

Overview of Program Accomplishments:

Wisconsin Land Information Program

1989 - 1995

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University of Wisconsin-Madison**

and

**Wisconsin Department of Administration
Madison, Wisconsin**

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I. Introduction

"These are exciting times ... in the development of information systems... .
Our opportunity is at hand to fundamentally change how we handle information in
the age of information."

Governor Tommy G. Thompson, February 19, 1990

Wisconsin Land Information Association Annual Meeting,, Stevens Point.

A. On the Information Highway?

Two decades ago, Wisconsin Department of Administration (DOA) analysts, in cooperation with the U.S. Department of the Interior and the UW-Madison, reported that in 1976 Wisconsin residents spent about \$78 million **annually** (about \$17 per citizen) in the collection and management of land records. About one-half of that annual expenditure was attributable to local government requirements (Fig. 1) (Larsen et al., 1978).

This annual multi-million-dollar expenditure was sustaining a land information enterprise based on management methods and technology developed in the 1830's, before Wisconsin became a state. In Dane County alone, DOA analysts discovered that the delineations of all real property and tax parcel boundaries were being maintained and updated on tablecloth-type linen cloth originally drafted with crow quill pens and india ink during the Great Depression by out-of-work Works Project Administration (WPA) employees. In some counties, the real-property grantee-grantor books that reside in county courthouses date back to the origins of the territory. In 1976, these outmoded land records "management" methods were the norm -- not the exception -- for many Wisconsin counties. They remained the norm until the implementation of the WLIP.

And, of course, the DOA analysts also discovered in 1976 that full use of this annual multi-million-dollar public expenditure was beset by a compendium of technical and institutional problems (Fig. 2). Prime among these were inaccuracy, incompatibility, and inaccessibility of data, rendering much of that multi-million-dollar expenditure of limited use.

Local governments face an expanding set of management issues. These include more efficient management of utilities and transportation systems, more expeditious delivery of emergency management services (such as E-911 routing in rural areas), increased information demands expected from the 1995 Farm Bill (such as the environmental and economic impacts of removal of lands from the Conservation Reserve Program), greater interest in precision agriculture and its needs for current soil and climatic information, and the traditional but expanding land use and zoning responsibilities of local government. All of these issues could benefit from expanded use of GIS technologies.

Financial resources for local government will be more closely directed than in the past. Nevertheless, some jurisdictions will be buying into GIS. By the end of the decade, all levels of local government will have invested millions of dollars in GIS technologies. The Wisconsin Land Information Board estimates that by the year 2000 about \$100 million will be invested to modernize Wisconsin's local urban and rural land information and records systems.

Finally, if local governments -- in particular, rural areas -- don't gain access to the information superhighway, many communities will wither as did many by not being on an interstate highway. This would have devastating impacts on job creation and retention, future revenues, and, in the end, their own livelihood. The expeditious transfer of information management capabilities will give local governments the means to gain efficient and effective access to the Information Superhighway.

What has been needed was to gain access to modernization resources to ensure that this multi-million-dollar expenditure resulted in a true *investment* in technologies that yield efficiency, effectiveness, and equitability in land records management and use. What was needed, because counties are the major collectors and custodians of land records data, was a modernization solution to these multiple land records management problems that would focus on the local level of government. Turning this annual public expenditure into a true annual investment -- through automation and coordination -- is the purpose and function of the Wisconsin Land Information Program.

Because of the Wisconsin Land Information Program (WLIP), modernization of Wisconsin's local land records is now underway.

"Re-engineering is customer focused. Re-engineering is not tinkering at the margin. Re-engineering is cutting into the very basics of how the organization operates."

Michael Hammer

Government Technology 8(9): 30-31.

B. Better Service through Land Records Management

Through the state-wide, county-focused, user-supported Wisconsin Land Information Program, local governments and state agencies are buying into automated land information systems for managing land and population information. Through these computerized systems, municipalities, counties, and regional planning commissions, and state and federal agencies were developing greatly enhanced abilities to improve public service through better land records management. Since most information about the land and its use is gathered and held at the local level, local government ability to acquire, store, retrieve, and share land records is elemental to providing service to the citizen.

Since its inception in 1989, the Wisconsin Land Information Program has collected and distributed about \$30 million in both retained fees and grants (Table 1). Tracking the use of those funds provides measures of counties' needs and interests, successes of the WLIP in providing assistance, and progress toward cost effectiveness in serving the public. The Annual Status Report Survey began as a survey of the status of modernization and allocation of funds, but it has since been expanded to include a section that allows counties to formally evaluate the WLIP annually. The survey is completed by each County Land Information Officer.

Other similar surveys have been sent to the 800+ land-use professionals around the state. These surveys have provided solid longitudinal data on the many aspects of WLIP performance, as well as land records modernization by local governments in Wisconsin.

This document reports those survey results on the benefits, effectiveness, expenditures, and accomplishments in land records modernization by local governments in Wisconsin.¹

II. WLIP

A. A Mechanism for Modernization

The mechanism that effected the Wisconsin Land Information Program (WLIP) was Act 31 of the 1989 Biennial Budget, crafted by land-use professionals over nearly a quarter century of research, discussion, and planning. These land-use professionals represented surveyors (like former Rep. Robert Welch, (R) of Red Granite), registers of deeds, property listers, and many more. Act 31 passed the Assembly on a vote of 68 to 30, and unanimously in the Senate. These public servants saw the enormous advantage of computerized land information data combined with the emerging power of automated mapping. They anticipated combining vast amounts of data -- ownership, property value, land use -- with actual places on maps, instantaneously. It was apparent to them that better government service was possible only if Wisconsin's local governments were adequately structured and equipped for efficient and effective use of these information technologies.

B. A Decentralized Confederation of Efforts

The Program was structured to be state-wide, yet county-focused, to be voluntary, operated on an incentive basis, at a level appropriate to any individual county. As conceived, the

¹ At the time of the first annual survey, 71 of Wisconsin's 72 counties participated in the WLIP. Of the participating counties, all but one responded, providing a 98% response rate. In the second year, 1993, all 72 counties were participating in the program. For the 1993 status information used in this report, 68 counties are included, providing a 94% response rate. For the 1993 evaluation data, 64 counties are represented, providing a response rate of 88%.

Program operates under enabling legislation from the state legislature and the governor. It is funded by user fees, the results of Act 339 of the 1989 Biennial Budget. The administrative arm of the Program resides with the oversight Board, the central Office of Land Information, and the Grants-in-Aid program (Fig. 3). The Board sustains dialogue among all levels of government and the private sector, and encourages those groups to sustain relationships with the governor and legislature. Parallel to the Board are individual county land Information Officers, who operate under their respective County Boards, in cooperation with each other and with the Board. They too, sustain productive relationships with all levels of government and enterprise. Corollarily, an organization of land-use professionals representing the public and private sectors (the Wisconsin Land Information Association) is expected to inform and advise both the Board and the Legislature on their views of land records administration.

Furthermore, the Program explicitly mandates the involvement of certain land-related state agencies, thereby ensuring that developments in technology and data sharing are complementary to the needs of various levels of government. The arrangement helps the Program fulfill one of its objectives as a clearinghouse for land information inventory.

The Program is incentive-based, in that counties were encouraged to take part by virtue of the arrangement that they would keep the bulk of the fees accumulated. Within the framework of the Program, they would spend those monies as the county itself determined appropriate. For counties with active changes in land ownership and use, greater amounts of money are generated to support efforts toward modernization. Those counties with fewer land transactions acquire fees consonant with the lesser demands on their land records offices. Access to the additional grants-in-aid from the collective coffer is available to all counties equally, dependent upon a locality's ability to prepare a grant proposal that competes with those from any other county or municipality. This "win-win" financing has resulted in full participation by all 72 of Wisconsin's counties. And still, land recordation fees in Wisconsin -- even at the authorized increased level -- are lower than those of all surrounding midwestern states.

Within the framework of the eight basic areas of land records modernization activities -- the Foundational Elements defined in the original legislation -- every county has complete autonomy over the pace, effort, funding, and timing of its actions.

The county-centered focus of the Program established a decentralized confederation of systems, whereby those units of government with land records responsibilities continue to collect, maintain, and keep custody of their land information. This confederation of systems exists as a set of independently held databases residing on a variety of computer hardware and software configurations. Because information is the critical component of the system, technical specifications, standards, and guidelines are focused on the data -- not on the custodial units of government. The system(s) then are developed "bottoms up," making local governments integral participants in the enterprise of developing integrated data systems.

III. Investments

A. User-Fee Supported

The WLIP is financed by those who use land information; it is based on an incremental increase in the document recordation fee (\$6 for the first page of any recorded document, and \$2 for each successive page) at the office of the register of deeds in each county that has chosen to participate in the program. All 72 counties have chosen to participate. Each county retains two-thirds of the collected fees to use within the program's eight defined areas, Foundational Elements. The final third goes to a collective coffer, from which funds are awarded back to the counties on the basis of proposals judged by the oversight group, the Wisconsin Land Information Board, composed of appointed individuals, secretaries of state departments, and non-voting advisory members from federal and other land-interest agencies.

Respondents reported spending a total of nearly \$6,700,000, excluding staff salaries, on Foundational Elements and other major categories in just one surveyed year (Table 1). The Foundational Elements are those eight essential areas of land records modernization agreed to be of primary importance by all program participants. "Other major categories" are those identified more recently by the WLIP to ensure that datasets are developed with the fullest potential for efficient use.

The cost of running the WLIP is estimated to be a mere 4% of program revenues.

B. Used as intended

The expenditures on Foundational Elements and major categories² are distributed unevenly among elements (Fig. 4). Efforts toward geographic reference framework have been given 36% of the funds. Base mapping and parcel mapping were given another 27% and 23%, respectively. Thus, approximately 86% of the funding spent on the major categories has been devoted to basic Foundational Elements. This reflects the counties' enormous commitment to structuring their land records modernization programs, literally, from the ground up, thereby ensuring accuracy and validity through all future uses of the shared data. Such an integrated effort meets the "enterprise" standard set by Gov. Thompson in his Executive Order 242 on information technology for state agencies.

Another Foundational Element receiving commitment from counties is Communication, Education, and Training. Considering that salary is excluded³, 'Comm, Ed' receives the sizable sum of over 1% of all expenditures. More importantly, 'Comm, Ed' was reported as an on-going activity in 43 counties, the second highest showing of all Foundational Elements (Fig. 5). It is that investment in education that shows that communities are making long-term commitments to the modernization process.

C. Equitable Distribution

The increase in the document recordation fee provides all 72 Wisconsin counties access to two purses of money. One is "retained fees," kept in the county where it is collected. The other is a collective coffer, to which each county sends one-third of its new receipts to be distributed through the grants-in-aid program.

The amount of retained fees varies by county and is directly reflective of the actual number of transactions and land record collection and management activity within each county. To take part in the Program (and thereby initiate the collection of recordation fees), each county -- with WLIP review, guidance, and approval -- has put into place a five-year land records modernization plan. Since 1990, Wisconsin counties have now collectively retained about \$20 million to invest in modernization (Fig. 6). To assure a modernization focus and consistency within the plan, the WLIP established priorities called Foundational Elements. Investments are initially encouraged in these elements, such as a modern spatial reference framework which is essential for the ability to aggregate, integrate, and share records and information (Fig. 5).

WLIP has alleviated the lack of equitable access to information technology across all Wisconsin local governments through the implementation of the competitive grants-in-aid program. The grants-in-aid program has awarded over 120 grants since 1991. All but ten counties have received grant moneys; eight of those have simply not yet applied for a grant (Table 2). Grants-in-aid help focus investment decisions in modernization by identifying data of primary importance to local governments through the Foundational Elements (e.g., property records). By annually monitoring these investments by Foundational Element by county, progress in terms of dollars invested (Table 1) and overall activity by Foundational Element (Fig. 7) are easily confirmed.

Other observed benefits of the grants program include competitive procurement opportunities among counties for similar land record modernization tasks and improvement of county modernization plans over time. The grants accelerate cooperation and data gathering and sharing compacts between all levels of government, utilities, and the private sector. They increase the implementation of standards.

D. Leveraging Other Funds

WLIP, like few state programs, is leveraging funds from other (public) sources well in excess of the investment generated by the program itself. Of the total dollar amount spent by

² Excluding salary.

³ To allow easier response to the financial questions, longitudinal consistency was sacrificed. Therefore, 1992 expenditure data includes salary and 1993 data do not. While this technique makes comparisons difficult, we have isolated each foundational element as a percentage of each year's total. The comparisons of these data do not necessarily show increases or decreases in amounts spent, but do show categorical shifts in spending. These data show that only two received a larger percentage of total expenditures in 1993 than in 1992. The two foundational elements that grew in percentage were Geographic Reference Frameworks and Soils.

counties on land records in 1993, WLIP was responsible for generating about 43%. More than half of the money spent on these major categories came from other sources, including county and municipal levies (Figure 8; Table 1), utilities, state, federal, and others. This means that the WLIP has been effective in persuading other local officials and the private sector that land records modernization efforts are to the benefit of other programs that might not have been directly contributing to the cost of land records modernization.

IV. Benefits of the WLIP

A. To Local Government

The WLIP is in the process of providing all counties with a basic information technology infrastructure. Through capital and technical support, WLIP is facilitating each county's acquisition of the hardware, software, and expertise to modernize land records. And because land records are the basis for property management, agricultural planning, utility routing, and other land-related human activities, they are elemental to integrating program operations across jurisdictions -- both local and beyond.

The WLIP is helping position local governments to improve their basic business stock -- reliable information, which can be central to enhancing conventional job development. When Outlook Graphics, a Menasha-based printing and packing firm, was looking for 15 acres for a new 150,000-square-foot plant, Oshkosh used its automated land information systems to pull up all its information regarding its industrial park facilities -- parcels, streets, sewer, and water. The city persuaded the company that that site offered them more amenities and greater flexibility in their building design and distribution operations than sites in other locations. The new plant will add 50 to 100 jobs to Oshkosh's labor market.

This reengineering of local government is/will be the product of new relationships and new forms of cooperation (Tables 3 and 4). The state Department of Transportation and the U.S. Department of Commerce-National Geodetic Survey have collaborated to create a more accurate geodetic reference system for Wisconsin, made available to local governments.

WLIP is helping to create new roles for existing institutions such as regional planning commissions. Access to retained fees generated by the WLIP has helped St. Croix County begin to implement a county-wide multipurpose land information system (MPLIS) to more efficiently manage urban growth. St. Croix County's investment has also attracted technical assistance for data-development support from the West Central Regional Planning Commission (WCRPC), and funding from both DOT and DNR. DNR has also provided hardware and data bases to the WCRPC for use in the county-wide land-use plan. The USDA-National Resource Conservation Service is also involved, sharing the production cost of county-wide digital orthophotos and assuming responsibility for the automation of a county-wide soils database. Credit for this cooperative and synergistic effort rests with St. Croix County officials, but without access to WLIP resources and its cooperative program with other state and federal agencies, such enterprises would be much more difficult.

In Kenosha County, with the long-time technical and database-development assistance of the South East Wisconsin Regional Planning Commission (SEWRPC), six local government agencies established a comprehensive and multipurpose land information and management system called the Kenosha Area Land Management (KALM) Project. This collaborative effort has resulted in a single, logical, automated, land-information source providing an on-line, transactionally based, up-to-date database for all of Kenosha County's related land activities. Operating staff who manage KALM include the Register of Deeds, Treasurer, Land Information Office, Assessor, Planning and Development Office, and Information Systems Office. This integrated data set has improved public access through ten searchable public-access screens. Private-sector benefits include improved access to title and mortgage companies, realtors, attorneys, and the Kenosha Area Development Corporation.

B. To Technology

The WLIP is accelerating automation of existing manual land records systems. Government units striving to constrain the size of their workforces find that, in many offices, automation provides significant savings in labor costs. The Winnebago County Tax Lister estimates that she can now efficiently and effectively do the work of six to ten people, making government

operations in that department alone far more efficient than they would be on a manual system. Similarly, the Dane County Land Conservationist believes that automation allows him to help farmers prove federal program compliance with one-sixth the staff that a manual system would necessitate.

The Register of Deeds Office in Racine County is now paperless and offers distributed access to the public sector and private sector. In Kenosha County, six offices (names) have allied their efforts to develop an integrated information systems. Even tho they different hardware and software, their information is completely sharable.

WLIP is creating opportunities to develop and implement workable standards to be shared among all data communities. These opportunities accelerate the exploitation of newly emerging information technologies such as digital orthophotography, soft copy photogrammetry, etc. Wisconsin counties are engaging in 'vertical' arrangements with governments above and below them, with other counties, and with the private sector. For example, with federal state and private sources, USGS conducted the National Aerial Photography Program (NAPP) in Wisconsin from which various federal, state and local agencies are now constructiong digital orthophotos.

At the local level, arrangements are changing among all types of public offices within individual governments. Surveys of such activity throughout Wisconsin show significant numbers of both formal and informal relationships springing up (Tables 3 and 4). These relationships are undertaken *because* they are mutually beneficial.

C. To Individuals

The WLIP has helped to engender renewed respect for professionals such as the tax lister, the property lister, etc. These are workers who have been empowered in local government to make a difference. Their authority is being expanded as they prove to be the innovators and managers of new information technologies. A majority of counties, 45, responded that their Land Information Office consisted of several staff members; 18 counties indicated that their office consisted of one individual only. In 13 counties the office included County Board members (Table 5). Such situations encourage and support an integrated approach to land records modernization and help elucidate the issues involved.

The fields that dominate the Land Information Offices are Real Property Listers, Registers of Deeds, Surveyors, Cartographers, and County Zoning Administrators with each representing the background of more than 10 LIOs. Many of these positions have traditionally been held by women. With the advent of GIS technologies, these "women's" jobs are becoming major avenues to management and policy positions for more women.

Furthermore, the cross-disciplinary nature of GIS/LIS and its use in local government is recognized in counties' structuring of their land information offices. This diversity hints at the complexities involved in the transition from training in a traditional field important to local government to one using a fully modernized system. Not enough people are yet available with a training or background specific to the GIS/LIS needs of these counties.

Similarly, WLIP is helping to create expanded long-term job opportunities and is fostering the increased demand for education. The Chippewa Valley Technical College is about to offer a degree program for a GIS technician. The University of Wisconsin-Madison is establishing both a degree program and a certificate program in GIS.

D. To the Economy

WLIP is modernizing the significant investment in traditional land records use and management. Two missing tax parcels worth thousands of dollars were discovered in Waukesha County by the Register of Deeds, thereby contributing to the county treasury. Because a more accurate flood plain map was developed in Winnebago County, a number of homeowners are relieved of paying FEMA floodplain insurance. At least one home owner saves over \$1000 per year.

WLIP has created jobs in Wisconsin. The increased demand for a GIS-skilled workforce is not unique to Wisconsin, but the state-supported call for LIS/GIS development has created more jobs in Wisconsin than in most other states. Ayres Associates of Madison has increased from 12 GIS specialists in 1987 to 100 in 1995. The Madison office is only one of six Ayres offices in the state. Likewise, WLIP gives Wisconsin a competitive edge in high technology products.

Intelligraphics, Inc., of Waukesha serves a world-wide market in conversion of data from manual to automated, a service that did not exist 10 years ago; it employs dozens of GIS specialists.

WLIP is helping to create better jobs, remunerative positions with promotion potential. Of the nearly 600 members of the state-wide professional organization, the Wisconsin Land Information Association, almost 10 percent are *employers* of GIS-skilled professionals. None of these measures count the number of new positions, or newly upwardly-mobile positions created by state, regional, local, and municipal governments who have added GIS specialists to their existing workforces.

The WLIP leverages more funding from other sources. Records show that moneys invested now by the counties is being matched dollar-for-dollar by other sources of funds. And much of that money is returned to the private sector. Over the six years of the Program, it is estimated that 40% of the \$30million total was funneled into private enterprise.

And the WLIP is giving Wisconsin a competitive edge in classic forms of economic development. The Outlook Graphics example in Oshkosh will add 50 to 100 jobs to Oshkosh's job market.

V. Effectiveness of the WLIP

As a general measure of WLIP's effectiveness, survey respondents were asked about the role that WLIP had played in initiating and accelerating their counties' information technology efforts. Every county indicated that the program had played some role in *initiating* their modernization efforts (Figure 9), with all but seven counties crediting it as "somewhat" or "very much" involved in the initiation. The vast majority of counties also indicated that WLIP had played a significant role in *accelerating* their programs.

But the job is far from over. Much remains to be done to bring all 72 Wisconsin counties into the 20th century, and to see them into the 21st. Wherever survey responses indicated that the Program was "Doing well," those actions are also rated as Major attention needed" -- an indication that success is there, but the need remains, too.

A. Technical Assistance Software Diffusion

An overall measure of the accelerating rate of diffusion and adoption of modernization is the amount and type of GIS/LIS software being incorporated into local governments in Wisconsin. In 1992, the most popular GIS/LIS software was "none"; one year later, it was a specific package. An indicator of the general growth occurring is the large increase in most software products from 1992 to 1993 (Fig. 10).

Many counties have opted to move into automated systems by buying into computer-aided drafting and design (CADD or CAD) software, which generally has limited spatial analysis capabilities. These purchases, which are much more affordable than GIS, represent important steps in modernization of land records and provide data sets that can eventually be converted to GIS.

A measure of the changing perception of LIS/GIS in local government is the astounding jump in 1993 of usage of ArcView, a GIS software designed specifically to provide desktop hands-on GIS to the non-technical user -- generally, the decision-maker. In fact, more respondents indicated the use of the decision-makers' package than the use of more technically sophisticated packages. The number of packages bought and the fact that the product was released just in that year imply recognition of the importance of making data accessible to managers and decision-makers.

Guidelines and Standards

A major success of WLIP has been in fostering the development and adoption of guidelines and standards. With the selection of eight Foundational Elements, WLIP structured the options available to counties to effectively and efficiently spend their modernization dollars. WLIP committees have cooperated with the WLIA in deriving procedures for developing and reviewing standards (the "Standard on Standards"). Two other standards have also been adopted by the WLIP -- the Uniform Parcel ID Standard and the Standard on GPS Densification.

Parcel Identification Schemes

A major point in sharing land information across jurisdictions is the ability to identify any single piece of land or array of pieces by an unequivocal designation that can be transferred across computer environments and understood across jurisdictions. Land-use professionals have proffered many parcel ID schemes over the years, and many have been put into place across the nation. Under the WLIP, the Board has recommended a georeferenced parcel ID scheme that has now been adopted (voluntarily) by 22 counties. More are counties are presumed to be ready to adopt the same scheme. Other state agencies have long advocated such a scheme, with no luck. This acceptance of a decision arrived at by the Board represents the esteem in which the Board and the Program are held, and the value of their interactive roles among land-use professionals.

Data Sharing with Utilities

Because the WLIP provides counties with an annual source of funding in retained dollars plus access to grants-in-aid each six months, some Wisconsin utilities have entered into jointly funded basemapping efforts. One example is the MCAMLIS project in Milwaukee County. Utilities share in the development cost, Milwaukee County uses both WLIP retained and successful grant funding, SEWRPC provides technical assistance, and all share modernized and automated basemapping information.

Data Sharing with/between Counties

One example of data sharing between counties is the Jackson and Vilas Counties multi-county agreement to use grant funds and to save money by sharing global positioning system (GPS) technology to assist in modernizing spatial reference frameworks on a multi-county basis. Acquiring or confirming accurate coordinates used to cost thousands of dollars per coordinate; it now costs only hundreds. Another example is the seven-county South West Wisconsin Orthophoto Consortium, combining efforts to win shared grant moneys to jointly support a regional orthophoto mapping project. The counties will save money and gain access to new technologies through collective efforts.

Coordination on Reference Frameworks

The WLIP has been central to helping counties contribute to the state-wide geographic framework that forms the legal basis of land-related information. Many of those efforts have been in conjunction with the state Department of Transportation and the U.S. Department of Commerce-National Geodetic Survey. Experts estimate that 112,000 stations⁴ at corners of the Public Lands Survey System (PLSS) have been remonumented. These points are 1 mile apart in every direction across the 56,000 square miles of the state.

The geodetic framework, which provides a far more exact measure of the earth's surface and is critical for truly accurate spatial determinations, has now been upgraded to 7,128 tertiary stations 4 miles apart, 1,152 secondary stations 7 miles apart, 257 primary stations 15 miles apart and 98 high accuracy reference network (HARN) stations 30 miles apart.

State-wide integration of data sets is a long-term WLIP benefit. Before WLIP, there was no formal process by which to even begin thinking, discussing, debating, or planning how local adoption of modern information technology would result in state-wide sharing and integration of information such as land records. Since the establishment of WLIP, the question is no longer "if" but "how" this integration should take place. One example is the HARN state-wide network and another is the the uniform parcel ID number. Given the recent interest by the state expressed in Executive Order 242 to organize and equitably accelerate the diffusion of information technology among all state agencies, WLIP offers a unique opportunity to share its modernization results with a variety of state entities.

In developing these frameworks, the WLIP has made it easier for local governments to accommodate new basemapping and image mapping technologies. In both southeastern and southwestern Wisconsin, consortia of counties along with the State Department of Natural Resources are implementing sophisticated mapping systems. Together, they will contribute their works to the database library being developed vertically and horizontally among Wisconsin governments through the WISCLAND Project.

Data Sharing with Federal Agencies

⁴ Assuming that every square is composed of two corners that are not also corners of any other square.

WLIP is increasing access to federal funding and data sharing with federal agencies. Federal agencies to re-engineer their services, products, and programs. Cost-sharing opportunities for data development and grants to fund data-sharing partnerships are examples of new federal initiatives that benefit states and localities. This cooperative funding effort between the WLIP, the USDA-Natural Resource Conservation Service (NRCS) and Richland County is illustrative. That joint venture represents \$300,000 total expenditure on soils information that will be shared by all parties.

Kenosha County has undertaken a similar joint effort with the National Park Service, the County Land Conservation Department, and a small Wisconsin GIS consulting company to address nonpoint source pollution abatement.

Education and Training

An indication of a commitment to modernization is the number of counties supporting their staffs' needs for education and training (Fig. 11). The primary education activity that the respondents identified was support for attendance of conferences. The second most common activity -- in-house training seminars -- received less than half as many responses, suggesting that while commitments to development have begun to be made, needs are not yet being fully met by counties.

Stages of Development

One indicator of modernization stages is the number of Foundational Elements being addressed by a county. As an organization modernizes, the number of Foundational Elements will likely increase even though the expenditures on some might be reduced to a minimum cost of maintenance. Two counties were addressing eight categories, fully half of the array of Foundational Elements and categories identified in the surveys (Table 5). Five counties reported expenditures on at least six Foundational Elements (Fig. 7). Over half of the counties were addressing up to three elements or categories.

As a measure of counties' ability to address changing issues of technology, the surveys questioned means of production of work, products, and services. As a probable sign that counties have progressed toward independence, respondents most recently indicated that 60% of their expenditures were allocated to in-house activities as opposed to 40% spent on outside vendors.

B. Expanding Demand

The surveys included questions about 15 specific WLIP efforts (Fig. 12). "Technical assistance" and "developing standards" were both shown as areas in which land-use professionals were demanding more help from the WLIP. That need for an increase in the quantity and quality of technical assistance is reflected by a large number of counties indicating that "some" or "major" improvements were needed. Other activities for which counties were demanding more help included "coordinating state agency plans" and "data sharing with state agencies." Clearly, counties anticipate increasing information transfer to and from state agencies as part of a continuum of a single, seamless, data flow.

Public Access is a Foundational Element for which the lack of development is noticeable. Only one county responded that it had an organized public access program. While over half of the counties, 37, responded that they had public access terminals, all 37 had tabular systems that were often part of an existing program through the treasurer's and register of deeds' offices. Only four of those counties had public access terminals with graphics capabilities. Given the public's right to know and the immediacy of importance of land information to the individual as well as to corporate America, the demand for Public Access will continue to grow. WLIP will be an essential source of funding and technical guidance to local governments as they strive to meet that demand.

At the same time, more than half the counties rated the Board as "doing well" at providing education and training. Given the complexity of LIS/GIS as a technology, and the multitude of its applications, the recognized services rendered in education and the stated need for more education reflect simply the long, demanding learning curve at every level of use.

In another segment, respondents were presented a list of state programs and asked about the importance of having them coordinated with the WLIP's support activities. The activities that

scored as most important were six: "conducting wetlands mapping activities," "vocational training," "education and outreach," "providing technical assistance," "sharing digital survey data," and "collecting, maintaining, and disseminating information regarding innovation in cartographic techniques and mapping procedures." These responses repeatedly reflected an expectation for training and education about GIS/LIS and related issues.

Results from the 1995 survey of 800 Wisconsin land-information professionals illustrate the phases of adoption and diffusion of technology and illuminate Wisconsin's progress. The WLIP has identified six stages:

- No modernization activities
- System development
- Database development
- Record keeping
- Analysis
- Democratization (Citizen access)

Results clearly illustrate that, since the implementation of WLIP, most -- if not all -- of Wisconsin's counties have moved from "no modernization activities" and are now fully engaged in "database development" (Fig. 13). The database-development stage is both technologically and institutionally complex. It takes time to reliably and accurately convert paper records to digital records. It takes time for an institution to become computer literate. This is the stage where the real initial investment in modernization and automation takes place. Since most county and local governments are intending to build multipurpose or enterprise-wide systems, full implementation of this stage requires a viable modernization plan and a multi-year commitment. Continued access by local governments to WLIP resources is essential to sustain this database-development stage and to realize the efficiency, effectiveness, and other benefits that begin to accrue in the succeeding stages.

Investment data from the 1994 County Annual Reports is now being collected and automated. Though its data are not yet available for this report, our preliminary estimate is that it will take at least five more years -- to the end of the decade -- for all Wisconsin counties and most local governments to move through the data-development stage.

The modernization tasks involved in the database-development stage are central to return on investment -- certainly for the individual counties and even more certainly for the citizens whose tax dollars are that investment.

State agency integration is one of the original statutory components of the WLIP. In keeping with Gov. Thompson's Executive Order 242, furtherance of the WLIP will serve to help counties cooperate extensively with state agencies as both groups see the synergy of information technologies. Prospective uses of the datasets encompass many types of land use activities, including ag planning and management, forest management, historical and archeological management, real estate taxation management, and infrastructure and facilities management, among many others (Holland, 1992, Sect. 4, App A). All of these contain spatial and non-spatial data, and they all relate directly to the Foundational Elements and the services and mandates of the State.

VI. Summary

A. WLIP Rose Out of Demand

In only six years, local government and professional interest in land records modernization has moved from "low" to "high" (Fig. 14). These same professionals are realizing success and progress toward their modernization goals (Fig. 15). All of Wisconsin's 72 counties have put approved modernization plans into place and are expending or saving WLIP-derived resources for modernization activities (App: County Profiles). Six years ago, a few of Wisconsin's counties and local governments were actively pursuing modernization. Since the establishment of the WLIP in 1989, some form of modernization is now in place across all counties. Where most counties were at the "no modernization" stage in 1989, a considerable number of these counties and municipalities are now in the "database development" stage (Fig. 13), including software and hardware implementation (Fig 10). As part of the Annual Survey, each County Land Information Office was asked, "What has been the WLIP's role in initiating or accelerating

land records modernization in your county?" The responses were overwhelmingly clear: The WLIP has helped initiate and accelerate modernization in almost all counties (Fig. 9).

B. WLIP Has Met the First Round

In 1989, at the encouragement of local officials and with bi-partisan and majority support, the legislature voted to establish the WLIP. In 1990, it voted to provide funding through a modest \$6 increase in the document recordation fee. In 1994, the legislature again showed its bi-partisan support by voting (in the Senate, 33 to 0; in the Assembly, 80 to 30) to eliminate the program sunset imposed at the time of initial enactment.

C. The Challenge Remains

Modernization of land records is clearly occurring throughout Wisconsin local governments. The stages of development appear to be commensurate with the length of time the WLIP has been in place. Results clearly indicate that activity has been focused on the critical initial stages of the modernization process. Respondents point out that these accomplishments could not have reached their current status without the WLIP. The WLIP has been an important, even crucial, program for many of the participants. On the other hand, respondents clearly sent the message that there is still a need for improvement in the operation of the program. Their desire for greater technical assistance stands out as a recurring request.

It is still expected that, in the future, as resources and technical support continue through user fees, local governments will move toward integrated systems for analysis and decision support. If they are able to do this, it will help ensure that our state's \$100- million-dollar expenditure on land records by the year 2000 will be appropriately managed.

Executive Order 242 and the creation of the Information Technology Investment Fund are important steps in providing all state agencies with a basic information technology infrastructure. Expanded use of the technology must seek to ensure its most cost effective use. Current independent planning and procurement of IT assets have created a significant variance among agencies in types of technology and effective level of integration with program operations. Such variance is inherently inefficient in providing technology to meet our needs. We must move to manage technology as one fundamental enterprise to make the most of our efforts in serving the citizens of the state.

The State of Wisconsin is a recognized leader in the use of information technology through the use of strategic planning and the WLIP. To build on that standing, significant investments in technology must be accompanied by increasingly innovative management of resources to provide the most cost-effective implementation.

With the WLIP in place, and in concert with Executive Order 242, Wisconsin will ensure that it is adequately structured and equipped for efficient and effective use of information technology for the next century.

Definitions

Throughout Wisconsin, land-use professionals have agreed on formal definitions for a number of terms:

- **land information** refers to any physical, legal, or economic information about land, water, ground water, subsurface resources, or air, in any format or medium.
- **land records** are the media in which land information is stored.
- a **land information system** is the means by which land information is organized and managed in an orderly fashion.
- a computerized **geographic information system (GIS)** is a primary tool for modernizing land information systems.
- **land records modernization** is the automating of land information systems to facilitate the sharing of information for a variety of uses.
- **local government organization** refers to the municipal or county government that manages land records including offices such as register of deeds, tax assessor, land information office, etc.

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Table 1 -- Expenditures on WLIP Foundational Elements plus other related elements by funding source, excluding salary, in 1993.

Elements	Source of Funding							Total	
	Federal	State	WLIP Fees	WLIP Grants	Levy	Utility	Cost-share		Other
Basemapping		\$1,700	\$718,222	\$251,249	\$572,168	\$255,157		\$33,000	\$1,798,496
GeoReference		3,500	639,412	272,419	1,402,822	5,110	\$23,000		2,379,264
Parcel			735,350	85,000	505,997	188,535	15,000	7,500	1,537,382
Wetlands			200		3,600				3,800
Soils	\$77,038	30,000	30,198	18,000	62,063		17,500		234,798
Zoning				500	37,750			400	38,650
Hydrography		23,892	50,000		284,889		25,600		384,381
Transportation			11,700		60,490				72,190
Utility							35,000		35,000
Admin Units						250			250
Inst Arrange			2,273		7,050			200	9,523
Comm, Educ			42,187	4,500	27,532		825		75,044
Public Access			29,923		56,660		300		86,883
Total	77,038	59,092	2,259,464	631,668	3,021,021	449,052	117,225	41,100	6,655,660

Table 2-- Total WLIP grants made by granting period and by county. (Grants shown to counties include, some cases, grants made to municipalities or other entities within that county.)

County	Oct-91	Dec-91	Jun-92	Dec-92	Jul-93	Jan-94	Jul-94	Jan-95	Total
Adams					70000				70000
Ashland									0
Barron									0
Bayfield									0
Brown	100000	46875					100000		246875
Buffalo						66000			66000
Burnett				61000				62350	123350
Calumet				62000		76800		72500	211300
Chippewa			50000		44800				94800
Clark									0
Columbia					50000				50000
Crawford					70000				70000
Dane		100000		20000			150000	46700	316700
Dodge			70000					93000	163000
Door			75000						75000
Douglas		46000			45000				91000
Dunn									0
Eau Claire			50000						50000
Florence						70000			70000
Fond du Lac			50000			55000			105000
Forest									0
Grant					40000			95000	135000
Green									0
Green Lake					40000				40000
Iowa								95000	95000
Iron									0
Jackson			50000						50000
Jefferson					100000				100000
Juneau				68900					68900
Kenosha	100000	50000		100000					250000
Kewaunee				52000					52000
La Crosse					50000				50000
Lafayette						95000		95000	190000
Langlade			50000						50000
Lincoln						57358			57358
Manitowoc		50000							50000
Marathon		150000							150000
Marinette					78000			80000	158000
Marquette					65000				65000
Menominee							80000		80000
Milwaukee	100000	150000		100000	100000	150000	100000	170000	870000
Monroe								70000	70000
Oconto				60000			50400		110400
Oneida	100000				45000				145000
Outagamie			55000					90000	145000
Ozaukee				75000		129083	100000	62500	366583
Pepin					35000				35000

Pierce					60000	100000		160000	
Polk				70000				70000	
Portage		100000						100000	
Price			45000		27720			72720	
Racine	100000		75000			100000	80000	355000	
Richland						100000		100000	
Rock		100000	66000				95000	261000	
Rusk				70000			70000	140000	
St. Croix								0	
Sauk			42700	80000				122700	
Sawyer							95000	95000	
Shawano		50000				100000		150000	
Sheboygan			70000			59510	90000	219510	
Taylor					66816			66816	
Trempealeau						100000		100000	
Vernon							95000	95000	
Vilas		60000						60000	
Walworth		50000		50000	60000	71250	80000	311250	
Washburn								0	
Washington			65000	40000	60000	60000		225000	
Waukesha		150000	60000	150000	80000	100000	66429	606429	
Waupaca				100000			90000	190000	
Waushara							85000	85000	
Winnebago	100000	105000						205000	
Wood			90000					90000	
ECRPC					47400			47400	
Total	600000	897875	850000	1022600	1440200	1053777	1371160	1878479	9114091

Table 3-- Wisconsin counties are forming new institutional arrangements with other units of government at the county level.

Other Units of Local Government	Numbers of New Arrangements		
	Total	Formal	Informal
Cartographer	22	12	10
Conservationist	49	22	27
Register of Deeds	62	35	27
Sheriff	38	9	29
Surveyor	55	32	23
Treasurer	57	26	31
Zoning Office	58	30	28
Data Processing Department	47	25	22
Department of Emergency Government	44	9	35
Department of Planning and Zoning	44	25	19
Forest and Parks Administration	33	10	23
Highway Commission	51	15	36
Land Conservationist	50	25	25
Land Information Office	55	32	23
Real Property Lister	60	32	28
Solid Waste Department	24	8	16
Zoning Administration	51	24	27

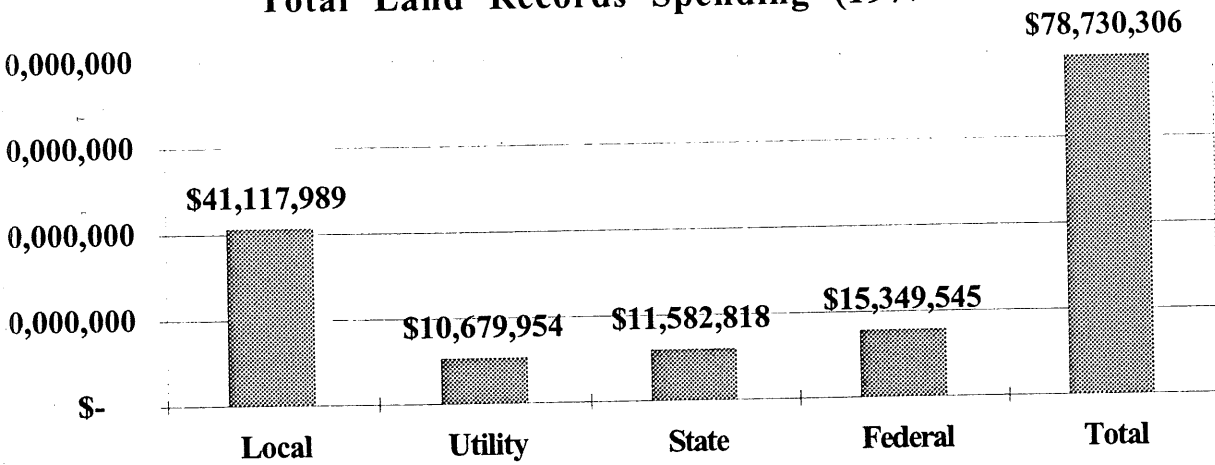
Table 4-- Wisconsin counties are forming new institutional arrangements with other levels of government and the private sector.

Other Levels of Government	Numbers of New Arrangements			
	Total (F+I)	Formal	Informal	Negotiating
Cities	84	56	28	6
Towns	71	44	27	2
Village	62	47	15	9
Regional Planning Commission	49	24	25	1
Multi-County Participation	157	89	58	7
Private Sector Participation	88	55	33	1
State Agency Participation	76	27	49	4
Federal Agency Participation	45	25	20	4

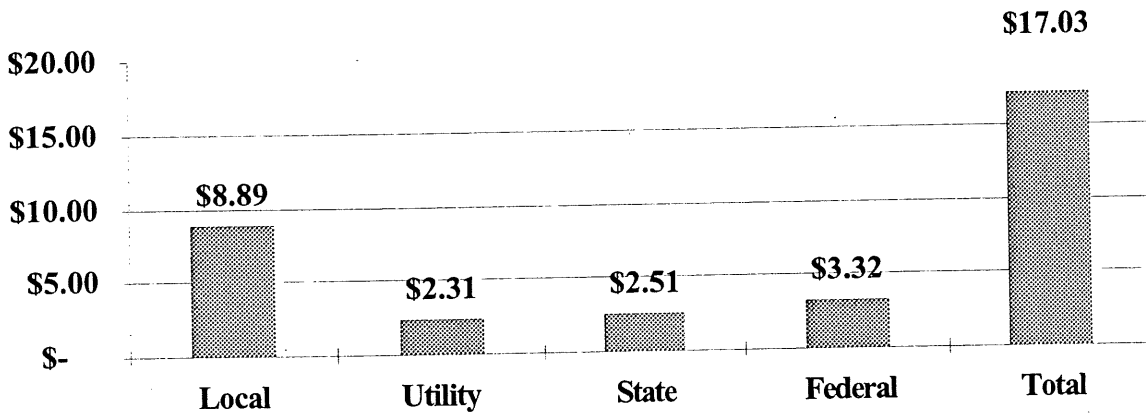
Area of Occupation of Land Information	Number of LIOs	Average years of experience
Real Estate Appraiser	1	17
Real Estate Partner	1	17
GIS Specialist	2	6.5
County Board Member	3	6
County Clerk	3	5
Economic Planner	3	16
Other	4	7
Tax Assessor	5	12.5
County Treasurer	7	10
County Conservationist	7	9
Land Use Planner	7	15
Data Base Programmer	9	7
Cartographer	12	14.5
County Zoning Administrator	11	13
Register of Deeds	16	14
Surveyor	16	12
Real Property Lister	18	12.5
Total	125	1487.5

Table 5-- Land Information Officers by number of individuals and average years of experience in occupational fields. "Number of LIOs" adds up to more than 72 because many respondents reported multiple occupations.

Total Land Records Spending (1976)



Per Wisconsin Citizen (1976)



Sub Total	
	4
	6
	2
	2
	6
	4
	7
	3
	3
	2
	3
	6
	3
	4
	3
	5
	4
	3
	2

Figure 1-- Expenditures for land records in 1976 by levels of government and utilities.

Wisconsin Land Information Program

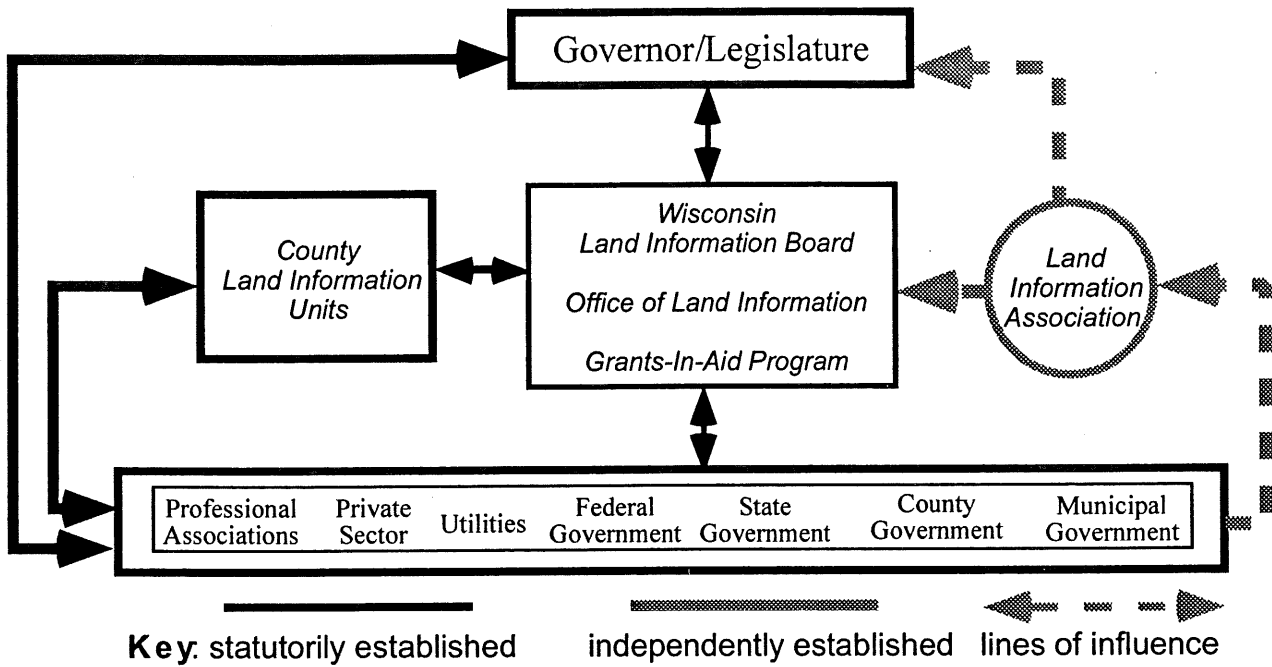


Figure 3 -- Lines of influence and cooperation in the Wisconsin Land Information Program.

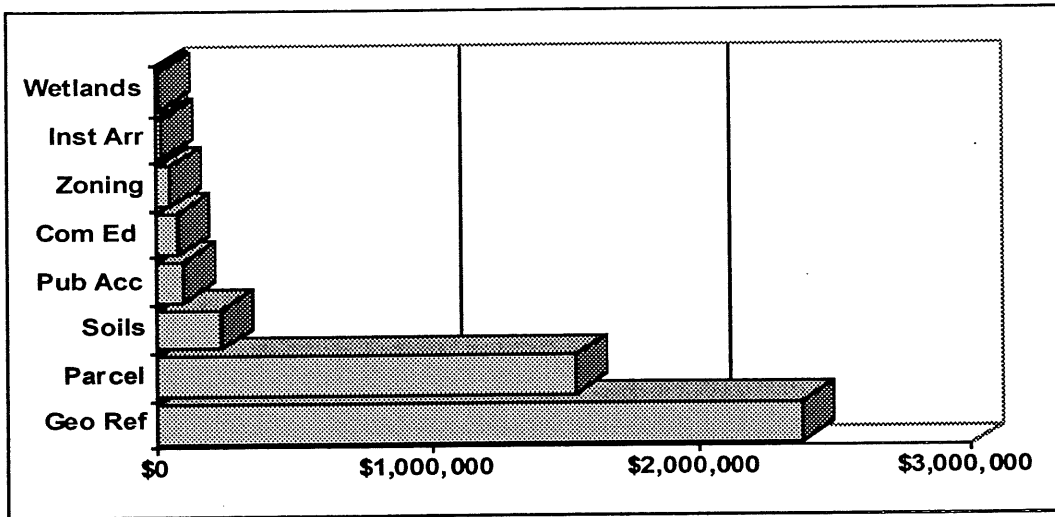


Figure 4 -- Expenditures by Foundational Element.

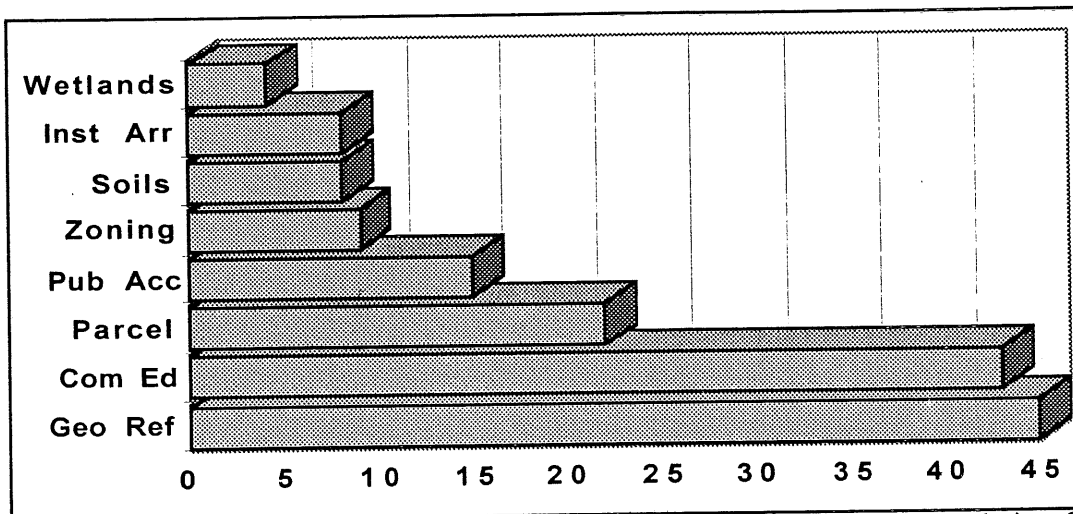
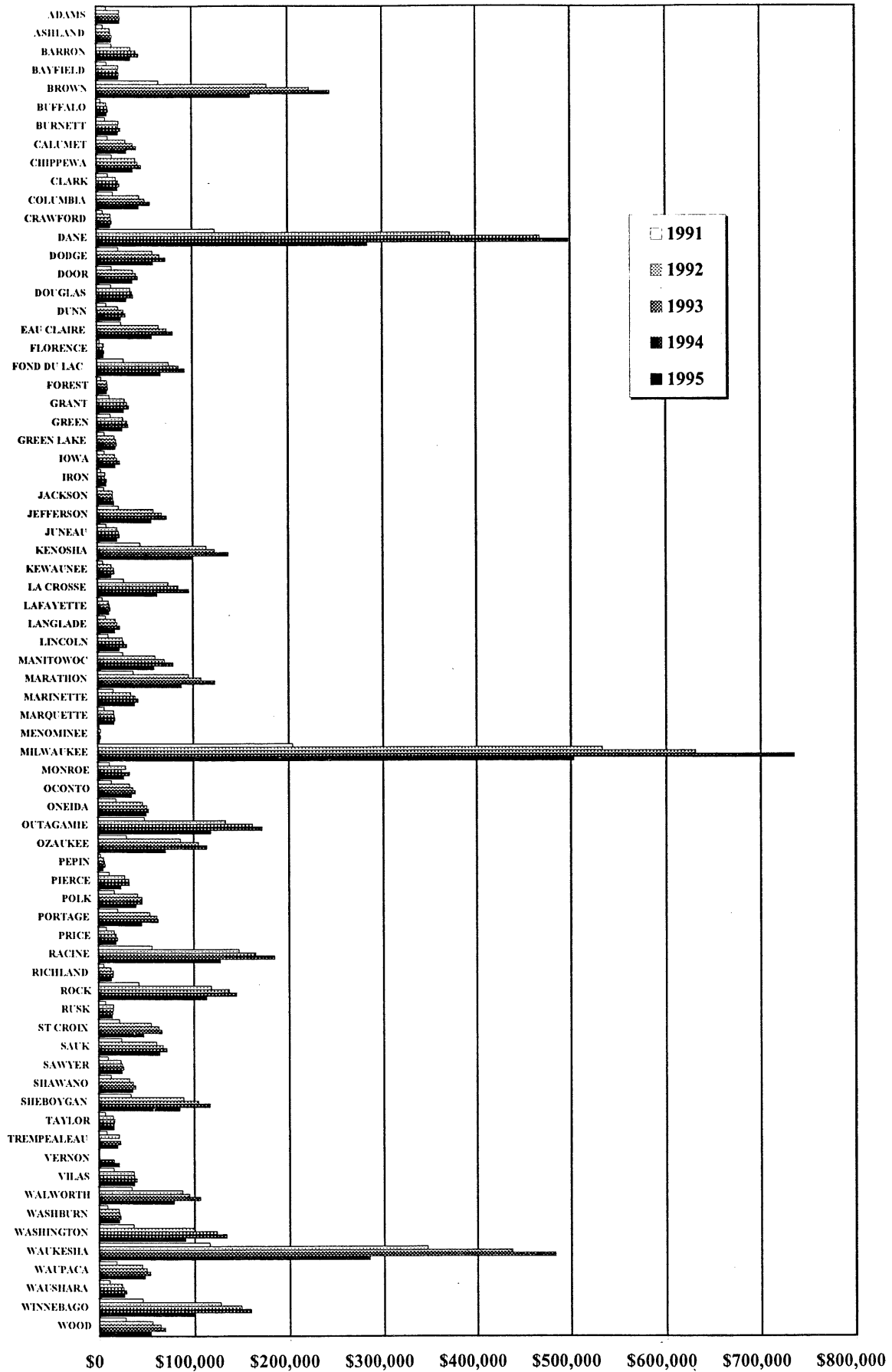


Figure 5 -- Number of Counties indicating expenditures on each Foundational Element

Figure 6 - Total Retained Fees by Year by County



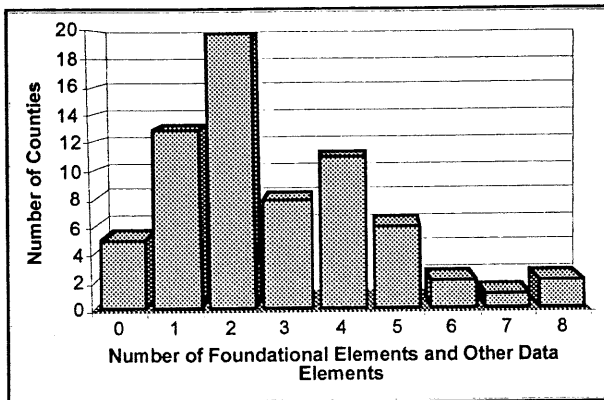


Figure 7 -- Number of foundational elements and other data elements for which counties reported expenditures

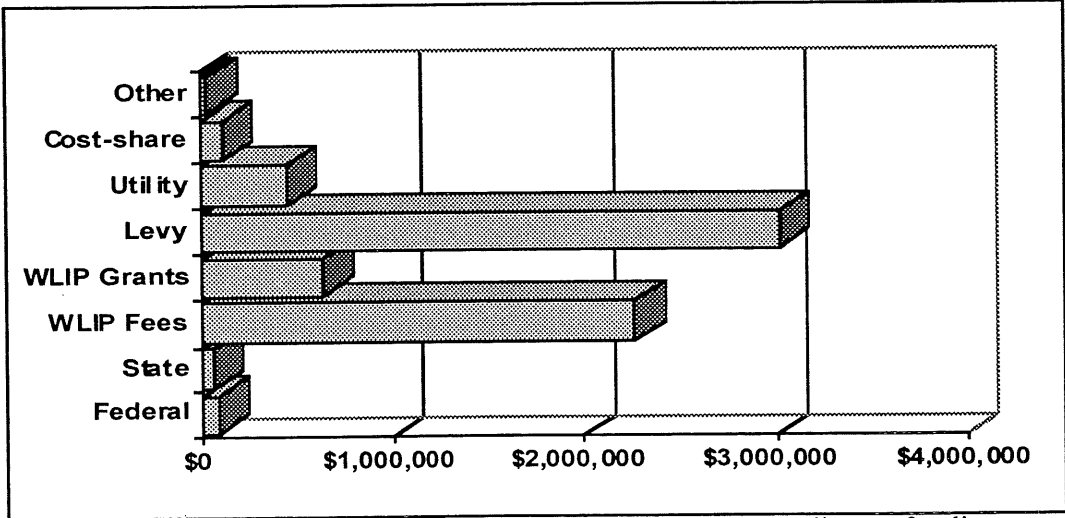


Figure 3 -- Expenditures on Foundational Elements according to funding source

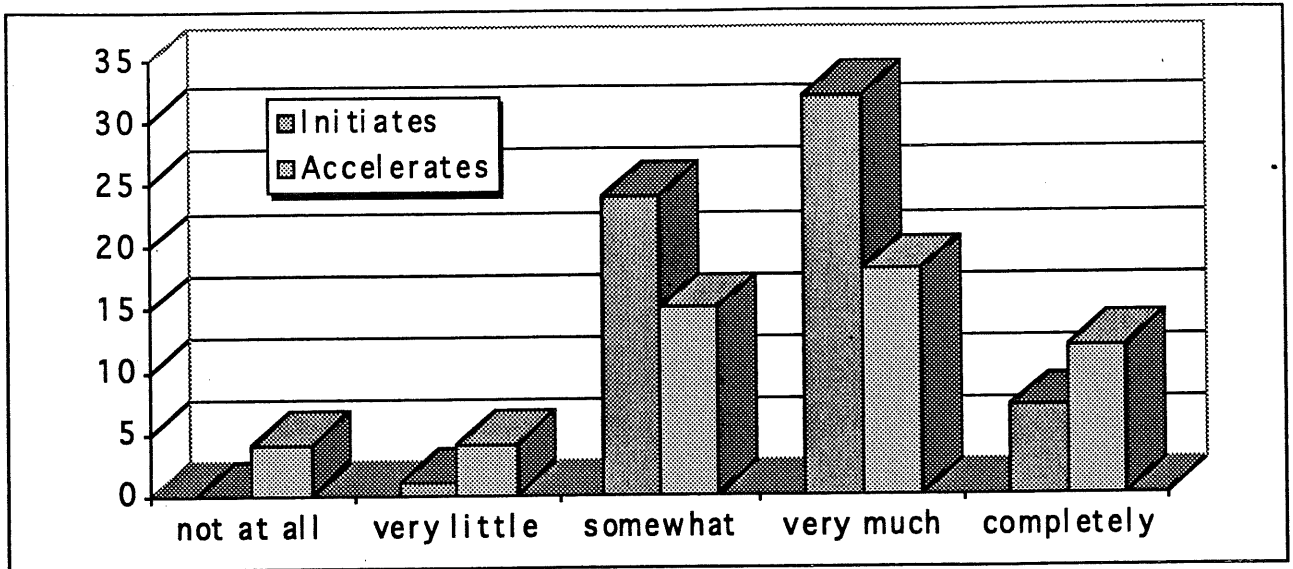


Figure 9 -- Responses to the question, "What role has the WLIP played in initiating and/or accelerating land records modernization in your county?", by number of counties.

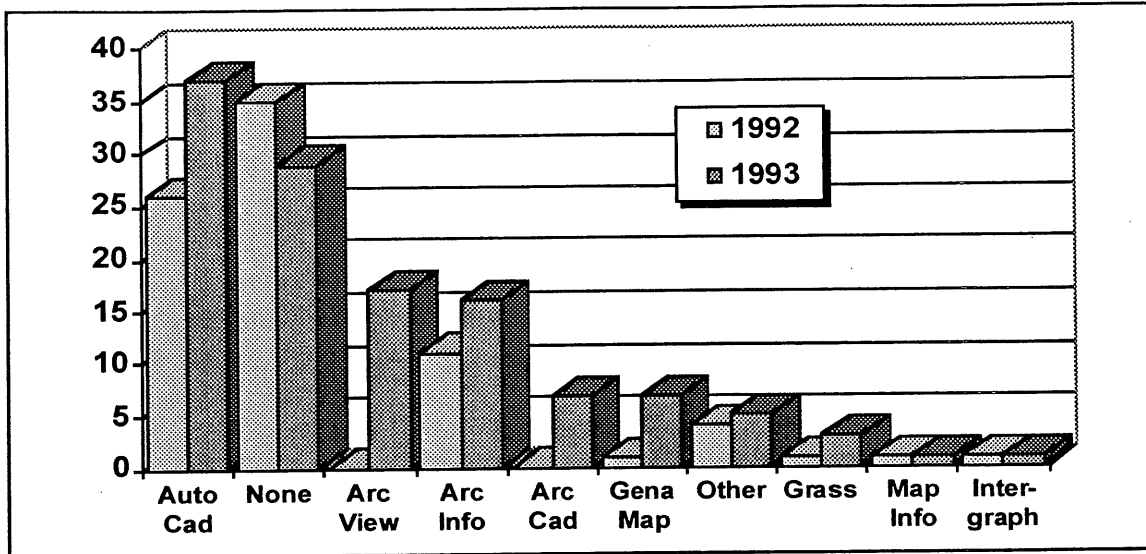


Figure 10-- GIS software used by Wisconsin counties in 1992 and 1993, by number of counties reporting their use.

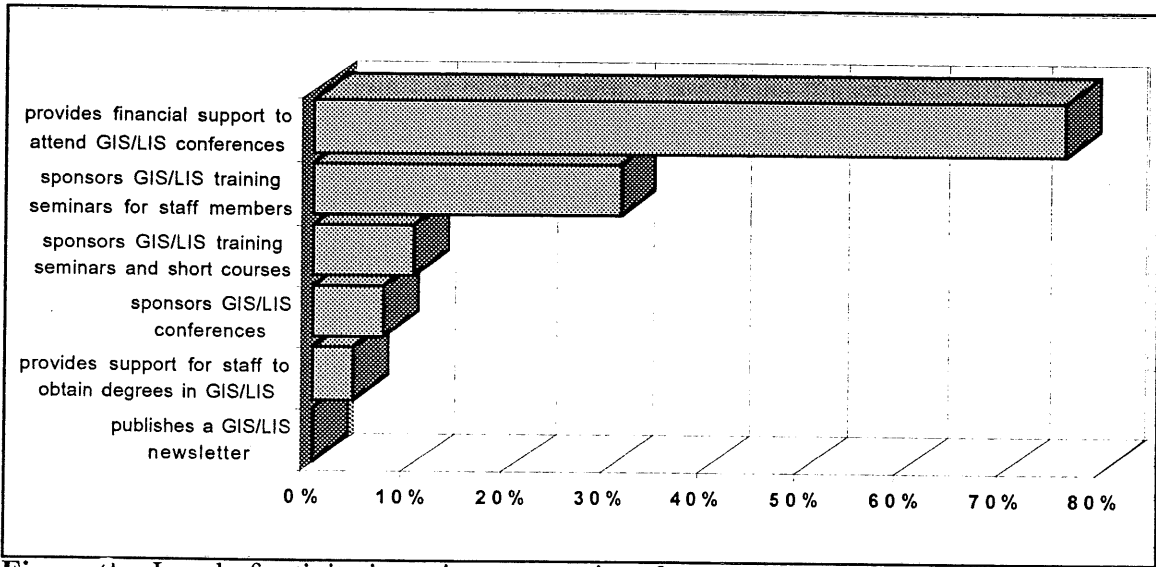


Figure // -- Level of activity in various categories of communication, education and training

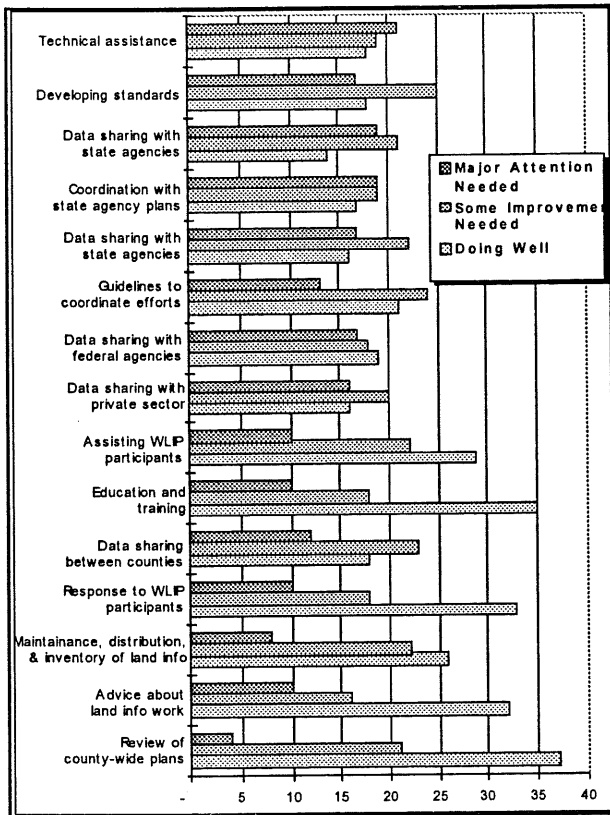


Figure 2 -- WLP effectiveness evaluated for 15 activities (by number of counties responding with each answer).

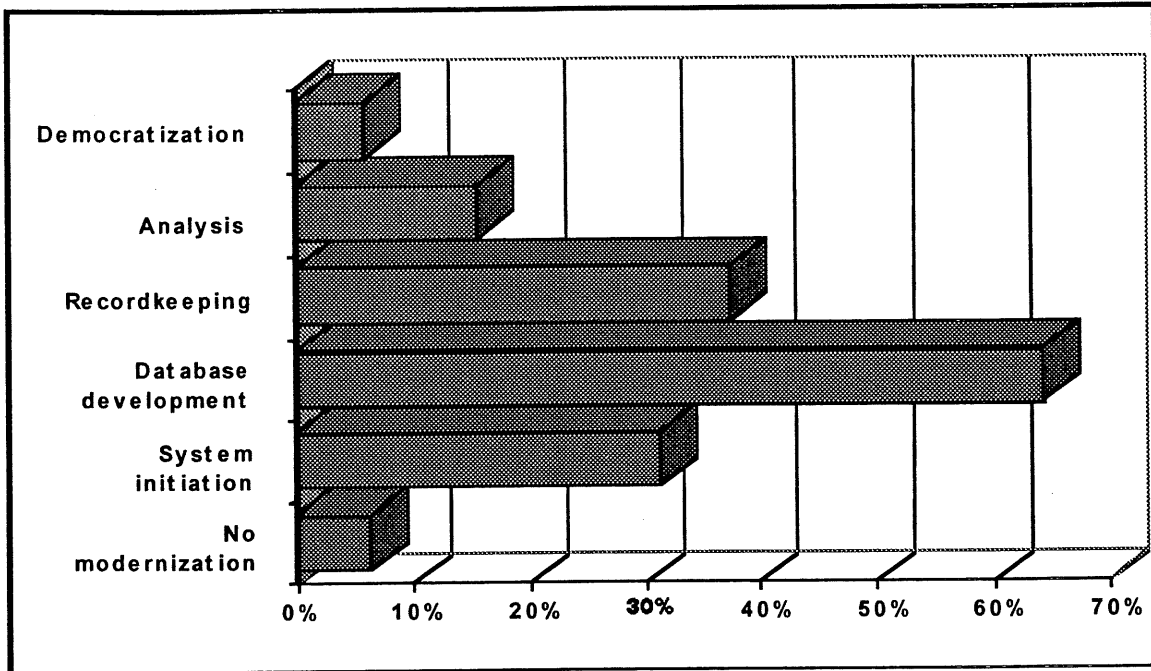


Figure 13 -- Responses to question, "At what stage is your local government in land records modernization?" by percent of respondents.

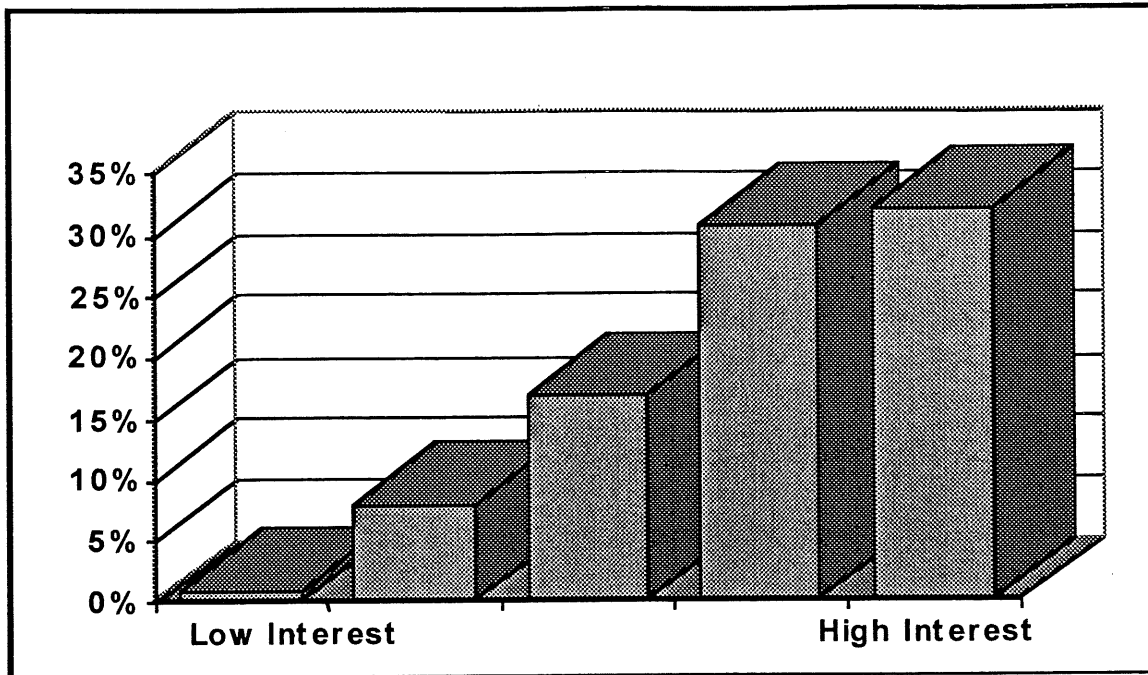


Figure 14 -- Response to the question, "What is the degree of interest in land records modernization on the part of your local government?" by percent of respondents.

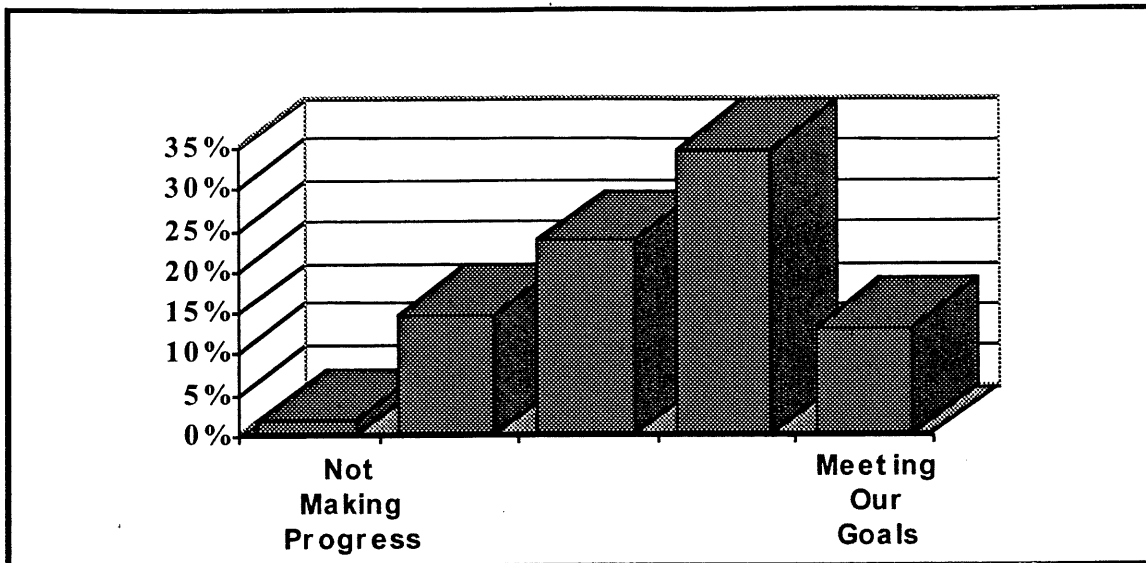
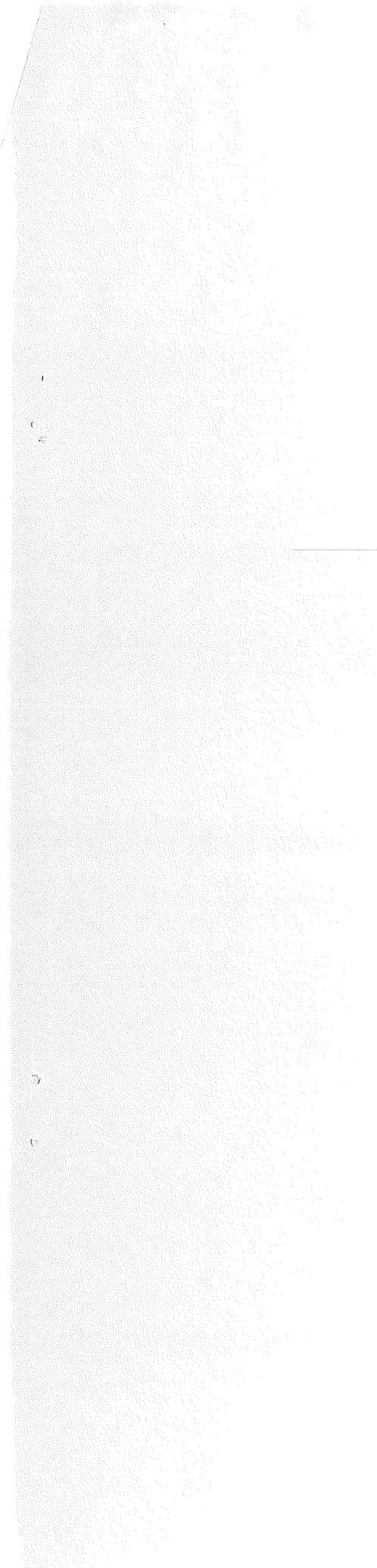


Figure 15 - Response to question, "How much progress is your organization making in land records modernization?" by percent of respondents.



1

2

3

4

