This article looks at how two offices changed their informal work relationships and patterns in response to a major technological innovation in their field. This inductive study involves a cross-case analysis with field studies covering a two-year period. The research applies the models suggested by social action theory to help explain outcomes. By the end of this study, one office had lost its funding and was eliminated, while the other has survived and grown. The article examines whether the differing organizational responses to new core technology were related to each office’s ability to survive.

The Effect of Technological Innovation on Organizational Structure
Two Case Studies of the Effects of the Introduction of a New Technology on Informal Organizational Structures

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In the late 1980s, archival and record-management offices—those offices that maintain, store, provide access to, and dispose of institutional records—found that the medium they managed was undergoing a fundamental technological shift from ink on paper to computer-based (hereafter referred to as electronic) records. The growing use of electronic records over traditional paper records has the potential for profound effects on organizational relationships in archival and record-management offices as it involves an “exogenous shock” (Tushman and Nelson), or significant change, to the work environment.1 The Advanced Institute for Government Archivists, convened in 1995 by the National Association of Government Archives and Records Administrators, said the change has “launched archivists on an uncharted journey.” They felt the change “compels a rethinking of basic assumptions about the purpose of...
archives and the methods used to accomplish that purpose” (Hedstrom 3).

My research focuses on two archives and record-management offices at publicly funded universities. These two offices reacted very differently to the widespread introduction of electronic records, and each has experienced different outcomes. One remains well funded, active, and growing (it recently moved into newer and larger offices), whereas the other has been eliminated. My particular interest in doing this work was to examine whether the differing organizational responses to this new technology might have, in fact, related to each office’s ability to survive.

Clearly, telecommunication and the emerging World Wide Web–based work environment have transformed record management. This increasing shift to electronic records has been the result of at least three developments. First, the rapid diffusion of personal computers and local and wide-area networks has given individuals the capability to create, access, manipulate, store, and communicate information on computers. The universities housing the offices I studied have thousands of World Wide Web and Intranet sites, advanced teleconferencing techniques, computer-based word processing, and a steady flow of e-mail messages. Electronic records are used in nearly all personnel actions as well as for procurement activities, class schedules, transcripts, admissions data, registration, and policy manuals. Second, the emergence of open-systems architectures has provided seamless communication across computer operating systems. Finally, the emergence of computer-supported cooperative work systems has enabled persons to collaborate and share resources over local and wide-area networks.

THE SOCIAL ACTION PERSPECTIVE

This research follows the model proposed by social action theory, sometimes referred to as “structuration theory” (Giddens). Anthony Giddens describes organizational structure, according to the social action perspective, as neither concrete nor situated in time and place. Rather, he suggests that organizational structure exists as an outcome of the interaction among human actors. Thus, to describe social systems as exhibiting structural properties that are produced and reproduced through the interaction of human actors is more appropriate
than to describe them as having structures (Barley). In this way, structure is both objective and subjective, emerging out of both the objective constraints of the institutional and technological environment and the subjective understandings and interactive activities of day-to-day organizational life. Similarly, Wanda Orlikowski and Daniel Robey (147) argue that structure has only "virtual" existence, which, like virtual memory in computers, does not have a physical existence but rather exists in action.

Thus, for social action theorists, the unit of analysis is the individual. Giddens argues for this approach and against using the institution or office as the independent variables, as is done with institutional and contingency theory. He reasons that "we should not conceive of the structures of domination built into social institutions as in some way grinding out 'docile bodies' who behave like the automata suggested by objectivist social science" (16). By downplaying or ignoring individuals and the unique social relations of the workplace, social action theorists contend, researchers miss out on the interactions and complex processes that occur when new technologies are brought to bear on the status quo. Consequently, much of the social action literature on technology and structure focuses on the changing social and power relations that technological innovation causes in organizations.

In charting their investigations into organizations, social action theorists begin by studying changes in the external social norms of the field and then exploring the environmental forces stemming from these modifications. I follow that research pattern in this study by first looking at the environment in which archivists work and then examining how archivists' jobs have changed since the media they work with shifted from print to computer based. When these environmental forces are played out in the workplace, social theorists contend that they give rise to a new stimulus—internal interactions among players—that further molds informal structures and actions. These interactions are the focus of the case studies described in this article. The discussion ends with a set of propositions that summarize my understanding of the cases and the ways in which informal structures evolved or failed to endure. My research asks the following question: What is distinctive about informal management structures for handling electronic records and overseeing their management and disposition as compared with those structures required for more traditional, paper-based records?
METHODOLOGY

Most of the fieldwork for this study of organizational structure and change was completed as part of my doctoral dissertation research. The cross-case study analysis involved open-ended and focused interviews, nonparticipant observation, and an examination of relevant records. Case-study research of this type differs from other more quantitative techniques as it explores, in their natural settings, situations, organizations, whole environments, and cultures. The cross-case analysis, as it was done here, first analyzed why one office of archives and record management apparently failed in its efforts to cope with a new technology. Next, a more intensive analysis was done on a second, more successful office of archives and record management, comparing and contrasting how it responded to the same technological innovation.

The more intensive fieldwork at the successful office of archives and record management was completed in two phases, with most of the on-site work completed during the summers of 1996 and 1998. The overall process for doing this analysis is shown in Figure 1.

The first phase involved a pilot set of interviews and nonparticipant observations as well as an extensive literature review on the subject of technology and organizational change. Following the initial fieldwork, categories or sets of relations were considered, followed by
an extrapolation to patterns. Finally, themes, or groupings, that fit the issues considered important by social theorists were developed. These themes and patterns were then tested and refined in the second phase of the on-site research, which involved more-focused interviews and observations testing the initial themes (verification, refutation) as well as further content analysis (explication). Appendixes A and B summarize the specific data-collection methods used during the fieldwork. (For an in-depth discussion of this methodology, see Creswell.)

CASE DISCUSSION

In the discussion that follows, emphasis is placed on management issues that exhibit social action’s interest in interactions among key players. To ensure confidentiality, names are not used, and the universities are referred to only as Campus A and Campus B. Both universities are large, structurally complex, publicly funded institutions located in the Northeast. They are among the largest and most diverse multicampus institutions of higher education in the nation, with campuses located throughout their respective states and with budgets exceeding one billion dollars each. The project was reviewed and approved by the SUNY Albany Institutional Review Board. A standard ethics protocol was read and explained to all participants prior to the start of interviews or observations. Participants signed the document prior to taking part in the study and were offered a copy for their records.

Campus A

The university archives director at Campus A learned the hard way that he could not passively wait until electronic records were handed over to his office for long-term retention and access. A study of the records at Campus A, funded with a National Historical Publication and Records Commission grant, found that more than 90% of the data sets lacked adequate documentation, thus making archival appraisal impossible. The study involved hiring an independent data archivist who appraised records representing data from 14 different university offices. The data sets studied included information of the most critical nature to the university: business services, student information, financial data, facilities/property inventory, budget opera-
tions, and planning. The records dated from the 1960s to the start of the appraisal project in September 1990.

Over the course of the study, the data archivist studied tapes for reliability, obtained sample dumps, and verified the data by comparing it to available documentation. Of the almost 4,000 online data sets studied, less than 1% were still readable with current computing technologies. Most of those records were still available as hard-copy printouts. But if the university were ever going to depend solely on online records, archives would have to respond to the issue of how to adequately maintain and preserve electronic records of potential historical and legal importance.

In response to the report, the university archives director would begin this effort by intensifying online record management in his office and by reaching out to relevant and important offices and departments around the university. He also began taking advantage of a new budget-management system that rewarded record-management efficiencies throughout the university system.

Changes to the staff, formation of new alliances. The director’s first move to correct this problem was to add the function of electronic-record management to the archives office. The placement of the electronic-record manager in the archives office was a departure from common practice in which record management is housed in an administrative program such as personnel or general services or in the president’s office. His second action was taking on a major role in the newly appointed university-wide Imaging Committee. This committee, composed of mostly senior administrators, was chosen to review current and new record-management technologies and techniques.

Changes in day-to-day communication through the use of advanced technologies have also had a major impact on how Campus A has been able to make allies at all levels of the organizational chart. The archives office at Campus A now communicates regularly with information officers around the statewide campuses through e-mail, a state-of-the-art teleconferencing system, and postings on the officers’ Web sites. Moreover, the university archives director has built a network of alliances during his lengthy service as archivist and from his experiences on campus as a full-time faculty member, chair of the university’s personnel committee, teacher, and former graduate student.

In addition, the record manager at Campus A has developed allies for archives, in large part by hosting the annual National Record Man-
agement Day, which actually involves not just a day but a week of activities. The activities are preceded by a media blitz, with a major article in the campus newspaper, e-mails to data managers, printed memos, and announcements at staff meetings. The event includes one-hour orientation seminars, workshops, and one-on-one meetings with record managers and staff throughout the university.

The rest of the year, the record manager maintains and adds to her alliances by sending messages throughout the campus community via e-mail and the campus Intranet. She announces seminars and open workshops and sends reminders regarding electronic-record management issues. In four years, she has led more than 200 record-management sessions, mostly on-site, with nearly every data steward at the university, from top-level administrators to summer clerical help. Every office at Campus A now takes part in a workshop or seminar at least once every three years. The record manager follows up on these workshops and seminars through e-mail discussions and one-on-one visits at offices as needed.

These actions fit with social action’s view that the indirect effects on sociotechnical systems account for the most variances in response to innovation. These variances include the restructuring of work activities through development of workshops and changes in the organizational climate, creation of communication networks, and, in particular, shifts in supervisory and leadership patterns (see Hulin and Roznowski; Liu et al.).

Changes to the budgetary process. A change in budgeting procedures at Campus A has made obtaining and disbursing funds a key method for developing alliances outside of the normal organizational hierarchy. According to library administrators, in the past, the highest level of administration allocated 80% of the university budget, while each office at the university disbursed only the remaining 20% of funds. Thus, administrators had made many of the budgeting decisions for offices. That changed when a state-of-the-art computerized fiscal-management system was put in place, and individual agencies were given direct control of most of their budget. This change meant agencies had incentives to work with archives, not because the bureaucracy required it but because it made economic sense. The archives office’s skills and awareness of electronic issues were already known to most agencies through their well-attended workshops and the director’s carefully honed network. Now, economic expediency
made following archives’ advice sensible for reducing record-management costs in personnel and warehousing expense.

The decentralization of the budget-disbursement process was due in part to the availability of a new technology, in part the result of a decision at the highest levels to modify budget management and in part the result of changing times. The changing times included a rapidly changing technological environment wherein both hardware and software were becoming nearly obsolete before traditional decision-support systems could provide answers and before procurement requests could be approved. Technical decisions had to be made quickly by those closest to the issue, and archives had positioned itself to be the group to turn to for help. Michel Liu and colleagues referred to this trend toward decentralization during times of change as “organizing to regulate the unpredictable variances of complex, automated systems” (12). Under the new budgeting paradigm, the archives office and its clients could respond much more quickly to changing technologies.

Campus B

The archives office at Campus B chose an approach to handling electronic records that was very different from Campus A’s. Instead of working with groups throughout the university system, the archives office chose to work with a small group of mostly external experts on developing an electronic-record policy. It chose to work on a very small but critical set of electronic records to be used as test cases for a larger policy. These test cases were largely confined to administrative concerns at the university. The next two sections review this focused strategy and its consequences.

Limited Approach. The office allocated most of its internal budget resources as well as a $130,000 national grant for drawing up a conceptual plan for handling electronic records. The funds were largely used to hire a small staff and pay faculty to run pilot record-management projects and formulate policy. The archives office director also appointed an advisory board composed of national experts in the field of electronic-record management. Only two persons within the university hierarchy—a campus personnel director and a campus information resources vice president—were on that board. According to its mission statement, the advisory board’s stated objective was “to re-
view research designs, work plans, and concepts, drafts of interim and final project reports, drafts of potential records and archival policies and guidelines developed for electronic records, and drafts of reports. The board met quarterly and helped oversee the development of the major product of the office of archives during this period—a policy for handling electronic records.

Prior to developing the records policy, the archive staff spent most of its time studying how to convert important university materials—its university procedure’s manual and its payroll records—so they could be accessed, searched, and altered online. The director, staff, and the advisory board hoped the experience with these materials would help the office develop a more widespread electronic-record management policy. The director felt that if her office could develop methods for the university to come to grips with the management and policy concerns surrounding electronic records, it might build a solid base of support for its larger archives and record-management mission.

Limited Support. Partly because of these strategies and partly because of her own background, the director of archives developed few alliances with individuals on the member campuses. The director was a career bureaucrat with more than 20 years of experience in administrative positions at the university but little experience on the campuses. She was not a faculty member and was not on any academic committees. She had no formal archival training and thus could not be approached personally for expert opinion on matters relating to archives. Despite these limitations, she was selected for the position for several reasons: Her appointment required no new salary line, only a reworking of the organizational hierarchy and a change in her title and job description; she was a well-known quantity as a university administrator, having worked as an assistant to the executive vice chancellor for more than 17 years; and her experience gave her first-hand knowledge of what events had been critical in the university’s history, how those events had evolved, and what records relevant to those activities needed to be managed and archived.

The office suffered a number of internal and external staffing and management problems over which the director had little control. Shortly after the archives office was created, the senior vice chancellor to whom it reported retired, and the office then reported directly to the chancellor’s office. Internally, about a year after the electronic-records project got under way, two temporary-project staff
members left archives for permanent employment elsewhere. As a result, the office was reduced to a regular staff of only one person in addition to the director. Whether these problems were exacerbated by archives’ already limited support among the academic campuses and whether staff left because they were concerned about the office’s chances for surviving long term are uncertain. In-depth interviews with these two temporary staff members indicated their concern about the support and survival of the archives office.

The office was effectively eliminated when its director opted for early retirement. Although she stayed on to finish the electronic-records appraisal project, no successor to her position was ever named, and the office was effectively eliminated in the 1995-96 fiscal year.

**Analysis of Spatial Dispersion at Both Campuses**

Where offices are physically located can have a significant impact on the development of informal relationships (Hall). The physical location, referred to by Hall as “spatial dispersion,” of the archives office at Campus A is in sharp contrast with that of the archives office at Campus B. Campus A’s archives office is prominently located to facilitate regular access to and interactions with constituents, whereas Campus B’s archives office was largely isolated from those it was meant to serve.

Campus A’s archives is located in the library near the geographic center of the main campus. The office is in walking distance to many university schools and offices as well as the main administrative building where the president’s office and public relations office are located. The library is a focal point on campus, visited regularly by thousands of students, faculty, staff, and administrators. Archives is among the first offices one sees when entering the library’s main entrance. Many visitors, on their way to the library stacks, stop by a small museum-quality exhibit area that is maintained and staffed by archives, further enhancing its visibility. Archives is also an important resource to the university community because it is a repository for and provides access to faculty-authored books and manuscripts, back issues of university and student periodicals, and university-related photographs, films, and sports footage. The exhibit area is sometimes open on Saturdays, after home football games, when many alumni and students drop by. Archives works closely with and is physically adjacent to the Special Collections rooms, which are popular with
researchers. The main administration building, which is also on the main campus, is less than one-half mile away. Parking is abundant and convenient, and buses run continually between the academic buildings and the library.

In contrast, Campus B’s office was housed on a secluded administrative complex far from most of the academic campuses and not part of any library. The office was on the 10th floor of “the tower,” as it is sometimes referred to, because it is a turreted, vaulted structure located in the center of a series of administration buildings that look much like a feudal castle. Visitors must park in a costly garage in a downtown area and walk through a maze of buildings past a number of elevators to get to the archives office. Campus B has no single campus that dominates the system, as does Campus A. It is a physically dispersed university system with a number of university centers scattered around the state. The closest academic campus was about 2 miles from archives, whereas others were up to 250 miles away. Thus, the office existed without ever being seen or visited by the vast majority of faculty, staff, and local administrators on the campuses it was meant to serve. Clearly, the Campus B archives office was much less likely to develop alliances when its constituency was physically distant. In contrast, the Campus A archives office was a well-known entity, encouraged at least in part by its physical proximity to its constituency.

Building Relationships with the Registrar and the Graduate Studies Office at Campus A

The alliance-building techniques used by the archives office at Campus A since electronic-record management became important are illustrated in its interactions with two key offices at the university: the registrar and graduate studies. Because no such alliance-building process took place at the archives office at Campus B, this discussion looks only at Campus A. Campus A’s archives office interaction with the registrar is a clear example of alliance building. Its interactions with the graduate studies are more of an illustration of the importance of a new budgeting-management system that allows an office to leapfrog normal bureaucratic hierarchies to interact directly with archives.

The registrar. The registrar’s online access system at Campus A included millions of critical records ranging from student transcripts to
current students’ records of progress toward a degree. Yet, despite the use of an online system for active records, the registrar was still using paper-based output for archival purposes. In 1997, the registrar decided he had to get out of the business of buying, organizing, filing, and accessing hard-copy folders in favor of a system that could be maintained exclusively online. He did not have to look far for help. Less than a quarter mile up the road was the archives office, which was more than willing to provide expertise.

The registrar and the archives director knew each other for several years having worked together on the Imaging Committee. The registrar’s office had learned about archives’ expertise regarding online records after taking part in several record-management workshops. After initial consultations with the registrar about the need to develop an online system that could be used for archival and legal purposes, the record manager reviewed the registrar’s electronic-records systems. She determined ways the office could streamline its system, noting, for instance, that students were required to enter the same data up to 65 times in a single set of online forms. She recommended a new method in which such redundancy was eliminated. Information was entered once and automatically cascaded throughout the forms. After checking with the school’s policy manual and legal counsel, the record manager determined that information about students who were accepted but who never matriculated could be legally removed from the system after six months. Many other records that were determined to be of no archival value could be deleted after three years. “They [archives’ staff] have become the experts we rely on,” said the registrar. “Without a doubt, we have more interaction with archives than before we went online.”

The archives office benefits directly from the changes to the registrar’s system and the alliances it has developed. Registrar’s files that are appraised as archival are now downloaded on cassette and turned over to the management of the archives office. As new generations of technology come into regular use, archives reviews the formats and retrievability of the records it has saved. The office refreshes data as needed so they will be compatible with the latest software and hardware. The cycle for long-term retention is in place and appears, thus far, to be working. Moreover, as the system changes, the registrar confers with the record manager.

The graduate studies office. A short walk from archives is the graduate studies office for the university system. In the early 1990s, the
graduate studies director had a record-management dilemma. His file room was packed floor to ceiling with student files, which included applications, transcripts, letters of recommendation, memos admitting doctoral students to candidacy, and accepted thesis proposals. Each time a new student was admitted, a new file had to be created and added to as the student proceeded through the system, which could take as long as 20 years. With more than 150 graduate programs, correspondence alone was filling up several boxes weekly. Two full-time file clerks and a number of temporary workers were needed to keep up with the unending flow of paper documents. Consequently, as more boxes were filled and the amount of material grew, finding information became more and more difficult.

Two related developments put even more pressure on the director to resolve this problem. New budget-management software was put in place providing the university with an opportunity to transfer more fiscal authority to each office. As a result, the graduate studies office became its own cost center, with responsibility for managing its own budget. At the same time, the university was undergoing a major cost-cutting program, and each cost center was told to cut 30% over three years.

The new online budget-management program verified what the graduate studies director suspected: His record-management budget was spiraling out of control. Previously, he had to work through the university’s computing purchasing unit for approval and upper management for funding. Now, he could make the funding decision himself, and for expertise he turned to record management in archives. The director had met the record manager from the record-management workshops, and he knew the archives director from their membership on the Imaging Committee. Whereas the computing purchasing office had general knowledge about computers, archives knew record-management issues and had evaluated relevant software.

Graduate studies initially chose a record-management system different from the one recommended by the archives office. When graduate studies made its initial decision to invest in an imaging system, it was the lone office on campus using this relatively new technology. However, as other offices on campus began investing in imaging software and hardware that was recommended by archives, graduate studies found itself with a system that could not interface with others on campus and that lacked campus technical support. Now, the graduate studies office is converting its files using the hardware and soft-
ware recommended by archives and the Imaging Committee and that have become an ad hoc standard on campus.

CONCLUSION

Giddens and other social action theorists contend that to understand an organization’s response to innovation, we must look at leaders and teams and the way they succeed or fail to adapt. In doing so, this case analysis found that the successful archives office responded to change with management strategies that included decentralization of authority, alliance building, use of a state-of-the-art budget-management system, and boundary-spanning management techniques. It placed value on and used physical proximity to its constituents. By moving power and control away from upper management and allowing micromanagement of budgets, the archives office at Campus A could exert control by a carefully reasoned argument that better record management leads to efficiencies and cost savings. Thus, alliance building was based on expertise and trust rather than organizationally defined hierarchical arrangements or predefined formal procedures.

The opportunity for workers to increase their authority through the use of technology and boundary-spanning management is a common thread in the social action literature. Shoshanna Zuboff describes how a new expense-tracking system provided an opportunity for machine operators to take on a greater role in production (260). One of the themes most frequently repeated in conversations with the operators, Zuboff notes, concerned how the tracking system permitted them to enhance their expert authority. Similarly, when archives was able to show the registrar and graduate studies how to save money by using certain electronic-record-management technologies, it increased its role on campus.

My cross-case analysis found that technology itself played an important role in promoting shifts in informal management structures. On Campus A, these shifts included

- a state-of-the-art budget-management system that takes control of budgetary decisions away from upper management and gives it to each office at the university,
- extensive use of e-mail and teleconferencing systems for sharing information and announcing record-management workshops, and
• the need for standards in computing systems to accommodate open-systems architectures, cost savings through volume purchasing, and in-house technical support. Such standards were developed by the campuswide Imaging Committee, of which archives was a part. Archives benefited from such a standard by becoming knowledgeable in the system’s use and by promoting and explaining it at its workshops and seminars.

Furthermore, the speed at which new technologies supplanted old, along with the expertise that the record manager had developed regarding electronic records, helped make archives a valued ally on Campus A.

The following propositions that have emerged from this study provide opportunities for future research and testing using both quantitative and qualitative methodologies:

**Proposition 1:** As innovation takes hold in an organization, successful organizations that are most directly involved develop new informal structural alliances that cross formal hierarchy. These alliances grow through the use of boundary-spanning management techniques such as scheduled and unscheduled meetings, workshops, consultations, and memberships on key committees.

The archives office at Campus A extended its reach among its constituents by direct contact with other offices, ad hoc and permanent committee memberships, workshops, consultations, and one-day seminars. Archives developed what is referred to as “network centrality” (Krackhardt 342) as key individuals on campus came to it for advice and information. A period of alliance building follows. The result is a flatter, more decentralized and informal organizational structure and a more democratic working environment based on knowledge rather than formal hierarchical positioning.

Workshops run by the Campus A archives office, involving nearly every group at the university, have become regular events on campus. Campus A archives logs more than 200 consultations annually involving both formal and informal face-to-face meetings. The archives director’s membership on key committees gives him direct access to senior managers of information technology around the campus.

In contrast, Campus B’s archives office made few attempts to build alliances on its member campuses in response to electronic-record
management concerns. Its director appointed an advisory board to oversee an electronic-record strategy, which included only two persons who were within the university hierarchy. It chose to focus its resources on the more theoretical issues of electronic record management and limited its consultations to nearby administrative offices. The board oversaw the development and publication of guidelines for the management and preservation of electronic records. But the archives office was dissolved before it could distribute or help oversee the use of the guidelines at its member campuses.

The focus at both archives offices was very different. Most critically, the archives office at Campus A focused on management strategies, whereas the archives office at Campus B focused on more theoretical issues. Social action researchers consider management concerns to be far more critical in dealing with an exogenous shock (Orlikowski and Robey). Thus, although Campuses A and B both faced an identical change in their core technology, only Campus A developed a clear management strategy, choosing decentralization of authority, alliance building, and boundary-spanning management techniques as its response to change.

This flatter, boundary-spanning informal work pattern fits with that found in other successful organizations dealing with new technologies. In 1993, T. K. Bikson and E. J. Frinking studied 20 Dutch organizations and government agencies in Canada, the United States, Germany, and Sweden all involved with the management of electronic records. They found many of the linking mechanisms and boundary-spanning management strategies used by the archives office at Campus A. In particular, they documented closer cooperation between record-management staff and information-system and technology experts (30). Recent social action studies conclude that corporations facing technological change should have structures that encourage frequent lateral communication between individuals and offices, decentralization of leadership and control, and free-flowing communication, or boundary-spanning structures (e.g., Van de Ven; Howell and Higgins; Eisenhardt and Tabrizi).

Proposition 2: In the period that follows the introduction of new technologies, decision-making and day-to-day activities tend to be loosely coupled with formal organizational structures and largely disconnected from the direct control and supervision of upper management.
Because of a modern communication and budgeting infrastructure, archives at Campus A is finding itself less directed and controlled by formal structure and more influenced by the needs of constituent groups. Where Campus B worked within the defined hierarchy, Campus A extended its reach across it. This property, in which organizational units have low levels of vertical interdependence, is what Karl Weick and others have referred to as “loosely coupled.” These types of organizations tend to be more flexible and responsive to environmental pressures. As a result, formal structure becomes somewhat disconnected from day-to-day decision making. This freedom is especially useful in the uncertain times of new technologies as it allows for a great deal of adaptation and change within formal structures without overtly disrupting them.

Having Campus A archives take on a central role in the area of electronic records was no small feat in an environment in which electronic records played such a significant role in nearly all administrative functions. The online student and business information systems alone consisted of millions of records accessible from all university campuses. The university was using the World Wide Web, another form of electronic record, in nearly all aspects of teaching and in university functions ranging from admissions to distributing news releases. The university reference utility was an online Intranet utility that contained many of the critical university policy manuals. Archives found itself strategically placed by actively confronting the issue of management of these essential records.

Although one cannot say definitively what caused Campus B’s archives to lose its funding, its lack of alliances across the university, its singular mission to develop an electronic records policy, and the director’s administrative background and focus on administrative units clearly left it vulnerable at a time of budgetary cutbacks. The director’s lack of access to a wide range of officers at the university and its isolated location separated it from groups that might best support it. In contrast, Campus A has shown a method for using a new technology for garnering resources, building alliances, and making itself a necessary office on campus. It is now fully funded and staffed and is about to move into new offices, also centrally located, in a new addition to the main library.
APPENDIX A
Campus A Research Methods

Interviews—Total of 24 open-ended interviews with some focused question (496 pages of typed transcripts)

<table>
<thead>
<tr>
<th>Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal informants</td>
<td>Conducted five open-ended interviews with archivists</td>
</tr>
<tr>
<td>Key players</td>
<td>Conducted 19 open-ended and focused interviews with administrators, librarians, business officers, technical support staff, faculty, and students at the schools</td>
</tr>
</tbody>
</table>

Nonparticipant Observations

<table>
<thead>
<tr>
<th>Location</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archives</td>
<td>Attended staff meetings</td>
</tr>
<tr>
<td>Branch</td>
<td>Visited and toured four campuses over two summers and sporadically over two fall and two spring semesters</td>
</tr>
<tr>
<td>Main campus and branch campuses</td>
<td>Studied buildings, libraries, offices, campus markers, murals, museum, computing centers</td>
</tr>
<tr>
<td></td>
<td>Studied sculptures, construction sites, use of trailers</td>
</tr>
<tr>
<td></td>
<td>Studied offices before, during, and after interviews</td>
</tr>
</tbody>
</table>

Archival research: Mostly biographies of leaders and statistical information about the university, also historical information and description of technologies

<table>
<thead>
<tr>
<th>Location</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>On site at central campus</td>
<td>Reviewed literature from the campuses: descriptions of courses, history of campus, description of the land-grant origins of the school, and titles of officers</td>
</tr>
<tr>
<td>Library</td>
<td>Collected campus newsletters, university press releases, alumni archives magazine, organizational charts</td>
</tr>
<tr>
<td>Public info offices</td>
<td>Collected posters, trustees’ minutes, press releases, annual reports</td>
</tr>
<tr>
<td>Formal studies and surveys</td>
<td>Collected faculty surveys of changes, surveys of alumni, evaluations of fund-raising</td>
</tr>
<tr>
<td>Branch</td>
<td>Collected official literature, course listings; visited computer campuses centers</td>
</tr>
</tbody>
</table>
Computer-Based Research

<table>
<thead>
<tr>
<th>System</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate school imaging system</td>
<td>Studied maintenance of graduate school records. Viewed the imaging operation of the system, including searching, accessing, and viewing graduate student records</td>
</tr>
<tr>
<td>Databases</td>
<td>Studied online transcript system, personnel, registration, student grade access, official policies statements</td>
</tr>
<tr>
<td>WWW sites</td>
<td>Analyzed library and campus sites, faculty sites, Intranet sites</td>
</tr>
</tbody>
</table>

APPENDIX B

Data-Collection Matrix: Type of Information

Collected at Campus A by Source

<table>
<thead>
<tr>
<th>Source</th>
<th>Interviews</th>
<th>Documents</th>
<th>Observations</th>
<th>Web Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archives personnel</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Library administrators</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Central administrators</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Campus officials</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Record managers</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Webmasters</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Data security experts</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Computer specialists</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

NOTE

1. The research disaggregates large-scale technological changes into two types: “competence enhancing” and “competence destroying” (Tushman and Nelson 1-8; Orlikowski and Robey 143-69). Whereas competence-enhancing changes build on existing know-how embodied in the technology they replace, competence-destroying changes render obsolete the expertise required to master the technology that they replace. The skills and knowledge base required to transform inputs into outputs fundamentally shift. Although services may change in response to many types of technological changes, the process by which services are rendered must change for technological changes to be considered competence destroying and thus exogenous shocks.
REFERENCES

Kahn, Russell. The Effect of Technological Innovation on Organizational Structure: A Dissertation. Ann Arbor, MI: UMI Microform 9922249, 1999. [NOT IN TEXT. OK TO DELETE?]

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