

PERSPECTIVE

**IMPLEMENTING LOCAL MULTIPURPOSE LAND  
INFORMATION SYSTEMS: POLITICAL-ECONOMIC  
RESEARCH ISSUES**

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**ABSTRACT.** *This paper explores the relationship between multipurpose land information systems and the acquisition, distribution and use of political power in U.S. local governments. It is argued that local governments will be the primary adopters and users of these systems. Evidence from related research suggests that adoption of computerized land information technology will act to reinforce, rather than redistribute, the existing distribution and use of political power. However, this evidence is based on non-land information system computer adoption. The need to conduct specific political and institutional research on land information systems, and to begin conceptualizing and testing a democratic theory of their adoption is stressed.*

Computers are an ever increasing part of all phases of local, municipal government operations. The average number of operational applications has nearly tripled in the decade 1975-1985 (Kraemer, King, Dunkle, & Lane, 1986). In the area of land records, an estimate by the U.S. government suggests that local governments have increased their use of computers for information storage and updating by 500% between 1976 and 1982 (U.S. Bureau of the Census, 1984). According to one estimate, there were over 1000 geographic and land information systems in North America in 1983 (Coppock & Anderson, 1987). Projections through the end of the decade are for continued expansion of computer use in general by local governments, and for geographic and land information system use to quadruple (Coppock & Anderson, 1987; Kraemer et al., 1986). In fact, according to one private market estimate of geographic and land information system investment, governments and utilities are expected to expend between \$45B and \$90B on these systems by the turn of the century (*Intelligent Infrastructure Market Report*, 1986).

This rapid expansion of the computer use by local governments, as well as businesses and other private organizations has led to speculation about an information society in an information age (Cornish, 1981; Molitor, 1981). Widespread use of computers is expected to revolutionize the economy, and social and political relations of American and other societies (Winner, 1985).

This paper explores, in a theoretical manner, the relationship of multipurpose land information systems (MPLIS) to the acquisition, distribution and use of political power within local governments in the U.S. The results of the exploration are unsettling. Current evidence suggests that the introduction of computers in local government reinforces preexisting power relationships. Instead of computers acting to redistribute unequal power, the hope of many computer pundits, they appear to increase the distance between the information rich and information poor, even while increasing the total amount of information available. Computers in local government in general, and by implication MPLIS, seem to lead to less, rather than more, democratic distribution and use of power.

However, the bulk of the data that leads to this conclusion is nearly a decade old, and it is not specific to MPLIS. Therefore, detailed studies of MPLIS acquisition and use need to be conducted. Also, a democratic theory for MPLIS adoption – what it would mean to facilitate democratic access and use of MPLIS – needs to be formulated, since the issue for the future of MPLIS is not if, but when and how they will be put into place.

In the sections of this paper that follow I will (1) define MPLIS and establish why a discussion of MPLIS implementation in the U.S. focuses on local governments, as contrasted with state or national governments, (2) review theories of local political power, and hypotheses regarding computer use and local political power as presented in a major study of that subject, (3) present evidence from this study on the politics of computing, and (4) offer speculative thoughts on appropriate future research on the political-economic impacts of MPLIS implementation and ways to ameliorate negative impacts from such implementation.

### **MPLIS AND LOCAL GOVERNMENTS IN THE U.S.**

Multipurpose land information systems is one of several phrases used to describe an interrelated set of computerized data on land. A composite definition from a recent World Bank publication is:

A relatively new development that incorporates into one source the legal and fiscal cadastral data (a cadastre is an official register of the location, boundaries, ownership, value and other attributes of land) plus information on land use, infrastructure, buildings, soil and other factors. A system that consists of a data base containing land related information and the procedures and techniques for systematically collecting, updating, processing, and distributing the information. (Austin, 1985, p. 2)

There are multiple rationales for these systems. According to the World Bank, MPLIS can help to “cope with growing demands arising from large increases in the number of land transactions, swiftly changing land use, and other trends related to city growth” (Austin, 1985, p. 1). Ideally, an MPLIS would provide accurate data on land market activities and their implications, provide clear, unambiguous data to formulate and administer land policies, encourage coordination within and among land related public agencies and private parties, and, not unimportantly, facilitate more effective and equitable property taxation.

While there are few, if any, fully functioning multipurpose land information systems, there are many experiments. One, in Dane County, Wisconsin, seeks to bring together into a single data base natural resource data, for example, data on wetlands, land cover,

and soils, with parcel level ownership data, legal land use planning data as expressed in zoning, and a base survey established by the federal government under the public land survey system (Chrisman, Mezera et al., 1984). A unique aspect of this project is that each of the data bases that make up the MPLIS are currently developed and maintained by separate public agencies for separate purposes. One goal of the project is to determine if these land records can be effectively integrated for use by all of the respective agencies as well as individual land owners, land realtors and developers.

This activity in Wisconsin, and related activity in other parts of the U.S., is spurred by two recent reports of the prestigious National Research Council (1980, 1983). These reports argue for the development of MPLIS on the basis of developments in information processing and land evaluation technologies (with regard to the latter this includes major new advances in satellite technology and its ability to help determine ground location and features), and, as noted, the advantages for land policy, planning and taxation that should result from system operation.

As the National Research Council and others work to develop the theory and operation of fully functioning MPLIS, one of the key issues to be resolved is which level of government – local, state or national – will have lead authority for such systems. In the U.S., this discussion focuses on the state and local governments. It is these governments which currently hold primary authority for most land policy, planning and taxation functions.

Among state and local governments, much of the current thinking tends toward the assumption that MPLIS will need to be compatible to local government operations. The reasons for this are twofold, having to do (1) with the sheer number of local governments and their current responsibilities in the general area of land records, and (2) recent attempts, within the last two decades, to shift land planning and policy authority from local to state governments, disillusionment with this process, and current resolve to work within the local government framework.

On the first point, Chrisman, Kaufman et al. (1984, p. 221) argue that “local government appears to be the focal point for land record modernization.” Using Wisconsin as their example, the authors note that given that the current system of land title recording and planning is locally based, at the county, city and township levels, the success of MPLIS is premised on its ability to match to this system. In addition, much of what the state seeks to accomplish in the way of land policy and land data collection is done through delegation of responsibility to local governments.

At present, [in Wisconsin] local government is responsible for floodplain, shoreline, farmland, and wetland zoning. It has recently been made responsible for soil erosion mitigation planning. These state-mandated programs are in addition to other existing land use and zoning authorities and responsibilities. In order to provide the basis for conducting these programs, local government is responsible for collecting and maintaining numerous types of land records. In addition, they are also responsible for maintaining one of our society’s most important land records – the one documenting ownership. (Chrisman, Kaufman et al., 1984, p. 221)

Chrisman, Kaufman et al. (1984) note that in Wisconsin alone there are nearly 3,000 local units of government, two-thirds of which are counties, cities, villages and townships. This pattern is repeated throughout the U.S.

The second reason for focusing the design of MPLIS at the local government level comes from largely failed efforts in the past two decades to reform a well-entrenched

system of local control over land use planning and land policy implementation (Barrows, 1982; Bosselman & Callies, 1971; Popper, 1974, 1981). This system of planning and policy implementation arose in the 1920's largely out of the necessity of cities to manage explosive urban growth. State legislatures throughout the U.S. passed enabling laws which transferred planning and regulatory powers to the most local of government units. By the 1960's a great deal of interest developed in the reform of this local planning and policy structure. The need for reform was premised on the inappropriateness of local control. It was judged to be parochial, discriminatory, destructive of ecosystem resources, and wasteful of investment capital. In the terms of population biologist Garret Hardin (1968) local land use planning was a "tragedy of the commons."

The movement to reform local land planning concentrated on the shifting of administrative authority upwards to regional and state governments and agencies (Bosselman & Callies, 1971). Centralized control was offered as the solution to the fragmentation of local authority. While significant experiments occurred in this movement (Bosselman & Callies, 1971; DeGrove, 1984; Popper, 1981), by the middle 1970's it appeared largely dead. After an initial period of what seemed to be widespread support for reform, for a variety of reasons these efforts began to generate considerable opposition (McCloughry, 1976; Walker & Heiman, 1981).

Now, in the 1980's, the current climate in land policy is unsettled. Popper (1988) has recently argued that the movement succeeded, though in a more fragmented way than expected. Even he suggests, though, that the future will contain a strong role for local governments. Others who once vigorously supported the movement toward regional land use planning are searching for ways to make the local system workable (Healy & Rosenberg, 1979; Weaver & Babcock, 1979). Rather than trying to replace what was perceived to be a system of irresponsible local control with a system of responsible regional control, some analysts are shifting theoretical and applied efforts toward exploration of the dimensions of a responsible localism (Jacobs, in press).

Thus, the development of MPLIS is directed at local governments in the U.S. because (1) they are the units of government with the most extensive land records and the most pressing need for effective management of those records, and (2) it is understood that local governments will continue to have a dominant role in the area of land planning and policy into the foreseeable future. That local governments themselves perceive the need to acquire and utilize MPLIS in some form is evidenced by the increasing number of governments with some type of system (Hysom & Ruth, 1984) and the current increase in the number of commercial vendors promoting such systems for local governments.

### **POLITICS, POWER AND COMPUTING**

According to Winner (1985) computer enthusiasts (or as he terms them computer romanticists) are overwhelmingly optimistic about the political impacts of new information processing technology. For example, in the area of political participation where participation rates have continually declined for all aspects of the political process—from membership in neighborhood political organizations to voting in local, state, and national elections—one enthusiast writes "the information revolution is bringing with it a key that may open the door to a new era of involvement and participation" (as quoted in Winner, 1985, p. 23). From very preliminary evidence, though, the actual impacts may be much less sanguine.

To understand the likely impacts of MPLIS on politics and power in U.S. local governments, it is first necessary to review the commonly held theories about how such power is acquired, distributed and used. To this it is then necessary to graft hypotheses about the impacts of computers. For this latter task and for evidence about actual impacts I rely heavily upon a study conducted by Danziger, Dutton, Kling, and Kraemer (1982).

There are three primary bases for explaining, and thus predicting, political behavior in and around local governmental units in the U.S. These three paradigms of local political behavior are commonly known as the pluralist, elitist and radical—that is, Marxian or neomarxian—schools. The difference in their interpretations of local political actions, and importantly non-action, focuses largely on the dual issues of who controls local government policy formation, and in whose interest.

The pluralist theory of local politics embodies current conventional wisdom about politics. It posits that in local politics there are a myriad of interest groups seeking to influence the legislative-administrative policy process. These interest groups compete with each other in the legislative-administrative policy marketplace for relative influence on the nature of final policy decisions and non-decisions. The critical element of this paradigm is the assertion about what results from this competitive process. Pluralists argue that the outcome of interest group competition in the policy arena is (1) a pattern of winning and influence in which no one group consistently dominates—that is, a somewhat random outcome to which structural variables, such as being the largest or most important interest group may not consistently insure success, because of factors such as salience of an issue to other interests and those in the legislative-administrative policy arena, and (2) a set of policy decisions which reflect compromise among all interest groups, and which do not always directly reflect the relative strength of the competing groups. This school of thinking is most prominently put forth by Dahl (1961) and Polsby (1963, 1980). It continues as the basis of the work of many political scientists, being perhaps the most ascribed to position in local political theory.

Of the three paradigms, though, pluralism was the second prominent theory, being developed in part in reaction to the dominant theory of the early to middle part of this century, the elitist school. A central figure in this school is the work of Mills (1959). The elitist school acknowledges the existence and competition of interest groups in local politics. However, it is asserted that what comes out of this competition is a process of politics which benefits an identifiable set of political and social elites—such as the ward boss, the banker, the real estate developer, or not uncommonly, their collaborative effort as an interest group (Bachrach, 1971; Domhoff, 1970).

Whether or not the elitist school was the correct explanation for the early to mid part of the 20th century—the modern industrial period—it did appear that Dahl's work and that which he inspired in the 1960's and 1970's offered strong evidence that community-local politics in the late or post-industrial periods of U.S. development was not strictly elitist. The issue that immediately arose, however, was whether it was strictly pluralist. In 1962, immediately following publication of Dahl's book, two political scientists began to contribute to what is now an ever growing set of criticisms about the universality of the pluralist paradigm (Bachrach & Baratz, 1962). This third paradigm has been given various titles: progressive, radical, class-dialectical, Marxist.

Like the other two paradigms, this third paradigm acknowledges the existence of competing interest groups, with varying strengths of resources and access among them. However, parting with the pluralists, the radical paradigm suggests that there is a consistent pattern of winning and influence in local politics. Broadly speaking, this

pattern sees one class of society consistently having its interests served and reinforced. However, this pattern is not always overt. Political influence can occur not only by winning and directly influencing the structure of a legislative-administrative policy, it can also occur by keeping items from ever appearing on the political agenda, so that there is never opportunity for debate and influence, or by social-ideological manipulation that even prevents an interest group from organizing, or, if organized, from having widespread influence (Lukcs, 1974).

In the study *Computers and Politics*, Danziger et al. (1982) take these three general paradigms of community-local politics and state them very specifically in terms of computer use by U.S. local governments. They modify the basic framework by generating two types of elitist theory, and, thus, have four paradigms against which they test their data. The labels they give these paradigms are: organizational pluralism, technocratic elitism, managerial rationalism, and reinforcement politics.

Organizational pluralism is described in much the same way as is pluralism. Various groups will compete for influence. All the groups will have some resources, though these will not be equal. In the competition no one group will consistently dominate the others. The political system "is essentially fragmented and nonhierarchical . . . no unitary control system [exists], . . . no group is either a consistent 'winner' or 'loser'" (Danziger et al., 1982, p. 17). Automated information is not seen to be significantly different than other forms of information, and information itself is only one of many resources important to the political process (Danziger et al., 1982, p. 40).

The technocratic elitist position is premised on the fact that organizations are composed of domains of technical experts dealing with complex and technical phenomena. Political power is believed to flow to these experts because of their ability to understand, manipulate and control technical processes. Therefore, it is not legislators and administrative policy personnel who control technology and technical information, but instead the very people generating and utilizing such information. Thus, when computer technology, such as multipurpose land information systems, is introduced, it can be expected that those who understand and use such systems will become more powerful over those policy areas to which the systems apply.

Managerial rationalism, the third theoretical perspective, posits that instead of technical elites benefitting from the introduction of computing, it will be the top managers of the organizations. In this paradigm, it is assumed that the goal of local government organization is to be as rational as possible in its decision-analysis and decision-making process. From this perspective, computerized information is seen as increasing the potential for rationality of the organization. It is believed that the very availability of large amounts of automated information will lead to greater use of such information, thereby leading to more rational evaluations, assessments and decisions.

The final political perspective offered is reinforcement politics. This perspective asserts that in any given political situation there is a dominant interest or coalition. The introduction of a technology, such as MPLIS, is believed to further reinforce the position of these dominant interests. According to the authors, "computing will *reinforce* the power and influence of those actors and groups who already have the most resources and power in the organization" (Danziger et al., 1982, p. 18).

According to Danziger et al. (1982), the computer literature offers two variations on the elitist theory of local politics. One thrust argues that the managerial rationalist perspective best explains and predicts the adoption and use of computers in American local governments. In contrast, another part of the literature hypothesizes that the technocratic elitist perspective will best explain and predict political events. The authors

amalgamate these two to hypothesize that “computing was likely to shift power toward technical experts and top managers in organizations” (Danziger et al., 1982, p. xiii).

### HOW POLITICAL IS COMPUTING?

Drawing from a national survey of 700 cities and fieldwork in a selected sample of 42 cities, the authors of *Computers and Politics* seek to test the salicency of the respective paradigms, or perspectives, of politics. Their results are unsettling.

Perhaps the most important general conclusion which is offered is that “computing is a political instrument rather than simply a neutral tool” (Danziger et al., 1982, p. 120). In fact, the authors go farther than this in their analysis and conclusion when they offer the observation that “computing has been a politically *conservative* [italics added] political innovation” (Danziger et al., 1982, p. 3).

These observations, and others, lead the authors to conclude that the perspective of managerial rationalism is not and cannot be a satisfactory explanation of local politics. This perspective is essentially, and especially among the four, apolitical. It assumes that the local *political* system has lost power to influence technological decisions. Instead decisions are made by neutral bureaucrats/administrators/managers whose only concern is the interests of the organization as a whole.

From among the other three paradigms, the authors next reject their other hypothesized explanation—that of technocratic elitism. According to their data, technocratic elites have not been particularly successful in gaining new political power as a result of their mastery over automated information technology. Instead, they observe that automated information technology and capability become diversified among units within local governments, and that while certain technocratic elites sometimes gain some power, there is no consistent pattern of gain for this group.

The politics of computing within local governments is thus best explained and predicted on the basis of either organizational pluralism or reinforcement politics. In line with the explanation offered by organizational pluralism, the authors note that the role of automated information appears to increase the number of perceived alternatives and thus further complicate bureaucratic politics: “infusion of data-based evidence . . . can exacerbate the competitive aspects of bureaucratic politics, producing outcomes desired by none of the players” (Danziger et al., 1982, p. 165).

While this would appear to offer evidence for organizational pluralism, when the authors examine the totality of their results and analyses, they suggest that reinforcement politics is the paradigm which best explains available evidence. In their words:

In general, it [information technology] has been shaped by those who directly control it to serve the interests of those who dominate the prevailing structure of influence within the local government. . . . computing tends to reinforce not only the prevailing structure of control within local governments, but also the prevailing political and organizational biases of those governments. (Danziger et al., 1982, p. 3)

Danziger et al. (1982, p. 20) explain the different levels of use for computing by suggesting that computers “tend to be employed where the dominant policy makers are most certain that they can control the access to, the manipulation of and the use of automated information.” The class nature of computing is brought out most clearly when it is suggested that computing “is a conservative technology and not an instrument for change and redistribution” (Danziger et al., 1982, p. 231).

In summary, the authors of *Computers and Politics* seek to determine which of four perspectives on local politics best explains and predicts political behavior around the issue of computer adoption and use. These four perspectives are derivatives of three fundamental paradigms in the fields of political science and community sociology on local politics. Organizational pluralism supposes that there will be interest group conflict over computers and their use, and that the outcome of a series of conflicts will be a pattern where no single interest group consistently prevails. Managerial rationalism and technocratic elitism are two variations on the general paradigm of elitism. Respectively, they suggest that either top managers and administrators will capture the political power of computers, to use in the general interest of the local government as a whole, or that computer/information specialists will gain in political influence as a result of their specialized knowledge about the workings of the technology. Reinforcement politics suggests that the outcome of local politics, regardless of what appears to be operating, that is, pluralist or elitist, will result in a set of decisions or non-decisions that will act to reinforce the existing biases of the local government and the existing power of those already holding power.

The results of this research are to reject hypotheses about either managerial rationalism or technocratic elitism being the most viable explanation of local political behavior, and to instead put forth reinforcement politics as the perspective best fitting the evidence.

This research conclusion, that the introduction of computing technology reinforces the existing distribution and use of political power instead of acting to redistribute it, concurs with the earlier research results of Laudon (1974) and the speculations offered by both Winner (1985) and Steinhart (1985). Laudon (1974) found that the use of computers helped to entrench traditional policies and lessened the perceived need for change. Information technology became a malleable tool whose meaning, content, and consequences were subject to the specific political interests that controlled it. Winner (1985) and Steinhart (1985) do not examine the issue of computing and local governments; instead they look more broadly at the impact of computing on power relationships in society. According to Winner (1985, p. 24):

The computer savants correctly notice that computerization alters relationships of social power and control; however, the most obvious beneficiaries of this change are large transnational business corporations. While their "global reach" does not arise solely from the application of information technologies, such organizations are uniquely situated to exploit the new electronic possibilities for greater efficiency, productivity, command and control. Other notable beneficiaries will be public bureaucracies, intelligence agencies, and ever-expanding military organizations.

Likewise, Steinhart (1985, p. 2) raises concerns about "revolutionary opportunities for exploitation, manipulation and privacy infringement."

### **THE POLITICS OF MPLIS IMPLEMENTATION**

Yet, the literature and research on computer use in general, as well as its use by U.S. local governments does not focus on multipurpose land information systems. These systems are relatively new. The politics of MPLIS implementation, an implementation process which will likely be widespread within a decade, may follow that identified for other computer use, or it may not. The research at the base of the conclusions offered



by Danziger et al. (1982) was conducted over a decade ago. Since that time there has been a revolution in microcomputer technology, software, availability and cost, and the trends of easier to use, cheaper, and omnipresent computers appears to be continuing.

These changes raise several issues for research on MPLIS implementation. Two of these are outlined below.

Given the changes in computer technology and software in the decade since Danziger et al. (1982) conducted their research, and the ever-increasing rate of computer use by local governments for MPLIS related functions, a specific study needs to be conducted which replicates Danziger et al. (1982) for MPLIS. Who uses MPLIS, for what reasons and with what results? Does use of MPLIS follow the pattern of other types of computer use in local government; do MPLIS allow for a concentration of power among a class of interests in a locality? These and related questions need to be posed. My colleagues and I at the University of Wisconsin-Madison (Buttenfield et al., 1984; Chrisman, Kaufman et al., 1984) are confident that the future will bring extensive use of MPLIS and aspects of MPLIS by local governments throughout the U.S. for a wide variety of functions. Will this nearly certain implementation of land related information processing technology lead, as Danziger et al. (1982), Winner (1985) and Steinhart (1985) seem to imply, to an Orwellian world of centralized information used for social and political control? At a minimum, it is incumbent upon those of us interested and involved in the development of these systems to honestly assess patterns and implications of system use.

If, however, this research confirms our worst fears, and we are convinced of the forthcoming ubiquity of multipurpose land information systems, then we need to formulate and test a democratic theory for MPLIS implementation. Research needs to be done on what would constitute a "democratic MPLIS." What does this mean for the design of a system—for example, the type of software used, the accessibility of the data set, and the cost of access? What does democracy mean for the maintenance and evaluation of a system—who should have responsibilities in this regard, with accountability to whom and under what type of charge? For instance, in Wisconsin, the statewide Department of Natural Resources is monitored by an independent public intervenor's office, in the Department of Justice, in order to assure that the Department's environmental mission is fulfilled. Will similar types of institutional arrangements need to be devised to insure democracy in MPLIS implementation?

Whether these are purely academic questions is unclear from the empirical evidence available to date. McKenzie et al. (1982) and Gross, Fabos, Tracy, and Waltuch (1987) seem to offer data to support the democratization of power based on the computerization of land use planning. But the arguments of McKenzie et al. (1982) are largely conjecture, and Gross et al. (1987) report on a case situation in Massachusetts in which they claim that the availability of land information systems allowed for broader participation in the planning process, but they offer no evidence of this.

Adler (1987) reports on recent changes within the Los Angeles, California County Department of Regional Planning which offers conflicting evidence. After introduction of two computer based planning and information systems, substantial changes have resulted and are anticipated in the role and function of the planning agency. On the one hand, the credibility of the agency has been enhanced in the eyes of some of its most active constituents—land developers, infrastructure and service providers, citizen activist groups, and elected local government officials—because of the agency's ability to provide accurate, detailed and timely information. On the other hand, the activities of the agency have changed and are expected to change further. Information previously

held in an exclusive manner is now more widely available. This appears to be leading the agency to modify its functions from the preparation of long-range plans to the facilitation of shorter-range sectoral plans, and to reduced discretionary activity on the part of planning professionals in the agency. At this time it is unclear who will gain or lose from these changes, and whether more democracy will be a result. But it is clear that the introduction of computers has shifted previous relationships.

The research results of Danziger et al. (1982) and others suggest that efforts to clarify, rationalize and increase the analytic capability of land related offices in local government may well result in the exclusion of ordinary citizens from the management of governmental affairs. Instead, those local political and economics interests that currently control such offices and governments will likely be able to grow stronger and more entrenched through the use of MPLIS. As an alternative to this scenario we need to formulate and test an MPLIS implementation process that at least does not exacerbate preexisting unequal distributions of power, and perhaps even fulfills the promise of computing—the distribution of access and use of information for more informed and empowered democratic participation.

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