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Automated Welfare Client-Tracking and Service Integration: The Political Economy of Computing

Rob Kling
University of California, Irvine

The impacts of an automated client-tracking system on the clients, caseworkers, administrators, and operations of the welfare agencies that use it are reported. The major impact of this system was to enhance the administrative attractiveness of the using agencies in the eyes of funders rather than to increase their internal administrative efficiency. This impact is a joint product of both the technical features of the computer-based system and of the organizational demands placed upon different agencies, administrators, and caseworkers. It illustrates the way "successful" automated information systems fit the political economies of the groups that use them.

Key Words and Phrases: social impacts of computing, organizational impacts of computing, management information systems, sociology of computing, information systems and service integration, urban information systems

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Author's address: Rob Kling, Information and Computer Science Department, University of California, Irvine, CA 92717.

1. Introduction

Despite the large number of computer-based systems in use, few reliable systematic descriptions have been reported of their operations in complex organizations, public or private [8, 15, 19]. Thus it should not surprise us that our theories for predicting the social impacts of computer systems are weak.

In particular, the ways that automated systems operate in actual organizations usually deviate from the expectations we can develop primarily by attending to technical specifications and idealized organizational behavior [5, 12]. Our predictions can become even more uncertain when we consider information systems that cross organizational boundaries. This study illustrates how the actual impacts of a computer-based information system (UMIS) are determined by both its technical features and the social setting in which it is used [12]. A theoretical account of automated information systems is abstracted from the data on UMIS in Section VI.

Sections II–V provide data on the operations of an automated information and referral system which has been described as helping to increase the efficiency and improve the quality of services provided by agencies in a highly decentralized urban welfare complex. It is one of about a dozen automated systems that have been implemented to keep track of the kinds of social services suggested for and received by individual clients.

Relatively little attention has been paid to the use of administrative computing in public agencies [15]. Conflicting accounts exist between public literature which stresses the use of reports as aids to administrative efficiency and a private folklore of computer-based reports which are unused or unusable. The study of UMIS provides new information about the social dynamics which encourage administrators to use or neglect computer-based reports. It also investigates conditions which foster the use of computing as a device to support legitimacy [16] as well as an aid to administrative efficiency. Such understanding has important theoretical, professional, and practical significance.

The case of Riverville illustrates the role played by computing in integrating similar functions across organizational boundaries. Some theorists [6, 20] argue that organizational activity follows the flow of information, and, ipso facto, the movement of information across organizational boundaries helps integrate administratively distinct units. Other administration theorists and computer-specialists have begun to implement shared databases that cross agency boundaries [14]. Integrating social service agencies in particular is the concern of many professionals [2, 17]. There are then three groups that view the problems of coordinating organizational units as a major practical and theoretical issue. Each group views the sharing of information as enhancing coordination and thus enhancing the quality of welfare services provided in Riverville.

The Riverville case also highlights the ways in which

local government agencies use computing to support direct client services. Most local government computing supports administrative activities such as accounting or equipment inventories, which benefit the public only insofar as they render government operations cheaper, smoother, or "more effective." There is a greater variety of *potential* uses and impacts when computer systems are used more directly in support of social services. New services might be provided to the public. Computing might actually increase social control by helping to catch "welfare cheaters" or by helping police obtain current addresses of wanted persons [15]. Such computing might also improve administrative ability to monitor resources consumed and services provided by various programs.

Administrative reforms usually serve certain administrators and their political interests [1, 15]. However, the benefits of different administrative reforms for the clients of social service programs cannot be taken for granted. Assessing the role of computing here is problematic because automated information systems may serve several uses simultaneously. Only careful analysis of specific reforms in specific settings can indicate how well politicians, administrators, agency staffs, clients, and the public actually benefit from different administrative arrangements [15, 22].

This study was designed to answer the following questions: 1. How do automated client-tracking systems help "integrate" decentralized organizations? 2. What impacts would such a system have upon the major actors—clients, caseworkers, and administrators—who use it? 3. What relationship would there be between the publicized characteristics and the actual characteristics of such a system?

Formal materials or analyses developed by UMIS staff would have been a fortuitous aid in helping us clarify their interpretations of the role played by UMIS and its effectiveness for various actors. Unfortunately, there are no staff reports describing the state of affairs prior to, during, or after UMIS development. Thus, this study, like others in this area [4, 8, 12, 15, 19, 21] relies upon the perceptions of UMIS staff, city administrators, and case workers in both public and private agencies who were interviewed intensively between 1974 and 1976. Together with project documents they form our primary sources of data.

This report sketches the Riverville welfare system and describes how the automated information and referral system operates in that context. Then the official design goals of the automated information system are contrasted with its actual performance. Lastly, the social dynamics of UMIS use are abstracted from the case data and contrasted with the findings of other studies.

II. The Social Service "System" in Riverville

Riverville is an industrial town of 170,000 serving as a regional center for several rural counties. Approximately 20 percent of the families live below poverty level. The median family income is $7200 and 36 percent of the population is Black. The needy are served by approximately 150 private, city, county, and state agencies covering geographical areas within and around Riverville. Some agencies focus on a neighborhood, others on a city sector, and still others accept clients residing anywhere in the city. Services provided include: emergency rent, unemployment money, health care, day care for children, job counseling and training, and foster homes [10]. These agencies serve a number of groups such as: anybody (foster homes), the poor (e.g., Riverville Bureau of Relief), or particular religious or ethnic groups (Jewish Welfare Federation).

As late as 1966, there was little administrative coordination among these agencies. The Community Action Agency supported three neighborhood service centers which housed information and referral offices [10], and service agencies partially funded by the city. The city government partly or wholly subsidized 35 agencies clustered under several administrative umbrellas including Model Cities and Community Action Agency. Each agency maintained its own intake forms, reporting conventions, and record-keeping systems. This pattern of multiple agencies serving similar groups with related needs prevails in most American cities.

The Department of Housing and Urban Development required the Model Cities programs to develop an information system (manual or automated) to report the number of services provided on a regular basis. In the late 60's, this system was automated and used by some Riverville agencies and by 13 surrounding rural counties.

The municipal activities in Riverville are supervised by a group of five elected commissioners, including the mayor, who supervise a specific set of activities, such as police and fire or public works. The mayor's office is responsible for both welfare and general administration. A new mayor, elected in 1971, had a difficult time learning how much city funds were spent for which services and who was being served. For example, the city was spending $10,000 per year on rat control, and the automated record-keeping system which monitored it treated "rats killed" like "clients served." When the mayor received a "workload report" showing that in that year a total of 300 rats had been exterminated, he was stunned and commented dryly, "I thought steak was expensive!". This incident impressed him with the utility of knowing the actual magnitude of services the city's programs were providing.

This new mayor advocated an on-line real-time reporting system to help his staff manage the diverse, complex array of city-supported welfare programs. The development of such a system (UMIS) began with seed money from the Community Action Agency; was developed by a grant from HEW, funding was operational by 1973, and was continued by city funding in 1975, at $130,000/year, when the federal grants terminated.

To further improve the control of social services the

mayor consolidated 35 of the 36 city-supported agencies into a new "Human Services Division" in December 1972. Under the mayor's jurisdiction, these consolidated agencies (including Model Cities, Community Action Project, and Concentrated Reemployment programs) became the primary users of UMIS.

Thus, between 1966 and 1974 two different but compatible strategies were employed to integrate social service agencies.[1] A "technical strategy" utilized UMIS to track particular clients through the public and private agencies. An "administrative strategy" consolidated all but one of the city supported agencies into a common administrative unit.

III. Official UMIS Design Goals

The UMIS project documents list a set of design goals which are supposed to help increase the "effective delivery of community services." These include: 1. Provide baseline information about the needs of people. 2. Provide for and monitor the sequencing or scheduling of (social) services on an orderly basis. 3. Track individuals and families through the service system to insure they received services as planned. 4. Provide information for management decisions about the amount of services individuals and families have received and their progress in breaking out of the cycle of poverty. 5. Eliminate duplicate records. 6. Increase the control over welfare funds. 7. Automate follow-up to keep people from "getting lost." 8. Evaluate the social service programs. 9. Eliminate duplicate services.

While official goals of a program or organization often differ from the operative goals, they nevertheless provide a convenient point of departure. This is particularly true in the case of UMIS since these official goals and claims about their efficacy were widely publicized in the press and professional media. (See Section V below.)

IV. Actual UMIS Operation

A. Client Entry with UMIS

The intake and referral offices within the five neighborhood service centers now supported by the city form a hub in the municipal welfare system. They register each new client in UMIS, and they refer the client to appropriate agencies (usually agencies within the Riverville Human Services Division).

The city of Riverville supports five neighborhood centers located in low-income districts. Any person seeking social services can apply through an intake center and be referred to the relevant agencies. However, the pattern of entries is complicated. Clients may apply directly to any agency they desire. Thus, entries may result from direct application to the private agencies, or from referrals by neighborhood centers. In addition, people who apply directly to any agency within the Human Services Division are entered on UMIS.

When a person applies for assistance at one of the neighborhood service centers, she or he is:

1. Registered and asked to provide the following data:
   a. Address and phone number.
   b. Monthly housing expense and number of rooms in house.
   c. Renting or purchasing home.
   d. Annual household income and main source (employment, Social Security, public assistance, etc.).
   e. Number of people in household, preschoolage children, and schoolage children.
   f. Social Security number (head of household).
   g. A list of each household member, including date of birth, sex, race, and highest grade completed. In addition, employment status for each person is coded as "preschool", "school", "unemployed", or "employed."
2. Checked to see which programs she or he is eligible for (e.g. Aid for Dependent Children);
3. Advised about which agencies may provide the services she or he needs;
4. Given a plan which lists all the agencies and services she or he has been set up for.

The neighborhood service centers emphasize family services [2] by providing assistance to all household members rather than only to the person who applies for aid. This means that when a head of household applies for emergency aid, the health of the dependents would be checked as one of the services provided.

Each client is described as receiving services at one of three particular levels: emergency assistance, professional evaluation, or a "long range plan" (or counseling). UMIS currently stores records of 42,000 clients. Approximately 13,000 of these cases are still active.

B. Which Agencies Use UMIS

Clients may currently apply to approximately 150 agencies for assistance. These agencies participate at different levels in UMIS. Several[2] agencies are "fully on" UMIS. They use the UMIS intake form for their clients and receive various management reports from UMIS. Agencies within the city Human Services Department may be viewed as the primary organizational beneficiaries of UMIS. Another 25 agencies are "partially on" UMIS. They do not use the UMIS intake forms for all clients, but cooperate with the neighborhood

[1] A major strategy of urban reform in the 60's emphasized the *participation* of neighborhood residents in making policy decisions for urban agencies [22]. A citizen's advisory board was set up in Riverville in accordance with OEO guidelines. As in other cities, its role was largely symbolic.

[2] The official UMIS reports list 35 agencies as "fully participating." However, most of these were bureaus within the Riverville Department of Human Resources which were once independent agencies. Some of the staff members in these bureaus resented this record-keeping practice. It made UMIS look more highly utilized at the expense of a unified denotation of the municipal agencies.

service centers by returning an "outreach form" for each client referred. In return, they receive statistical reports on their clients.

Most of the agencies in Riverville are "not on" UMIS, for reasons which include:

1. The agency uses its own automated system. For example, the State Department of Public Welfare (which receives approximately 20 percent of the neighborhood center referrals) and the county Department of Health (also receiving many referrals) have their own automated information systems and refuse to participate in UMIS. The state welfare offices maintain their own automated system, reporting conventions, and protocols. If the Riverville office were to join UMIS, it would have to duplicate some record keeping and depart from current conventions. Otherwise the entire State Department of Public Welfare would have to adopt UMIS conventions. Without extraordinary incentives, none of these alternatives appear attractive to state administrators. Demands for record-keeping efficiency in Riverville propagate demands for compatibly structured data across the state.

2. The agency administrators do not need special descriptions (e.g. demographic breakdowns) of their clientele for accountability. According to the director of the neighborhood service centers: "If an agency doesn't need the information to justify what they're doing or perhaps they don't have to justify what they're doing, then they don't have any need for the kind of information I need ... The kinds of agencies that have to have some kind of justification are primarily those that are spending the taxpayer's dollar."

Small private agencies seem unattracted to UMIS. One municipal manager commented: "Many people consider the computer above them, a "brain center" or something ... not simply an accounting apparatus. It frightens people. It frightens smaller agencies becaue they're operated by volunteers. They often don't have a lot of skilled people on their staffs. They don't have the time, they feel, to complete the paperwork."

There are many small agencies which serve only several hundred people a year. For this size of client population, manual record keeping systems may be quite adequate.

3. Some agencies share few clients with the neighborhood service centers. Some agencies serve a community which because of its religious or ethnic identification or its affluence and suburban location receive few or no referrals.

In assessing how UMIS promotes integration of Riverville's social service agencies, patterns of client referral and program coordination must be studied. Simply counting the "participating agencies" is a poor index.

C. Client Followup and Recording of Services—"Grass Roots" Integration

After each client is referred to an agency for assistance, an "outreach form" is sent to each receiving agency. Ideally, agency staff fill out the form and a UMIS courier collects these forms for keypunching. Agencies refusing to use the outreach form follow up their clients by telephone.

Each agency worker who provides a service is supposed to fill out a "worker contact card," listing the client's name, ID number, date, worker ID number, and a code for the service rendered. This provides the primary data source for tracking the client's subsequent UMIS activity.

In principle, each client should be tracked from the time he enters an agency "fully on" UMIS through the time he no longer needs social services. In that case, UMIS could document skeletal profiles of clients in continuing contact with the public agencies. In fact, the tracking and followup are incomplete.

When a person seeks emergency aid, all household members are entered in emergency status. Thus, if the head of a household needs emergency medical care, his/her children are also listed in "emergency level I." After the medical care is provided, the head of the household is listed as receiving the relevant services, but the records of the dependents are not updated. This problem complicates any evaluation of UMIS effectiveness based upon counting individuals in various services over different periods of time.

Other people may be "lost" through their own desires by not returning for further assistance, or through bureaucratic whimsy. Again, their UMIS files are not updated with their intentions or needs.

Some people are "lost" because of the followup policies in neighborhood service centers. For example: the AAA agency was able to find suitable housing for a family which placed it outside of its "service area." After the family was relocated, the caseworker couldn't provide further assistance since the family was no longer living in the agency's jurisdiction. When he attempted to refer them to the neighborhood service center, he was told that since the family had been helped by a community agency, which they judged satisfactory, the case was "out of their hands." Such administrative practices and episodes limit the utility of UMIS for tracking cases.

D. Utility of UMIS to Managers

"Integration of services" can refer to *agencies* coordinating the choice of *programs* to be offered. Or it can refer to the staff of different agencies coordinating the set of particular *services* provided to a specific *client* [2, 17]. In the first interpretation one expects managers to discuss programs. In the second case one expects caseworkers discussing clients.

UMIS greatest contribution may lie in its potential aid to the "grass roots" form of integration. However, none of the service-level professionals saw much actual impact on such integration. Grass roots coordination is as much a function of agency policies as of the client-tracking system. UMIS was developed primarily as an administrative and management aid.

Each agency which participates in UMIS receives a bundle of monthly reports which include: 1. The total number of services provided by the agency that month plus the year-to-date totals. 2. Breakdowns of the client population receiving each service by race, age, sex, employment, source of income, geographic area, and number in household. 3. A breakdown of services provided by each caseworker in the agency. It includes the worker's ID number, the total number of clients served that month, the total number of new clients, and the total number of each service provided by the worker. In the next section we will look at the ways these reports and the data which they include are or could be used.

1. New Reports

Most of these reports provide both new and old data more systematically than was typical prior to UMIS. Before UMIS, welfare agencies used to rely upon hand tallies or spot surveys to account for caseloads and volume of services. UMIS provides the agency with a kind of information that was de facto unavailable in comprehensive form previously.

In addition, some reports are formatted so that they can easily be incorporated into the reports that federally funded agencies send to their sponsors. Prior to UMIS, clerks spent several days per month collating information for these required reports. However, these counts apply only to those persons entered on UMIS, so they do not provide complete statistics for those agencies "partially on" UMIS.

2. Allocating Scarce Resources

In one special case, a municipal department head used UMIS reports to help allocate scarce resources to those most in need. For example, the Riverville Department of Human Services includes a transportation division which shuttles the poor from home to various agencies (e.g., a hospital). Each trip is recorded as a unit of service provided to the client. One report received by the director of transportation is a crosstab of his minibuses' destinations by the number of people in each family income level who traveled there in the previous month. Since transportation resources are limited, he uses that tabulation to identify those destinations most frequently traveled to the poorest clients. Clients call in a day in advance to request a trip, and as the minibuses are committed, the clerks become more selective in allowing new riders. Apparently, the listing of destinations by the income group served provides an important criterion for deciding which trip requests the agency will honor.

On the other hand, UMIS supports neither billing per unit of service nor cost accounting. A special line item budget is run monthly for public agencies that are "fully on" UMIS, but this budget is not directly linked to the number or kind of services provided. Thus, the hope that UMIS would provide special information to help control welfare costs seems unrealized.

3. Evaluating Program Performance

In principle, UMIS is supposed to help evaluate the effectiveness of various social service programs, but UMIS data may be of limited utility in such evaluations. First, UMIS doesn't record very precise data regarding services outcomes. Second, variations in the recording of a client's status confounds the use of the routinely kept data as well. Third, there is simply no baseline information about the accuracy, duplication, or completeness of information about clients prior to its implementation. At best, one can study trends in such indicators since UMIS was implemented.

In addition, agencies which do not regularly report their workloads provide a major systematic source of incomplete or inaccurate data. Agencies which are "partially on" UMIS and outside the control of city hall occasionally list the filling out of UMIS reports as a low priority activity. The UMIS staff and agency caseworkers work with different incentives and preferences: For the staff, complete and timely information is the basis of their "production;" caseworkers would rather work directly with a client than spend time filling out forms.

Due to support from the mayor's office, the UMIS staff has had some clout in getting compliance in the case of municipally supported agencies. But relations with other agencies are more delicate since their participation is optional and the mayor's power is limited. In such situations, the UMIS staff must encourage good will since threatening to withdraw service would undermine the development of a "comprehensive" system. Since different agencies have failed to report their activities on occasion, the data has "gaps"—diminishing its utility.

E. Relations with Federal Auditors and Funding Agencies

One by-product of UMIS is a set of monthly summaries used by the Human Services Department in Riverville for their routine reports to HEW. It appears that HEW auditors place more credence on "data which comes out of a computer" than in hand-tallied counts. The director of the department of transportation described the change: "Before, when we hand-tallied the number of trips we provided, the auditors tacitly assumed that we inflated our figures. Now, when I show them my computer-based counts we start our discussions by using my data as a baseline."

Of course, hand-tallied data or computer-tallied data may be similarly inaccurate. However, it leads managers who deal with the federal auditors to prefer UMIS.

Administrators in the department of Human Services have been able to capitalize on the enchantment between federal officials and UMIS. One top manager commented: "This is a rural region and most of the regional representatives are used to seeing very simple administrative aids. When they come here we take them down to the service center run by Mary. She's aggressive and

enthusiastic and really sells them the system. They're impressed and it definitely helps our funding."

On special occasions, data from UMIS was used to support special grant requests, since the city staff gains some credibility from the "administrative attractiveness" of city agencies supported by UMIS. However, in one case Human Services Department staff sought funds for adding a medical clinic to one of the neighborhood service centers. According to the director of the Department of Human Services: "We took our stats to the funder in Regional City. The proposition was really solid and they bought it. When we started there was no money for the clinic; now it's operating on a regular basis. That's one of the few times that we and the funding agency had no prior contact."

In contrast to UMIS' marginal utility as an aid for internal management, it has helped some of its agencies increase credibility and gain support from funders. This seems to be a major reason for UMIS' support by agency staff.

F. Utility of UMIS to Caseworkers

In principle, a caseworker can access a client's file from UMIS by calling the UMIS office. Such inquiries are infrequent. Staff work is sufficiently specialized that the client's record is largely worthless for day-to-day use, naming only the service rendered. While duplicate application forms are eliminated for agencies "fully on" UMIS, each agency maintains its own case files. While these separate files duplicate some information, agencies consider such data "personal and privileged" and wish to limit access to it.[3] A caseworker needs to know the focus and outcome of the counseling session or the nature of the group activity. This information is best obtained from the client directly or from caseworkers who have worked with him elsewhere.

G. Impact of UMIS on Welfare Clients

Service to clients provides the ultimate justification of social service agencies. Administrative reforms of such agencies can be justified by service to clients, or by claims that service costs borne by the rest of the public are reduced. UMIS has helped local administrators maintain funding from federal agencies and on occasion gain additional funds. Such gains help welfare clients when they are translated into concrete services.

It is also possible that computing can help to provide *new* services to the public. For example, Laudon documents the development of a children's immunization program inspired by an automated record of births [15]. The use of computing to support such new services is rare, particularly since many local governments have been reducing their level of services during the 70's. However, one such new service developed in Riverville, as a by-product of UMIS, helps illustrate the dynamics of such developments.

Monthly UMIS reports list subjects eligible for Social Security payments. These clients are contacted and registered for their payments, with the help of city staff. Clients receive their benefits, taxpayers pay less subsidy for the poor and administrators are able to provide a service which reduces local costs.

However, such Pareto optimal[4] policies are uncommon. Many studies of welfare administration indicate conflicts of interest between administrators and clients in which caseworkers are caught in the middle [7]. Such conflicts were not observed here. First, UMIS data plays little role in most caseworker-client interactions. Secondly, the staff of neighborhood service centers are primarily paraprofessionals who were attracted to programs that stressed client service, suggesting that these staff act in strong support of their clients [18].

V. Perception and Promotion of UMIS

A. Misperception of Computing and the Concept of "System"

UMIS is a novel system whose implementation was intended to explore the type of support it could provide to a set of neighborhood information and referral centers feeding a disorganized array of social agencies. This study separates the functions of UMIS from the various agency practices.

However, in some UMIS documents and in discussions with staff, UMIS and the organizational arrangements for providing services are confounded. For example, clients are spoken of as being followed up "by the system." The DataWhirl[5] application brief describes a "human services delivery system" (HSDS) which includes both automated information and the organizational arrangements it supports. Implicitly, the (DataWhirl) computer is provided with the best attributes of both. HSDS is described in part as: 1. "A system to simplify the delivery of services to the client." 2. "A recordkeeping system that reduces the clerical efforts of participating agencies." 3. "A system that in many cases attacks and systematically eliminates the cause of a person's dependency." 4. "A means of critical self-evaluation provided by management reports, both quantitative and qualitative, to enable agencies to improve their own effectiveness."

This portrait depicts the computer as a "welfare machine": a record-keeping device which helps raise the expectations or blur the perceptions of the staff who use it. One agency head seemed utterly disillusioned by the discrepancy between the vision promised by DataWhirl

[3] For example, one counselor reported that he recently removed some damaging information from a client's file. There was a third person (hearsay) account that the client's child had maggots in his bed. The report was never followed up and confirmed. The counselor remarked: "That was eight years ago when she was 16; she doesn't need that kind of **** in her file." Many counselors are protective of their clients and concerned that their own observations and transactions with the client be treated sensitively.

[4] A decision is *Pareto optimal* if its outcome leads to some parties being advantaged and no parties being disadvantaged.

[5] DataWhirl is a pseudonym for the computer vendor which serves Riverville.

and the actual information system in use today. DataWhirl, according to some city staff, "painted a real dream world which they said could be ours."

A second kind of misperception is exemplified by the phrase "all usable management information." Given the gap between the kinds of information routinely produced by UMIS and the kind of cost accounting that might assist financial control, it is at best a misleading slogan.

In another context, this same manager remarked, "The computer won't show how well a job is being done or how effective a program is except in numbers (of people served)."

B. Promotion of UMIS

When UMIS was first proposed in the early 70's, DataWhirl promoted UMIS among the city staff responsible for providing social services, selling an electronic utopia that would diminish the problems of Riverville families on welfare.

UMIS was the first fully operational automated information and referral system in the U.S. When it was initiated, none of the actors could be sure exactly what to expect. Generally, advocates expected UMIS to help streamline the administration of the welfare programs in Riverville.[6]

In addition, advocates of UMIS had to convince diverse segments of the public of UMIS' potential. Idealized goals, which can be seen here as conflicting, were stressed by UMIS supporters: the poor were concerned with getting better service and the middle class with cutting costs through "efficient operations." Difficulties in administration were glossed over.

By alluding to plausible benefits, the UMIS advocates hoped to capture the imagination and support of key staff in various agencies. In this setting, some prophecies could be self-fulfilling: the more agencies that fully participated in UMIS, the greater the comprehensiveness and accuracy of the data collected and the overall utility of the administrative tool.

UMIS seems to provide useful information for some agency heads, and maintains many routine records, but this mundane recordkeeping is much less than what was promised.

According to the UMIS director, "We aren't now where DataWhirl said we were in 1970. Every now and then a new article appears which describes UMIS. Some of the figures are updated, but it's the same story. We don't know who initiates them, but the story doesn't change. And we're not there yet."

Unfortunately, "the story" glosses the operational setting of the welfare agencies in Riverville. First, different agencies and caseworkers have different incentives for using the data processed through UMIS. Thus, UMIS is quite attractive to some agency staff, but would burden other staff were they forced to use it.

[6] UMIS was the focus of enthusiastic articles in *Nation's Cities, The Christian Science Monitor, Computerworld,* and *Business Week.* Its design and operation were presented at several national conferences for public administrators.

Second, many welfare agencies operate under certain administrative procedures that are largely outside their control. For example, AFDC (Aid for Families with Dependent Children) applicants have to be re-examined for eligibility every six months. These "redeterminations" absorb staff time which UMIS can hardly effect. Changes in federal guidelines concerning the frequency of such "redeterminations" would have more impact on those caseworkers who do such work as would any variation in the design of UMIS. "The story" neglects those sources of paperwork or paperwork relief that influence the workload of an agency, but are outside its control [11].

Moreover, "the story" of increased administrative efficiency is unlinked to any specific performance goals. For example, the phrase "eliminate duplicate records" could be equally well satisfied by a 1 percent or 98 percent reduction. None of the UMIS documents, let alone vendor application briefs, provide specific indices of improvement. However, their idealistic tone implies a kind of "total efficiency." But without specific performance goals, "success" or "failure" is in the eye of the beholder.

Similarly, "eliminating duplicate services" communicates an image of ideal efficiency. However, many agencies cater to specific clientele (such as runaway children), and specialized knowledge pertinent to the needs of such groups is hard to aggregate in one "super-agency." This indicates that apparently "duplicate services" should not be consolidated without careful analysis of the service, and the effectiveness of a "centralized" alternative. In fact, the primary reduction of duplication in Riverville seems to come from impersonal services such as accounting, being shared by agencies within the Department of Human Services. That consolidation was part of an administrative strategy rather than a byproduct of UMIS.

Until "the story" is changed to include the actual interplay between distributed access to a database of skeletal records and the recordkeeping practices of various welfare agencies, it's hard to see how UMIS could ever live up to its own press.

VI. The Social Dynamics of UMIS Use

A. Services Integration Through Data Sharing

The UMIS staff encountered several critical problems in developing their automated aid and having Riverville agencies adopt it. These include: 1. Agencies with their own automation or little need for frequent reporting and demographic analyses were unwilling to participate in UMIS. 2. Confidentiality of detailed case reports on clients and the skeletal information in UMIS lowers its utility to caseworkers.

In Riverville, much of the "integration" and "reduction of duplication" in welfare were byproducts of administrative strategies of consolidating agencies and cen-

tralizing support functions. And commitment to UMIS was occasionally reinforced by "leverage" from the mayor's office. In this setting, information uncoupled with administrative authority is a weak integrator.

This aspect of UMIS in Riverville parallels Quinn's findings about an automated welfare client-recording (but not tracking) system, IUIS, in Cincinnati [19]. IUIS was initiated by two local funding agencies (one of which was United Way) which provided grants to local programs. These two agencies forced the neighborhood agencies which they supported to report the services they rendered through IUIS. Many agencies and their staffs resisted using IUIS. Those agencies which received substantial aid from the funding agencies strongly supporting IUIS were most willing to "accept" its use.

Quinn reports that funders forced the neighborhood agencies to "clarify their linkages" and patterns of referral to other agencies. He also reports some increases in coordination between service-providing agencies, based on prodding from the funders. In that setting, IUIS served as an instrument which the funding agencies could use to force their grantees to coordinate their programs and to become more accountable for services they rendered.

In both Riverville and Cincinnati, the agencies which utilize automated information systems were driven by the incentives provided by external funders, rather than by its aid in improving the efficacy of agency operations.[7] Similarly, actual increases in program coordination in both Riverville and Cincinnati were fostered by the administrative influence exerted by the funding sources. In Riverville, the mayor consolidated 34 separate programs and placed them under a common directorship. The programs within the city's Department of Human Services were consolidated under a strong central authority, UMIS being but one incidental component of the (internal) reporting system. In Cincinnati, the (external) funding agencies were seeking greater influence over relatively autonomous neighborhood agencies. IUIS became a mechanism for forcing reports to meet specific standards and for getting distinct agencies to coordinate.

B. Administrative Efficiency and Administrative Attractiveness

Consider an organization with a fixed revenue, which distributes that revenue over a fixed set of programs and administrative overhead. Increasing *administrative efficiency* means that the organizational members find ways to provide more service per dollar of revenue. In contrast, an organization may select practices that increase its *administrative attractiveness.* These would be procedures that symbolize effective administration to resource providers and which encourage them to increase the organization's revenue. The two concepts are logically independent: increases of administrative efficiency indicate that an ogranization is producing more output for a given input while increases in administrative attractiveness simply alter the magnitude of organizational inputs. Specific practices may alter either an organization's administrative efficiency, or its administrative attractiveness, or both. A client of the organization may benefit from either strategy without knowing which was employed.

However, there are limits to the potential effectiveness of administrative efficiency in social programs. First, an agency should be pursuing appropriate programs[8] by efficacious strategies. (There is, for example, some evidence that decentralized service centers are more effective than central facilities [18, 22].) Reform should not become an end in itself so that attention to it overrides attention to a program's substantive service goals. Given these (stringent) assumptions, administrative reforms may help improve the quality of service received by clients. Ideal administrative practices can channel maximum resources to the program clients. If those resources are themselves insufficient or unavailable, efficient administration alone will not increase effectiveness. This is not to minimize the importance of skilled administrators, since an agency that fails to channel resources effectively can certainly hurt its clientele.

Throughout the 60's, while the total cost of welfare soared in urban centers, the allocations to individuals or families remained meager [5]. In the 70's, even the total federal funds for direct grants to social service programs decreased substantially. In a time of high unemployment, the most efficient scheme for referring applicants to good job training programs is bound to fail if there are few jobs to be had. While administrators and caseworkers do have some control over the generosity of grants or may inform only selected clients of their eligibility for particular programs, these seem to be "second-order" effects [5]. The availability of external resources and guidelines for their distribution strongly influences the kinds and intensity of social programs.

UMIS supported few increases of administrative efficiency[9] but was a major source of administrative attractiveness. Procedures that both enhance administrative efficiency and administrative attractiveness serve the staff and clients of the neighborhood agencies in Riverville. However, in a period when external resources were

[7] Quinn reports that the agencies in Cincinnati abandoned IUIS in 1973 after external funding for its support was removed. In contrast, after some internal controversy, the municipal users continued to support UMIS after external support was removed. Both these events are consistent. In Cincinnati, the agencies that were competing for local funding could jointly discontinue IUIS and continue their competition "under a different set of rules." In contrast, if Riverville were to drop its use of UMIS, it would lose a competitive advantage relative to other cities applying for limited federal funds.

[8] There have been major criticisms of liberal social service programs by people who argue that providing a minimum income would be more efficacious and less costly to administer [10].

[9] Municipal administrators were, of course, sensitive to strategies for administrative efficiency. For example, creating a transportation division within the city's Department of Human Services dramatically cut the costs of transporting clients. Under previous arrangements, caseworkers would use their own cars for client trips. In addition, an administrator in the mayor's office helped the transportation division gain access to the tax-free municipal gas pump. When this was first initiated, the taxes were 50% of the cost of gas. That alteration saved the division half of its fuel costs.

becoming scarce, it is not surprising that municipal administrators focused their attention on maintaining and acquiring resources rather than upon using them most efficiently [3, 23]. Thus, while UMIS was oversold as an aid to management efficiencies, its image, ironically, helped increase the kinds of services made available to the needy.

C. The Interplay of Technical Features and Organizational Demands

UMIS's impacts are a joint product of its *technical features* and of the *organizational demands* [9] placed upon different agencies, administrators, and caseworkers. This is best seen by imagining a slightly different information system that is used in similar circumstances and then imagining the impacts of UMIS under altered organizational arrangements.

First, consider some technical variations. If UMIS data entry were keypunched on cards and data were retrieved only by batch-printed reports it would make a less dramatic impression upon Federal officials and would have diminished "administrative attractiveness" for agencies in Riverville that use it.

If UMIS contained narrative data to replace each caseworker's files then its potential utility to caseworkers would be enhanced. However, it would also become the focus of conflicts about access of third parties to sensitive client information.

Suppose that the organizational arrangements for providing social services were slightly altered. For example, if all the agencies received funds from a common source, then they might be more persuaded to use UMIS, much like the agencies in Cincinnati which used IUIS.

Riverville's Department of Human Services faced demands for the justification of their expenditures in order to continue receiving Federal support. *Unlike* the case of welfare automation in Western County [15], its staff was not attacked by local elected officials for "inefficiency" or allowing welfare "cheaters" to receive funds. Were the local elected officials in Riverville more suspicious of welfare administrators, one might expect agency staff to view the automated system (as happened in Western County) with suspicion, as a tool of elected officials, as hurting the quality of services to welfare clients, etc. On the contrary, the primary complaints about UMIS focused on the discrepancy between what it promised and what it actually provided. However, in Riverville, UMIS was used as an administrative aid to help the agencies receive funding from external sources rather than being used as a tool of external elites to control social programs.

More generally, the use and impacts of computer-based systems are products of *both* their technical features and the social setting in which they are used [13]. Knowledge of the technology or the social setting *only* is insufficient for accurate predictions.

VII. Conclusions

As an administrative aid, UMIS provides: 1. A single intake form for the agencies which are "fully on." 2. Monthly statistical summaries of client profiles and agency workloads for managers. 3. A client-tracking system that records the agency to which a person has been referred, whether he has been accepted, and the category of service(s) provided.

These features directly benefit some Human Services Division clients by eliminating duplicate application forms, agency heads who save clerical work in filling out routine reports, and neighborhood service center caseworkers in following up of clients.

Other impacts of UMIS are less clear. Some benefits attributed to UMIS, such as eliminating duplicate services, actually accrue to the administrative strategy of consolidating disparate agencies and centralizing their support functions.

Like any complicated technical system embedded in a complex organizational framework, UMIS is imperfect. Since some agencies don't participate, the "integration of services" is incomplete. Some data is inaccurate [11]. And clients may still be "lost" through their own desire or the negligence of caseworkers. Perhaps fewer clients are lost through negligence or confusion. Unfortunately, there is no hard data to support such conclusions.

Some important points stand out clearly in this study. An automated information system may receive considerable support when it provides clear resources to the staff (and clients) of an agency which uses it. However, information alone appears to be a weak integrator in contrast with the exercise of administrative authority. While it is difficult to disentangle the impacts of computing from those of administrative policies, such distinctions are both theoretically and practically important. It is commonplace to expect that an "oversold" information system provides more benefits for the seller than for its users. But in this case, extensive oversell of UMIS increased the administrative attractiveness of the agencies which used it, benefiting them as well as the vendor. Lastly, the impacts of UMIS are a joint product of *both* its technical features and the organizational setting in which it is used. These observations lead us to expand our focus from the internal structure and operations of computer-using organizations to their political economies [3, 9, 23]. This study illustrates the importance of thinking through the impacts of computing with a sharp characterization of the technical features of a system on one hand, and the social setting in which its users carry out their activities on the other.

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Operating Systems

R. S. Gaines Editor

Performance of Rollback Recovery Systems under Intermittent Failures

E. Gelenbe
Université Paris–Sud

D. Derochette
Université de Liège

A mathematical model of a transaction-oriented system under intermittent failures is proposed. The system is assumed to operate with a checkpointing and rollback/recovery method to ensure reliable information processing. The model is used to derive the principal performance measures, including availability, response time, and the system saturation point.

Key Words and Phrases: database reliability, file systems, checkpoints, recovery procedures, checkpointing techniques, reliability and system performance evaluation

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Authors' addresses: E. Gelenbe, Université Paris-Sud, 91405, Orsay, France; D. Derochette, Projet de Base de Données Médicale, Faculté de Médecine, Université de Liège, Belgique.