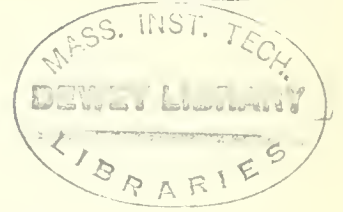


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A SURVEY OF CURRENT TRENDS IN
THE USE OF EXECUTIVE SUPPORT SYSTEMS

DAVID W. DE LONG

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NOVEMBER 1984

CISR WP #121

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Introduction

Since 1979 there has been a small but growing amount of research done on the evolution of executive support systems (ESS). These systems have been defined as "terminal-based computer systems designed to aid senior executives in the management of the firm" [Levinson]. Virtually all ESS research [e.g., Rockart/Treacy, 1981; Levinson] has been an attempt to develop an understanding of what executive support systems are, how they are implemented, and how they are actually used. The authors have drawn conclusions about ESS from a relatively limited set of companies that have pioneered in the development of systems to support top management.

Partly because of the limited evidence, much argumentation exists as to the efficacy and future path of executive support systems. Rockart and Treacy observed in 1980 that the ESS phenomenon was growing. Others, however, [Dearden, Naylor, Kiechel, Hollis] have since suggested that the idea of a senior executive using a computer terminal makes little, if any, sense and that only a few very unusual top managers will have them on their desks. Despite these negative predictions, the management literature and the popular business press continues to report on an increasing number of senior executives who are making use of computer terminals [Perham, Whiteside, Nulty, Steinhart, Verespej, Davis]. What has been missing up to this point is any

evidence concerning the actual prevalence and use of ESS in organizations. How many top executives are using computers to help manage their businesses? What are they using the terminals for? And, what is the impact of ESS?

The purpose of the study reported here was to gain some insights into these questions, by providing data from which to draw rough conclusions about the proliferation and use of ESS. A second objective was to identify some of the emerging issues and concerns that could be the focus of future ESS research.

This survey is just one part of a multistage study into the current state of executive support systems. The objective of this research is to gain a descriptive understanding of the systems now in existence -- the ways in which ESS are being used, their strengths and weaknesses, and the users' views of the systems. In the end, we hope this analysis will produce conclusions about senior management's use of computers which will be of value both in designing future ESS and in understanding the impact of the technology on the ways in which senior executives will manage their organizations in the future.

Methodology

The 50 corporations chosen for this study represent a 10 percent random sample of the 1984 Fortune 500 list. In each case, we contacted either the

senior computer executive in the corporation, or the information systems person capable of providing the best overview of the firm's activity in the area of computer-based executive support systems. At the outset of each telephone interview, the interviewees were told that their responses were confidential and that they would be sent a copy of the final report. Interviews were conducted between July 1 and September 15 1984, with 45 firms responding and 5 choosing not to participate.

The problems with telephone interviews are well known, and the results shown here must be treated with care. However, some interesting data emerged. In addition, several qualitative themes were noted time and time again, and we believe they are worth reporting.

The interviews ranged from 5 to 30 minutes in length, depending on the amount of ESS activity in the respondent's firm and the willingness of the subject to talk about the applications and their impacts. The average interview took 20 minutes. The questions used came from an interview outline, but not every question was covered in each interview because of interviewee time constraints and reluctance to discuss particular items.

The qualifying question used at the outset of each interview was: "Does your company have computer-based executive support systems?" Then, the interviewer read the following: "For this study, we define 'executive support systems' as the routine use of a computer terminal for any business function. The users are either the CEO or a member of the senior management team reporting directly to him (or her). Executive support systems can be implemented at the corporate and/or divisional level."

One of the problems with any study of "executive support systems" is that there is still great confusion about what really constitutes such a system. What one information systems executive might define as "executive support", another would discount as "just electronic mail" or "just a personal computer." Because this concept is evolving so fast and in so many different ways, our first objective was simply to determine whether or not a corporation's top executives had terminals on their desks. Then, we could begin to determine the system's capabilities, degree of use and impact on the organization.

Findings

Three significant findings emerged from the interviews:

- o About two-thirds of the companies had some activity going on in the area of computer-based executive support.
- o The type of use and expected organizational impact varied widely. In only three companies was ESS usage described as "high." Another fourteen reported "moderate" use.
- o Several key issues appeared repeatedly throughout the interviews. Most point the way to critical areas for further research in the ESS area.

Widespread and Diverse Activity

In 30 corporations out of the 45 responding in our survey, at least one executive, at either the corporate or divisional level, had a computer terminal on his or her desk. As Exhibit I shows, in most cases (29), computer terminals are appearing on the desks of "a few users" in the corporation, as opposed to individual or office-wide applications. (Note the total number of systems -- 39 -- exceeds the number of corporations where executives have terminals -- 30 -- because some firms have multiple systems with different capabilities.)

There are essentially three classifications of capabilities: office automation, status access, and query and analysis. Often, specific systems offer capabilities from a combination of the three classifications.

"Office automation" generally means terminal-based access to functions such as electronic mail, calendaring and word processing. The executive's terminal is usually networked to others in the company, although in four of the twelve firms in this category executives were using stand-alone personal computers (See Exhibit II). Office automation applications are generally designed to make the executive more efficient, and do not provide analytic capabilities. Although unreported in previous research (e.g., Rockart/Treacy, 1981), the use of terminals for communication purposes (e.g., electronic mail) appears now to be a significant factor in the evolution of ESS.

"Status access" applications give a manager the ability to access a predetermined and preformatted set of reports through a terminal. The data used to generate status access reports may be updated hourly or quarterly depending on the particular system, but the significant thing about these reports is that their formats are static and the numbers of reports available is finite. Unlike reports generated by query-based systems, the data cannot be manipulated or broken down further.

"Query and analysis" is the ability to perform random and unstructured "what if" and other analysis. One means of doing this is through analytical tools which access corporate or divisional data bases. Also included in this category are the capabilities provided by the spreadsheet packages such as Lotus 1-2-3, which are available on personal computers, and which may or may not be linked to corporate data bases. In fact, nine of the fourteen systems found in this category are stand-alone microcomputers using spreadsheet packages. The ability to do ad hoc querying in extensive corporate data bases, which is what many writers have in mind when they discuss "executive support systems," is still relatively rare at the executive level. Reasons cited for this include difficulties in aggregating production data bases, problems in developing the software for effective access to data on mainframes, and the political ramifications of providing such access for top management.

Of the 30 companies where executives have computer terminals on their desks, the most common user is, as expected, the chief financial officer

(37%), followed closely by the group vice presidents (33%) and the CEO or chairman of the board (30%). In one company or another, terminals are found on the desks of virtually all types of functional vice presidents at the corporate level. It is worth noting, however, that ESS use by an entire management team, at either the corporate or divisional level, is still relatively rare.

Limited Use

The most obvious finding in terms of the "Degree of Use" of the systems, as illustrated in Exhibit III, is that only in a very few cases (3 of 39) is the use of computer terminals considered "High" (daily use). A significant number of the systems get "Moderate" (i.e. several times a week) use. While only six systems fell into the "Low" (infrequent or no use) category, it is also likely that a majority of the "Don't know/Didn't comment" responses would fall into the "Low" use category. Our guess is that if key I/S managers do not know or do not feel informed enough to comment on use, then the systems probably are not very active.

As might be expected, there is a very strong correlation (the figures are identical except for one company) between the interviewer's impression of the "Impact of Use" (Exhibit IV) and the "Degree of Use" (Exhibit III). Data in Exhibit IV shows that executive computer use is not yet having a significant direct impact on the way most organizations are managed. Instead, there

appears to be tremendous variability in both use and impact, with comments ranging from "no discernible impact" to "the system has changed the way he does business."

Emerging Issues

Although a telephone survey is a limited research instrument, a series of issues were raised so consistently by those interviewed that they deserve special mention and further attention.

Political Implications

The first and most critical issue is the political implications of increasing access for senior managers to unfiltered operations data. In one corporation, executives now have on-line access to operational reports from the divisions two days after the monthly books close. Previously, it had taken 20 days to get the same information. "Our ESS has made the division people aware that they are under far more scrutiny than before. The feedback comes much faster," said the corporation's I/S executive.

At this company, on several occasions the vice president of finance has seen data on the screen, run off a hard-copy, red-penciled it, and mailed it off to financial VPs at division level, demanding explanations for certain

numbers. The divivional VPs were taken aback at how fast the corporate level could now react to the numbers -- sometimes even before they were seen in their paper formats in the divisions. Subsequently, the divisions have asked that the ESS be installed at their level, so they could anticipate questions from corporate management.

This situation is typical of the kinds of problems more and more organizations are going to face as ESS technology spreads. "Who controls the data is the key issue in ESS. The question is who gets what data and when," said one I/S manager in a natural resources corporation.

To deal with this issue, the manager of electronic office systems in a telecommunications company said his firm had appointed a "data base manager" at the executive level to address questions of data ownership. This person manages access to corporate data. "We had to ask: does the controller in the organization own the financial data? We decided the data belongs to the company, not the function," he said.

Data ownership and data access issues can have significant impact on the actual data "reported" in the corporation. "The staff used to have more time to review data and launder it," said the manager of I/S planning for a large manufacturing company. "Now the VP sees raw data." In other organizations, however, the "laundering" process has merely been speeded up because the data still moves up through the management hierarchy.

Influencing Computer Use

There is another side, however, to the proliferation of terminals at the top of organizations. Once executives begin using terminals, or at least having them on their desks, the use of computers by their subordinates increases significantly. "The chief benefit of the executives' use of computers is that they make it easier for subordinates to buy systems because now the boss understands the benefits," said one I/S executive. In another corporation, a senior executive forced his staff to get terminals saying, "If I send an electronic mail message, I expect a response." In cases where the systems are being used regularly by top management to monitor performance data, lower level managers are demanding access to the system so they can see the data their superiors are getting. "If you're not on the system, you're not in the ball game," commented one interviewee.

Data Management Difficulties

The politics of increased data access for top management are not, however, the only barrier to making data available. Aggregating, accessing and managing production data bases in a corporation with multiple divisions is proving to be the biggest physical roadblock to ESS development. Problems with aggregating non-compatible data bases and inconsistent data elements,

combined with frequent resistance and outright refusal to make this data available to top management, make data access a major issue that will have to be addressed if executive support systems are to be effective.

Implementation Problems

Another major barrier to the effective development of ESS is the lack of a well-understood implementation process. Unlike the processes for implementing more traditional transaction processing or decision support systems, which are well documented, executive support implementation methodologies are not yet well understood.

Four reasons for implementation problems were frequently mentioned. First, ESS is a relatively new concept, and literature on the subject is still scarce. Second, each system must be designed to meet different needs, fit a unique culture, and draw from differently structured data bases. Third, each system is shaped by the management style of the user and requires a significant time investment from that user during the design stage and in actually learning to use the system. Finally, there is a tendency to draw upon old I/S development processes, which are actually counterproductive for implementing ESS. Evidence of the implementation problems can be found in comments made during the interviews: "We hope management will come back and tell us what they really need." "The CFO likes the system we gave him and says he wants 'more'. But he hasn't told us what 'more' means."

"It's not resistance. It's just that executives don't know yet how to use the system and what they can get out of it. Right now they are reluctant to use it, but once people get used to the system, it will spread like wildfire." "We developed a system, but the executives don't use it much." Why? "There are some cultural problems."

All of these statements are evidence of the confusion or ignorance that exists around the implementation process needed for executive support systems. I/S people, for the most part, have not previously been asked to develop information systems from a senior management perspective. And top management has not thoroughly considered what information will provide the most leverage for managing and thinking about the business.

One implementation hypothesis presented in previous studies (Rockart/Treacy, Levinson) received some backing in the survey. Although the numbers are small and the data subjective, 87 percent of the systems initiated by the executives themselves receive "moderate" to "high" use (Exhibit V). Only one-third of the systems "sold" to top management by I/S were in the "moderate" category. None received a "high" degree of use.

Hardware and Software Capabilities

Another barrier to ESS is the lack of hardware and software capabilities needed to handle the special requirements of an ESS. Vendors will often claim

that their software can meet the specs of systems designed to support top management, but user experience suggests otherwise. System components for an acceptable ESS are still hard to find and respondents' comments illustrate the problem:

"We don't have a delivery system that can synthesize and summarize data and hand the executive the information he needs. Finding software packages that can integrate data from many data bases is the biggest barrier to ESS."

"Our first project is to find a software package that will allow the company to get at financial data very flexibly on a PC or terminal."

"We won't have an ESS until we find a link to our mainframe financial data. Once that software is found and implemented, our executives will begin to use the system for decision support."

Never before has the technology been called on to be so integrated, so transparent and so fast. While much of the necessary hardware and software does exist, it is very difficult to find and implement the component pieces for a customized system that can suit the whims and needs of individual executives. As a result, the technology utilized frequently falls far short of user expectations. The flurry of companies, however, now addressing this issue -- Metaphor, Boeing EIS, Pilot Software, etc. -- suggests the presence of a significant marketplace and a possible solution for this problem.

Management Style

Data access and technical problems notwithstanding, the factor that ultimately separates ESS from all other management-oriented computer applications is the role "management style" plays in the design, development and use of an executive support system. It is the management style of individual executives, which dictates the use and non-use of computer terminals and the need for specific applications. Executives whose personal style calls for lots of face-to-face communication, while leaving analysis to their staffs, will continue to resist ESS. So will those who do not type and who fear being embarrassed by the computer. Said one I/S manager, "There are several executives here who would love to have an ESS, but they won't move because of their sensitive egos and fear of criticism."

A respondent at one high tech corporation said, "Our top management has little interest in ESS. They see no need to become terminal operators. At best they will become casual users."

At another firm, executive responses to a new ESS ranged from: "Train my secretary," to "I only want to have to push one button," to "I want the capabilities, but I don't have time to learn the system."

It is clear that a large number of senior executives, for many rational reasons, are not turning to terminal usage. Nor will they be pushed, said the

I/S manager at a forest products company. "If you think you can sell an executive by jamming the system down his throat, you are very wrong."

User Support

User support is clearly a critical factor in determining the success of the technology because it is essential for dealing with management resistance to ESS. Asked about the type of support currently provided for executives, 15 of 19 respondents listed "one-on-one" or "coaching" as the primary type of support provided. Sometimes this lesson is only learned through experience. An I/S manager commented, "We've relied on one executive vice president to use the computer, giving him very easy software packages. But he has just not used the spreadsheets on his own, as we thought he would. The support will have to be much more intense."

Security

Once executive support systems are in place, a new problem arises -- security. Security is a very big issue because of the sensitivity of the files (e.g., strategic plans, executive bonuses) created and accessed by users. Some firms have dealt with the problem head on. One company, for example, has three to five levels of passwords for ESS users. Other firms are feeling vaguely uneasy about the security issue, but are not sure what to do about it. "Because we have a centralized DP operation, there are lots of

concerns about localized PC applications and the resulting questions of security," said the director of corporate computing for a major engine manufacturer. "There's lots of talk and worry, but no action as yet."

The Future

Future plans for executive support systems in the corporations studied range from none to extensive. According to our interviews, 23 of the 30 firms that currently have some executive support systems in place intend to provide additional ESS capabilities. In addition, 3 of the 15 firms that are currently without any ESS have plans to initiate executive systems (see Exhibit VI).

Of the 30 firms that currently have some ESS activity, 18 continue to move ahead slowly in this area, while 5 corporations are "charging ahead" with ESS development. The future plans for 3 remain "in limbo," and 2 companies have no plans to expand their current ESS efforts. Not surprisingly, in the 5 companies where ESS development is "charging ahead," the systems received early and strong top management involvement and direction.

It appears that, with more than half of the respondents planning some type of additional ESS activity in the future, the use of computers by senior executives will continue to increase in the next few years. As with earlier generations of computer applications, however, the spread of ESS will not be uniform. Our understanding of these systems is primitive. Much more needs to

be learned about issues such as the effects of senior management style on ESS, the managerial tasks that are most appropriate for these systems, what comprises an effective implementation methodology, and -- perhaps most significantly -- the impact of these systems on the organization.

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EXHIBIT I
CAPABILITIES/USERS

RANGES OF USE

		ENTIRE CORPORATE/ DIVISIONAL OFFICE	A FEW USERS	AN INDIVIDUAL	TOTALS
<u>SYSTEM CAPABILITY</u>	OFFICE AUTOMATION	2	10	0	12
	STATUS ACCESS	2	9	2	13
	QUERY & ANALYSIS	1	10	3	14
	TOTALS	5	29	5	39

EXHIBIT II
CAPABILITIES/ARCHITECTURE

		<u>ARCHITECTURE</u>	
		NETWORKED*	STAND ALONE
<u>SYSTEM CAPABILITY</u>	OFFICE AUTOMATION	8	4
	STATUS ACCESS	13	0
	QUERY & ANALYSIS	5	9
	TOTALS	26	13

* This includes personal computers or terminals that are linked to mainframes, as well as PCs that are linked to other PCs

EXHIBIT III
DEGREE OF USE

DEGREE USED

		HIGH	MODERATE	LOW	DON'T KNOW/ DIDN'T COMMENT
SYSTEM CAPABILITY	OFFICE AUTOMATION	0	4	3	5
	STATUS ACCESS	0	5	2	6
	QUERY & ANALYSIS	3	5	1	5
	TOTALS	3	14	6	16

EXHIBIT IV
IMPACT OF USE ON THE ORGANIZATION

		<u>IMPACT</u>			
		EXTENSIVE	MODERATE	LOW	DON'T KNOW DIDN'T COMMENT
<u>SYSTEM CAPABILITY</u>	OFFICE AUTOMATION	0	5	4	3
	STATUS ACCESS	0	5	2	6
	QUERY & ANALYSIS	3	3	1	7
	TOTALS	3	13	7	16

EXHIBIT V
SYSTEM INITIATOR/DEGREE OF USE

		INITIATOR		
		I/S GENERATED	MGT-I/S COMBO	MGT GENERATED
<u>SYSTEM USE</u>	HIGH	0	0	3
	MODERATE	1	4	4
	LOW	2	0	1
	TOTALS	3	4	8

Note: The "N" here is 15 since the data necessary to determine who initiated the ESS and what its use has been was only available for 15 systems.

EXHIBIT VI
FUTURE ESS PLANS

		<u>PLANS</u>				
		CHARGING AHEAD	MOVING AHEAD SLOWLY	IN LIMBO	NO PLANS	INSUFFICIENT DATA
<u>SYSTEM CAPABILITY</u>	OFFICE AUTOMATION	0	2	1	1	1
	STATUS ACCESS	2	6	2	0	1
	QUERY & ANALYSIS	3	10	0	1	0
	NO ESS	1	2	0	10	2
	TOTALS	6	20	3	12	4

Note: In firms that had multiple systems or where systems had multiple capabilities, such as office automation and status access, future plans were recorded here only under the more advanced capability. Thus, the multiple systems or capabilities represented in Exhibit I-IV (totalling 39) are not counted here, and each firm is only represented once.

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