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reservation: Maintaining Information for the Future

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Preserve: "to keep up, carry on; maintain" and "to save" —Webster's New World Dictionary.

**ELECTRONIC
STORAGE OF DATA
ALLOWS RESEARCH
TO BE CONDUCTED
IN NEW AND
EXCITING WAYS,**

but it also brings a new level of preservation concerns to archivists. This article chronicles the history of preservation activities at ICPSR and describes different approaches to the preservation of digital data.

Introduction

The past several decades have witnessed a rapid proliferation of electronic records generated by all segments of society, public and private. This dramatic growth in records, along with the development of the Internet as a quick, economic, and simple vehicle for access, present this and future generations with a richness of informational resources and ease of access only dreamed of 20 to 30 years ago. This phenomenon offers this and future generations the opportunity to create and to leave as a legacy some of the most completely documented societies in the history of the human race. Theoretically, future scholars researching this era both now and hundreds of years hence will have access to records that document all aspects of our public and private lives. However, unless those responsible for identifying,

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storing, and maintaining these records, along with those associated with the process, proceed with care and dedication we could lose much of this information because the records were not maintained and preserved accurately or in a timely fashion.

The steady flow of data coming from all sectors of society is partly a product of the electronic age in which we live and a society more and more accustomed to (although not always at ease with) the routine collection, documenting, and distribution of diverse information about itself. Records being created internally by private and private organizations are increasingly becoming available for potential archiving. Scholars who study these phenomena collect additional data that offer more opportunity for secondary analysis. What to archive and what to ignore in this wealth of information is one issue. But that in fact is only a part of the process. After determining what information to “save” (i.e., archive or preserve), the archivist is subsequently responsible for storing this information and keeping it complete, documented, and accessible well into the future.

While there is usually a great deal of concern and discussion given to which records to accession and archive and which to ignore, the processes that follow in the archival flow, including the subsequent maintenance of these materials, have not had the attention and discussion that they merit. For some archives, such as the National Archives and Records Administration, archivists guided by traditional appraisal criteria determine which

records should be archived. Other archives have missions requiring that they focus on a specific subset of materials, such as those in a selected subject area, given time periods, or certain events or individuals. In either case, less formal attention has normally been devoted to the maintenance and preservation of information already in an archive than is paid to what to initially acquire. Only a crisis temporarily raises awareness when certain valuable materials are at risk, but the attention quickly wanes. The sense is that once the information has been archived all is well, and the records will remain safe and secure for years to come. This has been normally true with paper documents and, to a large extent, in the earlier years of archiving of electronic materials. Although electronic materials have always been seen as requiring special handling and as having more or less ongoing maintenance requirements, the relative stability in the technological environment through the mid- and late-1980s masked many of the issues here.

The rapid change in technology in the last decade or so has led many archivists to start sounding the alarm regarding the need to deal with the growing and increasingly complex preservation issues looming for electronic data. If we are not to lose some of the most valuable electronic resources already in our archives, we must face these issues and act upon them. We need to recognize the importance of not only accessioning information still not in the archives, but also preserving records already in the holdings.

Accordingly, this article discusses the issue of preservation in the electronic archival process and some of the challenges that preservation presents to the electronic records archivist. Preservation issues are addressed within the context of both the past experiences of ICPSR and some of the preservation challenges the organization faces in the future.

History of ICPSR

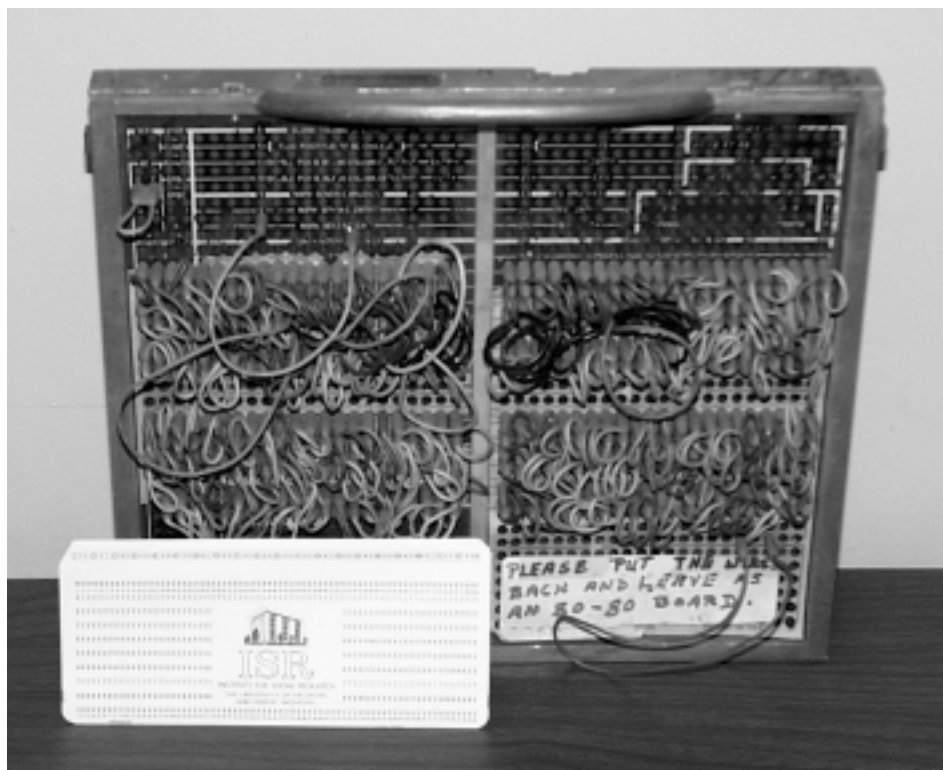
The Inter-university Consortium for Political Research (“Social” was added in 1976) was formed in 1962 as a membership-based organization to archive computer-based political science research data. Twenty-one major research universities around the country became the first members, and the archive was housed in the Institute for Social Research at the University of Michigan.¹ The organization now archives electronic information relating to the broad spectrum of the social and behavioral sciences and has over 500 member institutions from all parts of the world. Additionally it makes this information available to thousands of other institutions both nationally and internationally.

The founders of the Consortium were foresighted scholars who were becoming increasingly concerned about the need to find a mechanism whereby the growing amount of quantitative data being collected by political scientists and stored on punch cards in various offices scattered around the country could be saved, stored, and centrally distributed. Once the original investigator analyzed the data, the

collection still remained a rich source of information that had not been tapped. By storing and making these data available to other researchers, the wealth of information that each study contained could be further exploited.

The first *ICPR Annual Report* for 1962–1963 notes that there were 21 collections in the holdings with several more on the list of future

the archival data were backed up on storage decks of punch cards, when magnetic tapes came into existence the archival copies were moved from punch cards to magnetic tapes. Magnetic tapes remained both storage and distribution media for the next 20–25 years. Today archival holdings are routinely downloaded by users directly from the ICPSR Web site.



Circuit board used to “instruct” the punch card reproducer, used from the 1940s through the 1960s, along with a sample punch card.

acquisitions.² At that time, the data were deposited with the Consortium on punch cards. In turn the staff provided the data to researchers on punch cards and with paper documentation. In a year or two, the staff was shipping data to users on either magnetic seven-track tape or on punch cards. By the beginning of the 1970s, data were transmitted to users either on seven-track or nine-track magnetic tapes. While initially

ICPSR's holdings have grown from the first 20 or so unique files of information to over 50,000.³ The first data collections deposited in the holdings continue to be routinely downloaded by scholars. In order for these collections to remain accessible to users for the past 40 years, they have had to be maintained and preserved by the ICPSR staff.

Approaches to Preservation

There remains a lack of agreement as to what preservation of electronic information means and how best to proceed with the various processes that constitute preservation.⁴ Unlike the documents, paintings, and similar materials that have been archived in the past and which can remain viable over decades and centuries, electronic records can become inaccessible and useless in a matter of a few years. This is a function of the nature of the media and reflects the rapid turnover in computer technology that we have witnessed in recent years. Compatible hardware and software are necessary to properly access and analyze electronic records and both are relatively unstable. Even though magnetic tapes that were written 30 years ago may still be in good condition and retain the data stored on them, there may no longer be hardware or software readily available to successfully read them.

For ICPSR, preservation of electronic records such as those in its holdings consists of assuring that the information remains accessible, complete, uncorrupted, and usable over time. Since the Consortium is foremost an archive of machine-readable data,⁵ this refers to those processes that not only keep this information on viable storage media but also permit researchers to repeatedly access and successfully use the materials. While there are other preservation techniques for electronic materials, ICPSR has consistently employed two techniques to keep its data holdings viable and considers both integral

parts of its preservation strategy: migration and conversion.

Migration

Migration refers to the copying or transfer of data from one storage medium to another without any corruption or loss of information in the process. Checks are employed to assure that the copies were completed without any errors or modification of the contents of the records. There is no additional processing if the copying process is successful.

For the first three-quarters of the Consortium's existence, migration worked successfully as a preservation technique. This was primarily a function of the fact that for most of that period, there was little proliferation of hardware and software, unlike what currently exists and will continue into the foreseeable future. During this period technological changes involved increases in computing power, capacity, and speed, but the fundamentals of the hardware and software specifications continued without dramatic changes. During this time, the environment was mainframe and the standards were mainly driven by the fact that IBM dominated the mainframe and all other peripheral markets. Consequently, there was relatively smooth movement from one medium to another as they became available, and this happened without dramatic impact upon the method of storage or the internal contents of the records.

Once data were transferred from the punch cards, magnetic tapes became the main storage and

distribution medium and remained so for almost a quarter of a century. The first magnetic tapes were seven-track tapes that initially were written at 200 or 556 bytes per inch (b.p.i.), eventually moving to 800 b.p.i. When nine-track tapes arrived relatively soon after the introduction of the seven-track tapes, the Consortium copied files from the seven-track tapes to the nine-track tapes. The amount of information that could be stored on these tapes increased, and at the same time the records were kept

nant hardware and software manufacturer standard. Consequently, compatibilities among systems and across generations of software were such that users could move from one system to the other and copy their data from one to the other with relative ease and without loss of information in the process. This subsequently changed when other successful vendors arrived on the scene.

ICPSR also archived all security copies on nine-track tapes. As the



Working with magnetic data storage tapes.

viable as they were moved to the next level of technology. Although it may not have seemed that way at the time, this migration was more straightforward than what was to come in the future. As noted above, a major factor that made this operation simpler in the earlier years was that there was a single domi-

nant hardware and software manufacturer standard. Consequently, compatibilities among systems and across generations of software were such that users could move from one system to the other and copy their data from one to the other with relative ease and without loss of information in the process. This subsequently changed when other successful vendors arrived on the scene.

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magnetic tape capacity and the Consortium's move to the newer tape specifications had an added benefit: the records were also preserved during that process.

The staff was able to store the growing volume of electronic information on a relatively smaller inventory of tapes, since the capacity of the tapes kept increasing. What made this effort somewhat less painful was that while the capacity of the tapes grew, the other technical specifications remained fairly stable. Software continued to read the existing data formats, which also remained relatively constant, if uninspiring. There were limited numbers of technical platforms from which to choose. Consequently, it was relatively easy to provide most users with data that were readable on their local mainframes. During this time, however, users had to do much more processing of the information before analysis could begin.

ICPSR completed one of its largest migration projects in the mid-1990s when there was a final move away from the mainframe system at the University of Michigan, and when electronic file transfer became the preferred mode of data transfer. This involved going from an EBCDIC-based environment to a Unix-based ASCII server for all Consortium distribution files. To complete the move, data and all accompanying machine-readable support files were copied to magnetic tapes and transferred to optical disks on the server. Every file was run through internally-developed checks to ascertain whether the copying process created any

problems. This foundation underlies the current Internet data distribution system.

The file transfer to the Unix system was satisfactory for all but about 1 percent of the holdings. Those collections involved special EBCDIC-based formats that did not transfer easily to the Unix-based environment. The main reason for the small percentage of files not making a full migration from the mainframe to the Unix system was that many of the collections in the holdings with special formats were available in both a standard textual format and the special format. In those instances, the textual format readily transferred from one system to the other without complications. The files that presented problems and were not available in any other format were identified, and the staff then proceeded to evaluate the difficulties and develop other solutions.

During this time, any remaining nine-track tapes in the archival storage library were recopied to 3480 cartridges with similar checks employed to guard against any corruption arising from the copying process. The copying of nine-track tapes to 3480 cartridge tapes overall went smoothly, producing few problems. Currently, all incoming and newly processed archival and backup files are stored on digital linear tapes.

Conversion

As the technological landscape became more complicated both in the software and hardware areas, these developments brought with them changes that made copying of

data from one medium to another without the risk of corrupting the records more problematic. Information now comes into the holdings in a variety of formats, including system files tied to proprietary software packages. While these formats are frequently easier and less time-consuming for users, ultimately they will render the files much more difficult or impossible to work with. This is especially true when software packages become obsolete, or there are so many subsequent versions that using the data with the current versions of the software is no longer feasible. Furthermore, should future character sets no longer be compatible with the current ones (much like EBCDIC binary records now create problems on predominantly ASCII-based systems), these files would be at high risk of permanent loss.

While the Consortium has preserved its holdings from the beginning when the staff created storage decks to backup the first punch cards deposited in the new archive, the staff now also uses conversion in its preservation efforts. Rather than simply copying information from one medium to another, the staff is additionally assuring that data embedded in proprietary formats are systematically evaluated for preservation and converted from the software-dependent formats into standard ASCII formats. This assures that the information can continue to be used with most software packages and remain accessible at the most basic level.

ICPSR has faced just this problem with some of its data stored in OSIRIS format.⁶ The OSIRIS format is a mainframe-based, primarily EBCDIC format which was developed at the

Institute for Social Research at the University of Michigan in the 1960s. For the first 20 years of its existence, ICPSR processed and managed many of its holdings with the OSIRIS software package. With OSIRIS no longer in use and the software packages that now import this format potentially dropping that capability, data in OSIRIS format are now more vulnerable to loss. Copying these files to current media is not adequate to remove this risk. Many of the collections in the holdings that are in OSIRIS are also available in non-OSIRIS formats, thereby reducing their vulnerability to loss. However, there remain collections that are documented only by the OSIRIS dictionaries.

The ICPSR staff systematically identifies those collections “at risk” because of formats that are no longer supported in any current software packages or do not easily lend themselves to conversion by users, and converts them to more standard formats such as ASCII. At this point, the staff has evaluated and converted several thousand OSIRIS files. Hard copy documentation is being converted to image format, which in turn will eventually require conversion. While this work is more resource-intensive than the copying of information from one medium to another, the organization recognizes that it must take these steps or some of the classic studies in its holdings will be lost forever. Additionally, if these conversions are done while software is still available to aid in this work, the expenditure of resources to do this work is substantially lower than when the tools to do the conversions are no longer readily available.

There are a number of extensive “at risk” collections that were in OSIRIS-only format, and for which the ICPSR staff have created SAS/SPSS data definition statements. Among them are the United States Historical Election Returns collections; various datasets from the 1790–1970 historical census collections; the United States Congressional Roll Call Voting Records; the Social, Demographic, and Educational Data for France, 1801–1897; Roll Call Voting Records for the Confederate Congresses; the monthly Surveys of Consumer Attitudes and Behavior from 1977 through 1990; and other historical surveys.

Emulation

Another preservation technique discussed with respect to preservation of electronic materials is emulation. Emulation would do away with both the migration and conversion as described above. Instead it seeks to have the features of the hardware and software that created a given set of records available through the appropriate tools (i.e., software) that would read and utilize electronic records in their original state and with the original software. Under this strategy, software created under earlier platforms would successfully run under current platforms thereby negating the need for the other preservation strategies.

Emulation theoretically sounds promising as a solution to the preservation problem, and if successful, would eliminate, or at least reduce, the need for other strategies now used. There would no longer be need to move data

from various storage media to others and convert from one format to another. The key requirement would be to develop and maintain software that would keep the diverse formats readable on current media.

ICPSR has been involved in some emulation activities. Several years ago a PC was configured to emulate many of the capabilities that were available on the University of Michigan mainframe when mainframe service was discontinued. This capability has been used occasionally and has proven to be useful when the Consortium must deal with incoming information that is available only in an earlier format. One such instance was when punch cards from a survey from the 1950s arrived, and there were no other means to handle this information. After locating an old punch card reader, the staff was able to use software still available on this system to read and subsequently copy the data to current media.

The Past and the Future

Over its 40-year history, the Consortium has followed a number of paths, both in the distribution of its data and in its storage. The overall strategy has been a blend of following and leading while at the same time staying in touch with diverse constituencies and their needs. The directions that ICPSR has taken have been dictated in part by the technology at the time, in part by the needs of the researchers, in part by the depositors of data in the archive, and in part by decisions made by the staff and its governing Council. Over much of its history, the Consortium

used migration to maintain viability of its holdings while allowing the organization to continue to take advantage of current technology. This in turn led to a successful preservation program.

Past migrations have been successful, but as noted above, preservation by migration only will not work when exotic formats and system files are the only formats in which electronic files are stored. The proliferation of formats and the

developments. There will need to be reliable software running on current platforms that can successfully emulate the large variety of systems and formats of electronic information covering the past 40 or more years. The emulation software will need to be routinely updated to keep pace with emerging platforms and future software packages. There will be an ongoing need for talent that thoroughly and accurately understands the multitude of

frequently are not among the primary considerations when information first comes into an archive. While this may have worked earlier when, much like traditional archives, preservation of an acquisition did not become an issue until many years later, that is not the case with electronic information. Generations of technology have very short lifespans, and preservation issues for a collection may surface as early as a year or two after acquisition. Therefore, preservation considerations should be part of accession and the subsequent archiving process. They should not be left for a later time when solutions to save the information may be much more expensive or not even feasible. Archiving and preservation standards for this information that are not onerous and yet reduce the potential dangers of data loss should continue to be developed, studied, and ultimately followed.

Preservation of electronic material has never been a simple nor economical process, and it will not be in the future. Preservation must have a prominent place in the budgets of electronic archives. Like museums and libraries, electronic archives are charged with keeping and maintaining materials in perpetuity. Preservation will not be a simple process, since there is not one solution to the problem. Rather, the solutions will depend upon the circumstances. In a large number of cases, migration will continue to be a satisfactory solution to preservation needs. In other cases, there will need to be an evaluation of what is needed to save the data and its contents. The Consortium has been taking this multi-pronged approach



Today, users can download studies such as the 1948 Election Study, which originally arrived at ICPSR on punch cards, from the ICPSR Web site.

growing number of electronic files available for archiving will mean that conversion will of necessity have a greater role in preservation than has been true in the past. There are too many other variables now that work against migration being the only route to electronic data preservation for the foreseeable future: conversion will play a more prominent role in the organization's preservation efforts.

For emulation to become a viable preservation option for ICPSR, there will need to be a number of future

technical systems and formats from the past and present. Additionally, there needs to be an understanding of the diverse information archived over the years. These requirements involve a substantial investment in software development and maintenance by someone. If solutions to these different problems can be agreed upon, developed, and accepted, this option is one to consider.

The implications for the preservation of any given collection

to the problem. While this may appear to be a more expensive approach to the problem, conversion if done in a timely fashion can be done relatively economically and effectively.

Conversions should be done when there still are options that allow the data to be moved from an endangered format to a more current one. For example, normally there is a window of opportunity to save information when a software package is phasing out or making dramatic changes. But if that opportunity is lost and there are delays in performing these tasks, then not only will the costs be prohibitive, the efforts may be unsatisfactory at best, and futile at worst.

There are circumstances in which emulation for certain kinds of formats would be a good strategy. Like conversion, emulation may be a good solution when there is not a great deal of distance between the current technical environment and the one to be emulated. ICPSR's limited experience with emulation was reasonably successful when the emulation was implemented as the old platform was being phased out. There is no question, implementing the emulation further in the future would have been much more difficult if the staff that understood both systems had no longer been available.

There needs to be continuing effort put into raising awareness and educating producers and potential producers of the critical need to not only produce but also save and preserve their digital information. Steps need to be taken to help make preservation of the information more straightforward in the future. Some of this could be as simple as building funding into grants that enables principal investigators to convert or fund conversion of their data into a more standard format before depositing them in an archive rather than leaving them in a proprietary one. Similarly, groups and organizations creating records that subsequently become part of the public record need to become more aware and consequently more responsible about the future of any records they may contribute to the public domain. In some instances keeping these records with these groups and making them responsible for their preservation could be one way to handle the burgeoning inventory of records no one organization, or limited number of organizations, will ever be able to archive, much less preserve indefinitely into the future.

There are both obstacles and resistance to overcome, but if we do not continue raising consciousness on these matters, we will not be leaving future generations the most documented society in history but rather an inventory of unreadable electronic records.

Footnotes

1. Visit the ICPSR Web site at: <http://www.icpsr.umich.edu>
2. *ICPSR Annual Reports* have been issued since its founding.
3. The ICPSR staff manages and maintains nearly 200,000 electronic files of information that include distribution files, archival files, and backups for the unique files.
4. ICPSR holdings are not only data files, but also often include documentation such as codebooks, questionnaires, manuals, and related support materials. When the term "data" or "information" or "materials" is used in the paper, it refers to all of these items and not just data per se.
5. The definitions of preservation terms may vary from what can be found in other articles and publications. Readers are advised to consult the CAMiLEON Project Web site for a number of links to articles and Web sites that deal with digital preservation issues: <http://www.si.umich.edu/CAMiLEON/>
6. OSIRIS was one of the first packages to provide a full suite of programs to process, manage, and analyze social science data. In OSIRIS each logical data collection had electronic documentation and data stored in separate files. In the dictionary (documentation) files some of the critical information such as variable numbers and locations are stored in binary. This cut down on storage space and limited processing time during an era when computing costs were significantly higher. It is the binary portions of the records that present the problems translating from EBCDIC to ASCII and potentially to any other character sets.

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Meet the New 2002–2004 ICPSR Council Members

ICPSR is pleased to announce that six new members were elected to the ICPSR Council by the Official Representatives at the end of 2001. **William Darity Jr.**, University of North Carolina, Chapel Hill, and Duke University, **Ilona Einowski**, University of California, Berkeley, **Franklin Gilliam**, University of California at Los Angeles, **John Handy**, Morehouse College, and **Mark Hayward**, Pennsylvania State University, have agreed to serve four-year terms. **Kathleen McGraw**, Ohio State University, was also elected, but will be unable to serve. Acting in accordance with the Bylaws of ICPSR, the Council selected a sixth new member: **Elisabeth R. Gerber**, University of Michigan. **Ann Green**, Yale University, will act as chair of the Council.

Outgoing Council members are **Charles Betsey**, Howard University, **Stephen Fienberg**, Carnegie Mellon University, **Diane Geraci**, Binghamton University, State University of New York, **Paula McClain**, Duke University, and **Huey L. Perry**, Southern University, Baton Rouge. ICPSR thanks the outgoing Council members for their years of service, and warmly welcomes the incoming members.

WILLIAM DARITY JR.

William Darity Jr. is the Cary C. Boshamer Professor of Economics at the University of North Carolina at Chapel Hill. He received his B.A. from Brown University and his Ph.D. from the Massachusetts Institute of Technology in Cambridge. He has taught at the University of Maryland and the University of Texas at Austin, but most recently at Duke University and the University of North Carolina. He has held positions in several associations, including the American Economic Association, in which he is currently chair of a committee that researches the status of minority groups in the economics profession. His research interests include racial and ethnic economic inequality, North-South models of trade and growth, interpreting Mr. Keynes, the economics of the Atlantic slave trade, and the social-psychological effects of exposure to unemployment. He has published over 100 articles in professional journals and authored or edited 7 books. His most recent publication, co-authored with Samuel

Myers Jr., is *Persistent Disparity: Racial Economic Inequality in the United States Since 1945* (1998).

ILONA EINOWSKI

Ilona Einowski is the Director of User Services at the University of California Data Archive & Technical Assistance (UC DATA) at the University of California, Berkeley, where she has been the data archivist since 1979. She has served as the ICPSR Official Representative at Berkeley since 1983. Her involvement in ICPSR activities is extensive, and includes serving on the ICPSR Census Advisory Committee (1990 and 2000) and serving as a member of the ICPSR Review Committee (1995). She has been active in the International Association for Social Science Information Service and Technology (IASSIST) since 1979, and served on the IASSIST Administrative Committee from 1995–1998. She is the chair of the IASSIST International Outreach Action Group, coordinating efforts to provide funding for information professionals from developing

economies to attend IASSIST conferences. She is currently active in the development of the California Digital Library on-line data access system (Counting California) in conjunction with the Office of the President of the University of California, where her project responsibilities reflect her years of experience as metadata, numeric data, and XML specialist.

ELISABETH R. GERBER

Elisabeth R. Gerber is Professor of Public Policy and Director of the Center for Local, State, and Urban Policy (CLOSUP) at the University of Michigan's Gerald R. Ford School of Public Policy. Her research focuses on the policy consequences of electoral laws and other political institutions. Her current research involves a major study of the politics of land use and the dynamics of local ballot initiatives. As Director of CLOSUP she is overseeing major collaborative interdisciplinary research projects on regional governance, local political accountability, and the Michigan

economy. She has published numerous papers and two recent books on the use of initiatives and referenda (*The Populist Paradox* and *Stealing the Initiatives*). Her work on primary election laws led to her involvement as an expert witness in the state of California's defense of Proposition 198, The Open Primary Act. She received her Ph.D. in Political Science from the University of Michigan in 1991. Before joining the Ford School faculty in 2001, she held faculty appointments at Caltech (1991–1994) and UC San Diego (1994–2001).

FRANKLIN GILLIAM

Franklin Gilliam received his B.A. from Drake University and his Ph.D. from the University of Iowa. He is Professor of Political Science and Founding Director of the Center for Communications and Community at the University of California, Los Angeles. He has also taught at the University of Wisconsin at Madison, Grinnell College, and the University of Dar Es Salaam, Tanzania. Most recently, he has taught with former Vice President Al Gore at Columbia University, Fisk University, and Middle Tennessee State University. He will be a visiting scholar at Brandeis University in 2001–2002. He is the author of *Farther to Go: Reading and Cases in African-American Politics* (Harcourt Brace) and, with Shanto Iyengar, *The Forthcoming Race, Television News, and American Politics: Script-based Reasoning About Crime and Welfare* (Princeton University Press). He has also published works in several scholarly journals, including the

American Political Science Review, *Urban Affairs Review*, *Public Opinion Quarterly*, and *Political Psychology*. The Ford Foundation and UCLA's African American Studies Center awarded him post-doctoral fellowships. He was also awarded a Research Fellowship from the Center for American Politics and Public Policy, UCLA. Over the last five years, he has been consulted on a wide range of projects focusing on race and media.

JOHN HANDY

John Handy is the Charles E. Merrill Professor and Chairman of the Economics Department at Morehouse College. He teaches microeconomic theory, the history of economic thought, and statistics. He served for six years on the board of the National Economics Association, and as Director of the Southern Center for Studies and Public Policy. He has published in the areas of minority business history and development, local public finance, lottery education funding, community development, and international trade impacts on Black employment and wages. He is currently a technical advisor to the Atlanta Commission and a consultant to Fulton County, Georgia, on water management systems. He received his B.A. in Economics from Hunter College, M.A. from Columbia University, and Ph.D. in Economics from Georgia State University. His current research interest centers on the application of game theory in understanding social issues.

MARK HAYWARD

Mark Hayward is a Professor of Sociology and Demography, and the Director of the Population Research Institute at The Pennsylvania State University. He also was recently named the inaugural Director of the Social Science Research Institute. He has over 20 years of experience in conducting large-scale federally and privately supported research. His work has focused on the influence of career dynamics and life cycle achievement on the retirement and health experiences of the American older population. Recent publications have focused on health as a determinant of racial inequality in the retirement life cycle, career trajectories and the retirement process, the confluence of morbidity and mortality in determining active life expectancy, socioeconomic and racial inequality in active life expectancy, and the consequences of chronic disease for active life. He is a member of REVES, an international organization of scientists and policymakers dedicated to promoting: (1) the use of health expectancy measures for public health policy and planning, and (2) international standards for methods of data collection and calculation procedures for health expectancies. He is also a member of the Board of Directors of the Population Association of America, and a member of the Advisory Board of the Brookdale National Fellowship Program. He also is a council member of National Archive of Computerized Data on Aging, a special topic archive of ICPSR.

New Web Site Search Tool Available

ICPSR has developed a controlled vocabulary system to assist users searching its social science data archives. As part of a larger project to enhance and expand online archival search capabilities, the controlled vocabulary system consists of a subject thesaurus, a name authority list, and a geographic region/country name list. Currently, there are over 2800 subject terms, 200 personal names, and 500 geographic terms in the system. Using

terms selected from these lists, searches can be implemented on the ICPSR “basic” and “advanced” search pages. The Archive can also be searched from within the controlled lists by clicking on “search this term” located on the term display page.

In conjunction with the development of the controlled vocabularies,

ICPSR is in the process of indexing the archive metadata collection. Until the indexing is completed, searches using the controlled vocabularies will focus on the full text of the metadata record and not the subject term field.

Please visit the Controlled Vocabulary Web site at:
<http://www.icpsr.umich.edu/THESAURUS/index.html>
You may also access it from the ICPSR search page:
<http://www.icpsr.umich.edu/search-basic.html>

Additions to Holdings

ABC News/Washington Post Afghanistan Attack Poll #1, October 2001 — ABC News/The Washington Post (ICPSR 3298)

ABC News/Washington Post Afghanistan Attack Poll #2, October 2001 — ABC News/The Washington Post (ICPSR 3299)

ABC News/Washington Post Anthrax Poll, October 2001 — ABC News/The Washington Post (ICPSR 3300)

Annual Survey of Jails in Indian Country, 1998: [United States] — United States Department of Justice. Bureau of Justice Statistics (ICPSR 2979)

Annual Survey of Jails in Indian Country, 1999: [United States] — United States Department of Justice. Bureau of Justice Statistics (ICPSR 2980)

Annual Survey of Jails in Indian Country, 2000: [United States] — United States Department of Justice. Bureau of Justice Statistics (ICPSR 3196)

Arrestee Drug Abuse Monitoring (ADAM) Program in the United States, 2000 — United States Department of Justice. National Institute of Justice (ICPSR 3270)

CBS News Monthly Poll, February 2001 — CBS News (ICPSR 3275)

Census of Population and Housing, 2000 [United States]: 1998 Dress Rehearsal, P.L. 94-171 Redistricting Data, Geographic Files for 11 Counties in South Carolina, Sacramento, California, and Menominee County, Wisconsin — United States Department of Commerce. Bureau of the Census (ICPSR 2913)

Cooperative Agreement for AIDS Community-Based Outreach/Intervention Research Program, 1992-1998: [United States] — United States Department of Health and Human Services. National Institutes of Health. National Institute on Drug Abuse (ICPSR 3023)

Current Population Survey: Annual Demographic File, 2001 — United States Department of Commerce. Bureau of the Census (ICPSR 3301)

Current Population Survey, February 2001: Contingent Work Supplement — United States Department of Commerce. Bureau of the Census (ICPSR 3302)

Current Population Survey, October 2000: School Enrollment — United States Department of Commerce. Bureau of the Census (ICPSR 3303)

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FIRST SESSION (June 24–July 19)

Workshops

Quantitative Historical Analysis
Introduction to Statistics and Data Analysis I
Mathematical Models: Game Theory
Introduction to Regression Analysis
Regression Analysis
Advanced Multivariate Statistical Methods
Simultaneous Equation Models
Maximum Likelihood Estimation for Generalized Linear Models
Bayesian Methods
Regression: Graphics, Nonparametric, with **R** and **S+**
Quantitative Analysis of Crime and Criminal Justice

Lectures

Mathematics for Social Scientists I
Mathematics for Social Scientists II
Introduction to Computing
Statistical Computing in **S**
*Advanced Topics in Social Research

2-5 DAY WORKSHOPS (May 23–August 16)

Latent Growth Curve Analysis (5/23–25)
Multilevel Models (5/26–28)
Eurobarometers (5/29–30)
World Values Survey (5/31–6/1)
Event History Analysis (6/3–7)
Minority Aging and Health (6/10–14)
Hierarchical Linear Models: Introduction (6/10–14)
Criminal Justice Data (6/17–21)
Mixed Models (6/17–21)
Census 2000 (6/24–28)
Spatial Analysis: Introduction (6/24–28)
Hierarchical Linear Models: Advanced (7/8–11)
Network Analysis: Introduction (7/8–12)
Categorical Data Analysis (7/15–19)
“LISREL” Models (7/22–26)
Network Analysis: Advanced (7/29–8/2)
Spatial Regression Analysis (8/5–9)
Providing Data Services (8/12–16)

*Advanced Topics:

Missing Data Analysis	Resampling Techniques: Bootstrap
Causal Inference	Bayesian Modeling
Data Mining	Statistical Graphics for Univariate and Bivariate Data

SECOND SESSION (July 22–August 16)

Workshops

Scaling and Dimensional Analysis
Regression Analysis
Time Series Analysis
Mathematical Models: Rational Choice
Introduction to Statistics and Data Analysis II
Categorical Analysis
“LISREL” Models: General Structural Equations
Longitudinal Analysis
Advanced Maximum Likelihood Estimation
Quantitative Methods in the Study of Russia and Eastern Europe

Lectures

Complex Systems Models
Introduction to Computing
Matrix Algebra
*Advanced Topics in Social Research

Fond Farewell

It is with both sadness and joy that we announce that Gwen Fellenberger, Program Coordinator for Administration of the Summer Program, has retired as of January 2. Gwen made major and significant contributions to the Program over the last 15 years, and much of the Summer Program's success during this period is attributable to her efforts. We will miss her hard work, devotion, and many skills. We all share in wishing Gwen well in this new and well-deserved stage of life. —Hank Heitowit



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