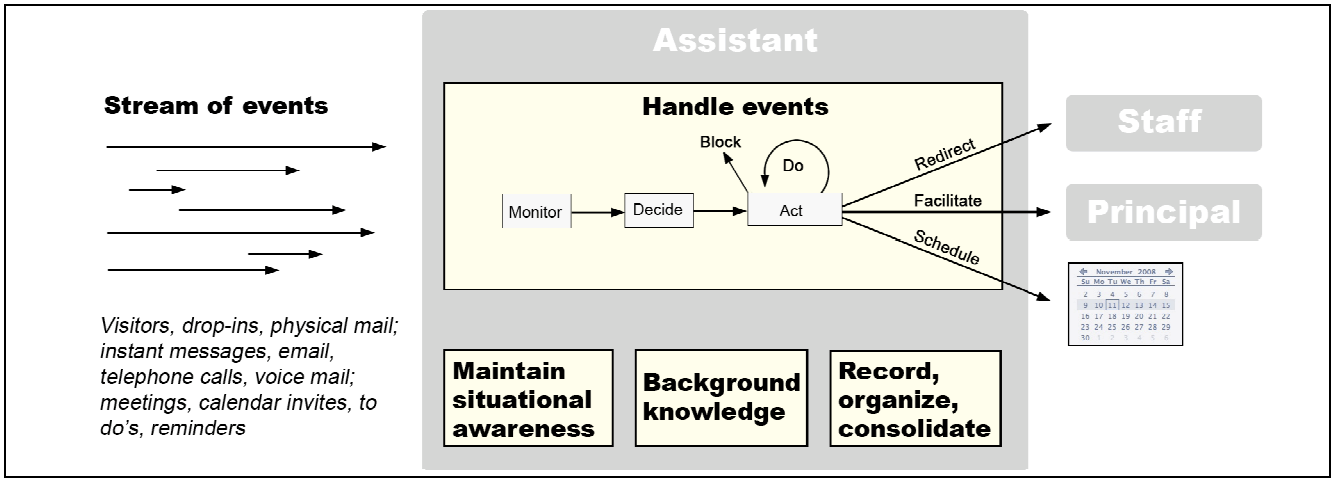

Figure 1. The work of an administrative assistant.

I'm aware of what's going on in our department. But when she's away it's much more critical." (A9)

Another form of monitoring occurs when assistants are collocated with their principal, typically in an outer office. As we observed a number of times during our interviews, this vantage point allows the assistant to observe (and intercept) visitors, notice incoming phone calls and who they're from, and monitor the progress of face to face meetings going on in the principal's office. The situational awareness that arises from collocation is particularly useful in noticing when things aren't happening – a visitor is late, a meeting is going over time, an expected phone call has not come in. One assistant noted: "~*One thing assistants are very tuned into is when things aren't happening. And you don't wait for your principal to ask; you know what you need to do.*~"(A8)

To summarize, assistants reported two reasons for monitoring. The first was to watch for urgent events – particularly important when the principal was traveling. The second one was more general: to be aware of what was going on (or not). This more general aspect of monitoring is crucial to the maintenance of situational awareness, and also to the gradual accretion of background knowledge, both components of the assistant model.

As assistants monitor events, they are also making decisions on how to act on them. The most important thing we learned is that most of this decision making happens without the principal's intervention. As one assistant said, "*It's not in his best interest to take the time to talk about something.*"(A2) Instead, assistants rely on their knowledge of their principal, his or her job, and the priorities *vis a vis* the current situation. A closer look at the factors involved in this decision-making may be found in [3] and [22].

Blocking, Doing, Redirecting

Many of the actions taken by the assistant are designed to protect the principal. The first of these is for the assistant to block the event. This wasn't reported as being frequent; it was most commonly described in the case of high ranking principals receiving requests from non-employees (e.g., for talks). One assistant said, "*Once external folks get his email address, here comes the tsunami. There are several requests he doesn't even have to really see... I can tell from the subject matter. ... I know this is not a* [P] *matter but I'll send it off to* [a staff person] *in case it should go to someone else within* [Global]."(A2)

A second mode of action is for the assistant to simply do what's needed. Assistants reported handling a wide range of events in this way, from small things like answering questions to major tasks like organizing a workshop. Often these events were regularly occurring activities required by business processes such as managing inventories, creating monthly rollups and devising agendas for visitors.

A third mode of action is for assistants to redirect events to their principal's staff members, either because they know the staff member is the appropriate person, or because the principal is traveling and they understand whom the principal would be likely to ask. As one principal said, "*For certain meetings I know I can depend on one of my colleagues to act on my behalf... Making the decision to delegate and finding out if the delegate is available and able to take over – a good secretary will go ahead and do that.*"(P2) The fact that a putatively low ranking employee is in effect assigning work to high ranking employees is a nice illustration of the paradoxical nature of the assistant role.

Facilitating

So far the event handling we've described protects the principal and his or her time; but of course many events require the principal's direct involvement. In this case, assistants act by making sure that things go smoothly. This can play out in several ways. One way, already mentioned under monitoring, is noticing when things are not happening. For example, several assistants mentioned the need to remind their principals when a meeting was running over and someone was waiting. As one of the principals said in this context, "*With her there* [outside my office] *to essentially protect me, schedules were still able to be somewhat maintained. ... She kept me out of trouble, cause let's face it, propeller heads have trouble. ... I've always had trouble keeping track of... as you get into a discussion, fill in the board and you lose the time.*" (P3)

Another way that assistants facilitate things is by guiding interruptions – not blocking them, but getting the crucial ones in front of the principal in a timely and non-intrusive manner: "*...if it's urgent I'll print it out and slip it in front of* [P] *when he's in a meeting.*"(A5) Another example occurred during an interview, when the assistant instant messaged an employee to let him now that *right now* was a good time to catch the principal for a requested phone chat. Afterwards she said, "*And this I consider a nag. But there's no other way of knowing because if I didn't ask* [coworker] *I'd get a note back from* [P] *saying I haven't spoken to* [coworker] *yet.*"(A2)

A third form of facilitation is making sure the principal has the information needed to carry out a task. This is the motivation behind much of the work in the "Record, Organize, Consolidate" box of the model. For example, most assistants reported preparing travel folders for their principals that contained travel and lodging information, meeting agendas and other supporting materials. A comment by an executive who travels much of the time, illustrates how extensive this type of facilitation can be: "*Here is one acid test I use for admins. If I'm comfortable to take out my calendar and it says go to .... no, get up at 4:00 – and she'll do stuff like that – and walk outside your door and there will be a limo there. And I don't look at anything else... I don't look to see what hotel I'm staying at, sometimes I don't even know where I'm going. It might say bring your passport, by the way. To me that's sort of the perfect one. I've had three of them.*" (P1)

Note that for all of these forms of facilitation, monitoring is crucial. In the first two cases, collocation is quite helpful, as it both facilitates monitoring (e.g., tracking the progress of a meeting in the principal's office, observing the state of the phone), as well as the unobtrusive guiding of interruptions. The third form of facilitation – constructing artifacts that pull together the information needed to do a task – also relies on monitoring. We'll look at this case more later.

Scheduling

All but one of our assistants stated that the majority of their work was scheduling. Part of the reason for this dominance is that it involves far more than just putting a meeting on the calendar. One assistant summed this up very aptly: "*My husband and I are boaters. We always say, buying the boat is the easy part. There's a lot more to it. The maintenance, the upkeep, this, that and the other thing. Just plopping something on the calendar is mindless.*"(A5) Like facilitating, much of the work lies in making sure the right things happen at the right time – for example, meetings with executives may require preparation, which in turn may require other meetings. One assistant, whose principal is a strategist, described her preparations for a meeting with a VP: "*The meetings that I set up are cascading meetings. In other words, in order for me to do this meeting that I'm setting up for* [...] *which has changed like five times, I have had to set up approximately twelve different meetings before that, knowing the players and what they do.*"(A1).

But while there's more to scheduling than "plopping" a meeting on the calendar, the main reason it consumes so much effort is creating a place to put it. Automatic scheduling mechanisms assume that there will be 'empty' time in which to schedule meetings, but the calendars of the principals we studied were heavily booked, often weeks into the future. Not only were they heavily booked, they were often double- or triple-booked: "*All three of my clients tend to double book.*"(A4) Even when principals avoided double-booking, scheduling a meeting often required moving other meetings to enable all the key participants to attend. This in turn leads to churn: "*A meeting set up this morning will be canceled by this afternoon. Or rescheduled. And the rescheduled date will conflict with something else and then you have to work on that.*"(A7) Another said, "*Most meetings that I set up – that everybody sets up – get moved at least one or two times. Minimum.*"(A1) One assistant said that she often scheduled meetings with other assistants to schedule meetings for their principals: "*We will* [instant message] *everybody and say can we all get together at 2:00 to look at calendars. We'll get on the phone and do a conference call just to schedule a meeting.*"(A9)

Except when the person calling the meeting is very high ranking ("*~When you're a VP everyone jumps to your tune~*"(A1)), considerable work may be required. One assistant observed that the higher the level of the invitee, the more involved it was: "*It's because their calendars are filled up, they require background, they want to know why they're being pulled in to this meeting. I don't know if its the executive or the assistants.* [...] *You pretty much have to have all your bases covered.*"(A7). Furthermore, negotiation skills may need to be brought into play: "*I do a lot of, um, begging, I do a lot of groveling... negotiating... If you've got to pull a meeting together with all the VPs, say, and there's one or two that say they're not available, but that's the only time you've got 8 of 10 to do it, you'll go back to those two* [assistants] *and just say, you know...*"(A3)

Beyond Handling Events

So far we've looked at how events are handled. They can be blocked, done by the assistant or redirected to staff members; if they require the principal's attention, they can be facilitated or, if not urgent, scheduled. But, at the same time as handling events, the assistant is doing other things.

Maintaining Situational Awareness

As we discussed in the section on monitoring, assistants try to track email, calendars and other channels to maintain their awareness of the current situation. The importance of situational awareness is further emphasized by assistants' complaints about things that disrupt it. Among the most vexing disruptions are their principals' tendencies to do things themselves, without keeping the assistant in the loop. As one said, "*There's just some people who walk down the hall and say yes to everything, and don't include their assistant in the process.*"(A3) Another, asked what would make her job easier, replied, "*In all honesty, full control of all of their calendars. <laughs> If they would all just leave their calendars alone and let me work them and not* ever *touch them, that would make my life easier!*"(A7) In addition to 'uncooperative' principals, another difficulty in maintaining situational awareness is lack of collocation. "*But when he's in* [a remote site] *I lose the ability ... and I know control sounds terrible... but I lose the ability to keep track of things that need to be kept track of.*"(A2) So, in summary, situational awareness figures in deciding how to handle events and, in its absence, the assistant loses some control over what's going on.

Maintaining Background Knowledge

In addition to maintaining awareness of the situation, it is clear that a considerable amount of background knowledge is necessary. Knowing what to block, when and who to redirect something to, what is urgent enough to warrant slipping a note in front of a principal in a meeting, at every turn knowledge about the principal and his or her roles, responsibilities and coworkers are required.

This knowledge is critical because assistants need to be proactive – they can't interrupt their principals all the time. This point came up repeatedly when we asked assistants and principals what distinguished an ordinary assistant from an extraordinary one: "*The qualities of an assistant that make them exceptional are they understand what you do, they understand who your colleagues are, they understand your travel preferences and your schedule preferences, and*

they manage the schedule proactively." (P2) Another principal gave an example: "*Last week I told her the* [executive] *quarterly review is coming up. And she said 'no problem, I'll get some speakers.' Now is she a researcher, does she know the topic? No. But she knows what* [executive] *cares about, she knows what I want to talk about, and she knows what we talked about with him last time. So it's not so much the mechanism... it's the semantics, the meaning behind it all. She understands the team.*"(P3) One assistant, talking about getting to know a new principal, said: "*You get to know... you keep an eye on their mail – I have access to his mail, I keep an eye on his sends, he copies me on most anything. Especially with calendaring... I know I now have a sense of his priority. So it really is just getting to know that person. It's always the hardest part when you start with somebody.* [It's] *like learning how to dance with someone.*" (A3) She went on to note that "*~ When you're in a job longer you can anticipate and see things coming. Which is different from being a good assistant and figuring out later that you'll need something; a superb assistant would already have that in the folder.~*"(A3)

Recording, Organizing, Consolidating

While assistants clearly hold a lot of information in their heads, they also record, organize and consolidate information. While some of this is for their own use (one showed us a long list of acronyms that she was learning as a consequence of her principal moving into a new position), most was for their principals. Assistants consolidate all information relevant to a task so that when the principal takes up that task, everything needed is at hand. This is another variant of facilitation, though in this case it is asynchronous. For example, assistants described a number of annotation practices. One described adding notes on calendar entries "*so that when* [P] *sees it he'll have a clue as to what's going on.* [...] *I'll put a little note 'the prep is on the week before.'*"(A5) Another described a similar practice with email, flagging the email and then "*I'll put on the top of it* [i.e., annotating in the body of the email] *exactly what background he needs on this and then we'll go from there.*"(A2) And, from the other side, a principal commented: "*She'll actually go in and edit the note, usually before I get to it, and in bold red letters when I first open the note it will say '*[P] *this has been scheduled.' Which is saying don't respond to it, don't send it to me, you know, delete this.*"(P1) This sort of recording, organization and consolidation enables principals to move quickly from one task to another, and also to avoid unneeded communication such as forwarding a note to the assistant to have it acted on. As already noted, it is not in the principal's interest to have to talk with the assistant: ideally the assistant will have been proactive and have everything already lined up.

Summary of Results

This section has laid out a model of the work of assistance in a large organization. In the large, it depicts events impinging on the assistant, who monitors them, makes decisions, and takes various forms of action. At the same time, the handling of these events both draws upon and maintains the assistant's situational awareness and background knowledge, and also results in the production of artifacts that record, organize and consolidate task related information for use by the principal.

GENERAL DISCUSSION

Beyond the Model

The model has been a useful way of bringing order to an intricate weave of detail. But it is important not to mistake the model for reality. Like all models it foregrounds some things at the expense of others. In this case it foregrounds events and artifacts – the things that are most prominent in the assistants' descriptions and that are easiest for us to observe. However, there are aspects of the data not captured in the model, and it is to these we now turn.

What Does it Mean to be an Assistant?

To begin with, let's step back from the model, and consider the question – typically the first we asked in the interview – of how assistants see their jobs. Responses generally had to do with making things easier and smoother for their principals, echoing the findings of [14]. But they often went considerably farther. One executive assistant remarked, "*I run* [P's] *day without him knowing I do it. He thinks he's the boss with the calendar!*"(A5) Another assistant, who served several principals, said something similar: "*~I run people's lives.~*"(A6) And yet another – the assistant who supported the most principals said, "*I have to be the glue that keeps everything together – cause without me everybody's going to be going cuckoo.*"(A10)

Principals made similar comments. One said of the things his assistant did, "*these may all seem like little things but they make the difference between things going smoothly and things not going smoothly*."(P4) Another principal commented that assistants could see the big picture: "*They're distant from the woods enough to where they can see all of the trees – the good ones* [assistants] *– and they can come back and warn you – again, keeping you out of trouble.*" (P3) And a third, an executive, after commenting that his assistant could "*read his mind*," said "*There would be times when she'd really need a decision, and I'd get these gentle reminders... and then she'd decide.*"(P1)

These comments provide a counterpoint to the model. They undermine the idea that assistants are just event handlers: rather they are proactive – they are running things, blocking some interruptions, slotting others that their experience tells them are important into the flow of the principal's day. At the same time they orchestrate the future, creating empty time in which new events – and the preparatory and follow up meetings that those events require – can be scheduled.

Principal-Assistant Collaboration

There are two types of activity that are quite important to this more proactive, more control-oriented notion of assistance that are not foregrounded in the model. The first

is collaboration between the assistant and the principal. When we went into the study, we expected to hear that assistants and principals had regular meetings. But while this happened sometimes, often meetings were more haphazard, or mostly superceded by instant messaging or email. Instead, the most consistent finding was the emphasis on knowing what to do based on one's long term experience in combination with the awareness gleaned through monitoring. Input from principals, when it was received, often came after the fact: feedback rather than guidance. We've remarked on this already, but we also want to call attention to some further implications. What we see here is that the administrative assistant is often acting autonomously, and this speaks not only to the knowledge and awareness on which it is based, but to the considerable degree of trust and (at least by proxy) authority the assistant has. One of the clearest indicators of this is a comment from one of the managers responsible for assigning assistants: "*It's easier to tell them we have to cut your support in half but you can keep your assistant, than we can give you more support but you have to change assistants.*"(AM2)

Cooperation Among Assistants

A second type of activity that underlies this more proactive vision of assistance emerges most clearly in the context of scheduling: that is cooperation among assistants. We saw several instances of this in the results, the report of the practice of scheduling conference calls among assistants, as well as comments about the need for negotiation among assistants. Indeed, the assistant who mentioned having to "grovel," (who, in fact, supports an executive), commented on the importance of maintaining good relationships: *"That's the thing of having a good relationship with your coworkers. And always trying to accommodate them if you can. I always try to do that back. If it's something at all that I can move, I will do it.*" (A3) Another, speaking of assistants, said "*We try to make our lives easier for each other* [...] *if I can move a meeting because it makes her life easier I'll do it. You know, camaraderie.*"(A6) But although most evident in scheduling, cooperation among assistants underlies much of what they do. One said: "*I get the job done that I get done – and I'm very good at what I do – because I've been here for so long and I can pick up the phone and in thirty seconds get a projector, get a screen, get coffee for a meeting, get a conference room that no one else can get,* [...] *because of the people I know. Because I can also help them* [...] *It's a huge advantage. We all wash each others' hands.*"(A1) These personal networks are maintained both by the mutual aid described here, as well as by social activities like gathering after work. However, assistants also commented that the increased press of work has decreased traditional social activities like having lunch together, and that the suburban location of the division in which they worked also decreased social opportunities.

The Case of Partial Support

Before moving on, a final point to make about the model is that it best fits the case in which a single assistant provides full time support a single principal – the case of the executive assistant. However, as we move down the management chain, sharing begins below the level of the Vice President, and increases with decreasing levels, so that an assistant may end up supporting five or more principals. In this case, our interviews suggest that assistants perform the full scope of event handling (especially monitoring) only for their most senior principal; 'lesser' principals supported by the same assistant receive support only for certain tasks, usually scheduling or managing travel and expenses. For example, one of the lesser principals noted that she only used her (partial) assistant to schedule complex meetings; otherwise it was easier to do it herself than to communicate the information and contingencies that a full time assistant would have just known from experience. She missed the old days of more plentiful assistance, saying: "*That's what good assistants do. They remind you of things. They check conflicts. They keep you honest, is the way I like to think about it – when they have the time to do that. And they don't seem to have the time. As the resources get more and more stretched that's the kind of thing that falls off the plate.*"(P5)

IMPLICATIONS

In the introduction we suggested two reasons that looking at assistance is important: to help in designing systems that interact with people, and to help in designing organizations and the information systems that support them.

With regard to assistance as a model for human computer interaction, our findings suggest that this is a challenging goal. Anyone who aims to create an intelligent assistant that is more than an empty metaphor is going to have to build a system capable of some formidable tasks. It will need to bring considerable knowledge and intelligence to bear to (1) understand skills, roles and priorities of its principal, (2) understand the idiosyncratic preferences of its principal, and (3) understand the skills and roles of its principal's collaborators – subordinates, peers and supraordinates. It must also be able to draw on the above to (4) maintain a dynamic model of the situation from which it is (5) able to adjust priorities on a moment to moment basis. It also must be able to (6) negotiate with other assistants to reschedule meetings (and muster the social capital necessary to conduct successful negotiations), (7) be able to re-assign tasks on the fly to other personnel (and to have the authority or trust needed to make the assignments stick), and (8) be able to consolidate and organize information so that it can be drawn upon in support of the principal's activities (keeping in mind the principal's often idiosyncratic approaches to various tasks and activities). Above all, it must be able to do most of this without (9) requiring the principal's attention, and often (10) proactively – before the principal recognizes that it is needed. This seems, to us, to require a degree of intelligence and knowledge that is far beyond the grasp of today's computational systems. It is also seems well beyond the norms of human willingness to accept the decisions of intelligent systems (e.g., in re-

assigning tasks). While many of the capacities needed for an intelligent assistant are being explored under the rubric of context aware computing [12], the broad nature of the assistant's job, combined with the need to adapt to the constraints of a single individual in a unique organizational context, make this a rather tall order.

Of course there are alternatives to simply trying to replicate human assistants. One might be to shed the proactivity and instead focus on emulating the human assistant's ability to record, capture and consolidate incoming information, assembling it into coherent packages that are analogous to the travel folders or annotated email and calendar entries produced by human assistants. Or alternatively, perhaps it should be recognized that human intelligence is going to be an inherent part of any truly intelligent assistance, and that a wise strategy would be to look for ways to support and augment human assistance. A natural starting point here, suggested by our study, is to look at the task that dominates most assistants' days: the problem of scheduling meetings in a world of full calendars. In this world the question is not where is the empty time, but rather which meetings can be most easily moved. Given that calendar entries include the names of attendees, we can imagine estimating the difficulty of rescheduling any given meeting by analyzing the calendars and other meetings of all participants. Such a system should not, of course, try to reschedule meetings on its own, but rather should assist human assistants in deciding how to proceed, providing them with visualizations or other means of exploring the density of the enterprise's meeting network.

This brings us to the design of organizations. One of the trends in many industries is outsourcing functions to distant geographies. Assistance is, in the eyes of some, a candidate for this sort of refactoring. This study suggests that such a move should be approached, if at all, with caution. While if we look solely at the upper region of the model – a stream of events being monitored and handled by an assistant – to the extent events are digitally embodied, outsourcing seems plausible. However the difficulty comes in the lower part of the model – the development and maintenance of situational awareness and background knowledge. This is more difficult to do at a distance, separated from the daily life of the division and its personnel. It becomes more problematic when we think about the collaboration and cooperation that underlies it, and the long term bonds of trust that form between principal and assistant and between assistants who work together. Were an organization to outsource its assistance, what would happen to the networks of assistants that now exist within the organization? It is not clear, given the economic rationales for outsourcing, that maintaining such networks of assistants would be seen as efficient. Nor is it clear how such networks would function, extracted from the tightly knit organizational context in which they currently exist. It *is* clear, however, that mutual cooperation, and the underlying links of reciprocity, trust and accountability, need to be supported for assistants to continue to function as they do.

CONCLUSION

Assistance has been a topic of longstanding interest in information technology. As a model and metaphor it has been invoked in generations of attempts at devising electronic secretaries, intelligent agents, intelligent assistants, and personal digital assistants. While some of these used "assistant" simply to provide an appealing name, others clearly sought to emulate the best qualities of human assistance. In view of these latter systems, it is surprising how little attention the general form of assistance provided by human administrative assistants has received.

In this paper we've taken a close look at the work done by administrative assistants, interviewing them, their principals and their managers. Much of what we've seen – the maintenance of situational awareness and the continuous use of deep and detailed background knowledge – resonates with what has been seen in studies of other forms of seemingly "routine" work by clerks, operators and accountants. Other aspects seem more particular to administrative assistance. The cooperation among assistants as they negotiate meeting times for their already-fully-booked principals is one example. The intense relationship between the assistant and their primary principal, with the trust and authority-by-proxy that goes with it, is another. But what we've found of most interest is the nature of the assistants' work.

As we've found, and others have observed, assistants carry out a wide variety of tasks for their principals: blocking, doing, redirecting, facilitating, scheduling. Much of what they do reminds us of the sociological construct of articulation work [19, 17]. Articulation work is, simply put, the work necessary to prepare to do a task: arranging who is to do what, and when, where and how they are to do it. As Gerson and Star write "Articulation is all the tasks involved in assembling, scheduling, monitoring and coordinating all of the steps necessary to complete a production task." (p 266) [7] Articulation work also includes time spent juggling multiple tasks – switching from one task to another, 'cleaning up' after the first task, and 'laying out the materials' for a newly started task. And it is also, in Star's words, "work that gets things back 'on track' in the face of the unexpected, that modifies action to accommodate unanticipated contingencies." (p 84) [18]

In this view, much of what managers and executives do as well is articulation work, although of course they also do things like make decisions about strategy, and contribute to project directions at both large and small scales. What is of particular note, though, is that virtually all of what managers and executives offload onto their assistants is articulation work. We will suggest, in fact, that by analogy with the notion of knowledge workers, administrative assistants may be viewed primarily as articulation workers, with a concomitant set of skills and knowledge.

We like this term, not only because it aptly captures the considerable variation of tasks the assistants perform, but also because the term articulation has two contrasting meanings. One meaning has to do with articulating or distinguishing the separate (but connected) components in what Strauss [19] would call an arc of work, just as a speaker clearly enunciates the words of a sentence. The other meaning, which both contrasts with and complements the first, has to do with creating coherence, in the same way that an articulate speaker fluently combines separate words to create a meaningful whole. This is an aspect of assistance that we have just touched on here, and that we believe merits further attention.

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