1-1989

Land Information System: Strategies for Local Governments in Oregon

Oregon. State Map Advisory Council

LAND INFORMATION SYSTEM: STRATEGIES FOR LOCAL GOVERNMENTS IN OREGON

by
Oregon Land Records Committee
of the
State Map Advisory Council

1988 Annual Report

January 1989

Center for Urban Studies
School of Urban and Public Affairs
Portland State University
Portland, OR 97207-0751
(503) 725-4020
(503) 725-5199 FAX
http://www.upa.pdx.edu/centers.html#CUS

TABLE OF CONTENTS

FORWARD

The purpose of this report is to disseminate the findings and recommendations from the deliberations of the Oregon Land Records Committee (OLRC) of the State Map Advisory Council (SMAC). The OLRC consists of state and local government officials and professionals, and representation from utilities and private sector firms involved in the maintenance and use of land records and geographic information systems (GIS) for the analysis of data about land. These individuals have given freely of their time and experience in furtherance of the mission and goals of the OLRC.

This report is directed to professionals and public officials in local government who are concerned with modernizing land records by employing the new technology of GIS. This report identifies promising strategies and lays the foundation for a possible state interest, role and program.

The mission of the OLRC has to do with fostering land records modernization in Oregon by promoting the wise procurement and implementation of geographic information systems concepts and technology.

- Promote modernization of land record to achieve greater efficiency and equity in planning, managing, and conveying land.

- Improve the quality, access, and utility of land information systems at the local government level.

During 1988, attention has been directed towards database issues that are hardware/software independent. Consequently, the recommendations of the OLRC deal with a dual strategy for developing two separate but related databases at the local governmental level. We urge that local governments proceed with a consistent effort in the development of land information systems. We recommend the development of two land information systems, one at an intermediate scale for generalized planning and management applications, wherein the street addresses and land ownership parcels are positionally located as point coordinates. A more detailed and accurate database is needed for operations programs, such as infrastructure and property tax assessment, and engineering design. Our recommendations spell out this dual strategy of two databases, which together with GIS functionality, will produce a powerful land information systems in local governments.

For additional information, contact Kenneth J. Dueker, Chair, Oregon Land Records Committee, Portland State University, Portland, OR 97207-0751, 464-4042.

BACKGROUND AND CONTEXT

The **State Map Advisory Council** consists of an **Executive Board** and three committees -- **the Oregon Mapping Committee, the Oregon GIS Committee, and the Oregon Land Records Committee.** The Executive Board is composed of persons appointed by the Governor to provide leadership at the technical and policy interface of land information system issues. Their task is to translate policy concerns in natural resource issues to land information system requirements. The purpose of the Council is to improve the quality, access and utility of Oregon's land information systems, and to link information and analytical resources to the policy needs of the agencies. The focus, organization, and membership of the Council is designed to synergize the entire spectrum of organizational coordination toward enhanced land information systems.

The State Map Advisory Council is a unique innovation suited to Oregon's present needs. It incorporates a recognition of: 1) the need for federal, state and local coordination at the policy level, 2) the fragmented responsibility for natural resources among agencies in Oregon, 3) the need to expand efforts in the area of local land records, and 4) the need to focus efforts into action using existing institutions and budgetary mechanisms.

All three committees are involved in fostering the adoption of a powerful new technology - geographic information systems (GIS). GIS is having a major impact on the way governments conduct their affairs. GIS is being used to effectively deal with mapping and information issues. The advantage of GIS are many. They include better service to the public, automation of routine activities, better planning and management of public services, more efficient assessment, taxation and conveyance of property, and improved emergency dispatching.

OLRC GOALS

The Oregon Land Records Committee provides a forum for education and communications among professionals concerning the appropriate application of GIS concepts and technology to modernization of land records and information at the local level. The specific goals of the OLRC are to:

- Promulgate the multipurpose land information systems concept for spatially registering data layers.
- Foster cooperation among state and local governments, utilities, and private users and providers of land data.
- Foster coordination of geodetic control and densification of monumentation programs to achieve more accurate base mapping by local governments.
- Foster development of addressing systems and integrated address registers by local governments for unambiguous location of parcels, accidents, buildings, wells, etc.
- Provide a forum and services for education and communication among professionals and public officials concerning these objectives and programs and policies for carrying them out.

CURRENT SITUATION

The OLRC is functioning in the midst of a fast-moving technology, GIS technology is difficult for state and local governments to assess, procure, and implement. The technology will continue to evolve rapidly, which suggests that the OLRC should concentrate on the more stable element, the database, which together with the GIS technology makes up land information systems. This database orientation transcends specific hardware/software issues and database issues must be addressed by all. It is the logical starting point.

Modernization of land records is an important issue because the traditional ways of managing data about land are increasingly proving inadequate. The term land records is construed broadly, it is more than information about land ownership, conveyance and valuation. It includes land and water resources, infrastructure serving land and information about demographics and economic activities that constitutes human use of land. GIS technology provides the tools by which we can integrate data about land to address complex problems concerned with planning and management of our valuable land resource base. GIS technology provides promise of: 1) generating efficient and effective **views** of databases that describe land records, 2) **integrating** the land **data** to minimize redundancy and foster understanding of relationships, and 3) handling transactional **updating** of land data to maintain current information.

The public is demanding quality public services and management of the public interest in land records in much the same way as they are demanding quality in goods and services from the private sector. Books like Search for Excellence demonstrate the importance and rewards of quality goods and services. Increasingly, the public sector will be held accountable for improved land information by which to manage land resources more effectively. We must avail ourselves of GIS concepts and technology to meet these expectations.

We are already seeing these expectations being translated into mandates, such as Enhanced 911 emergency dispatching. E911 places a demand for a GIS database that associates a phone number with a street address and an emergency service provider, to facilitate the dispatching process. E911 is a higher quality service than the basic 911. Similarly, the need to coordinate construction of infrastructure projects requires the spatial registration of map layers of different utilities, which in turn requires more accurate geodetic control and base mapping. This is needed to support one-call systems for utility excavations. Another example of mandates for improved information is EPA storm water regulations, which will require identification of outfalls to rivers.

This growing demand for improved land information demonstrates the need to think beyond increasing the efficiency of doing the present tasks and functions of land resource management, and to design systems to improve the ways in which the tasks and functions are performed.

OLRC RECOMMENDATIONS FOR LAND RECORDS MODERNIZATION

The OLRC has developed a recommended strategy to the modernization of land records in Oregon. It is a two-part program, one being a long-term process of creating powerful multi-purpose land information systems, while the other is to develop in the short term a geographic index that will serve immediate needs to integrate and access data by location. This short-term strategy is described first.

Strategy 1 - County Geographic Index

The OLRC recommends that counties develop a County Geographic Index, which uses the U.S. Bureau of the Census TIGER file as a spatial framework. TIGER will be used to geocode street addresses of the nation's residents to blocks, tracts and jurisdictions used by the Census to tabulate data. TIGER is a digital street and road map that will be a valuable resource to state and local governments. The TIGER line file contains a record for every street and road segment for each county in the U.S. In areas with addressing systems, address range data are also included in TIGER. The County Geographic Index concept includes a program of rural addressing to extent street and road addresses county-wide. The inclusion of address ranges in a digital street map enables the conversion of street address data to x,y coordinates and to service areas, such as voting precincts, school attendance areas, and emergency service zones. This capability is central to being able to integrate and locate records from separate data files.

The OLRC County Geographic Index recommended program goes beyond this address conversion capability. An important extension is to include a Parcel Index (a geographic cross-reference file) to the County Assessor's parcel data. A Parcel Index includes the following: 1) tax lot number, 2) owner name, 3) site address, 4) x,y coordinates and 5) areas in which the tax lot is located, such as tax district, city, and school district. It is proposed that this Parcel Index be in the TIGER framework, and thus part of the County Geographic Index.

Although the x,y coordinates in TIGER are not highly accurate, approximate coordinates for addresses and tax lots can be interpolated using the address range information. Tax lots without addresses will have to be digitized for inclusion. As more accurate x,y coordinate information becomes available for tax lots and street intersections, the less accurate information can be replaced easily.

The County Geographic Index can solve many of the needs for integration and location of data in separate files. Geographic informations systems technology can be used for graphics processing of the TIGER file and of data that TIGER has added x,y coordinates. This will add greatly to increase the utility of data already available, but not very accessible by geographic criteria.

Strategy 2 - Multi-Purpose Land Information Systems

OLRC's second program recommendation is to carefully construct a foundation for multi-purpose land information systems (MPLIS). The MPLIS concept consists of spatially registered layers of institutionally independent data. Organizations remain in control over their data, as the responsible organization is best able to update and insure the accuracy of the data. Yet, the data, or some derivative or part, can be made available or shared, if the layers are spatially registered.

The spatial registration part of the MPLIS concept is dependent on accurate geodetic control. There must exist a network of points on the ground and in each layer of data, for which accurate state plane coordinates are known. Global Positioning Systems technology is rapidly becoming available that will enable a dense network of geodetic control to be developed. The OLRC recommends that this dense network of control be developed from a state network to insure a consistently accurate base.

The OLRC also recommends that counties undertake a base mapping program and produce orthophotography, in both hard copy and digital forms. The orthophotos can serve as base maps for the display of other layers, without having to digitize planimetric features.

The cadastral (land ownership) layer should be built in conjunction with the Cooperative Mapping Program of the Oregon Department of Revenue (DOR). However, some counties may find it necessary to digitize line images of parcels and parcel centers while awaiting their turn to accurately

reconstruct the cadastral layer in the DOR Cooperative Mapping Program. This should only be done if the work can be amortized over a 2 - 5 year period.

Layers are to be created by the organizations responsible for those data, such as: the County Assessor for the cadastral layer; the County Surveyor for the survey and control layers; the highway department for the roadway layer; the planning department for the zoning, comprehensive plan, and capital improvements plan layers; and, the layers of jurisdictional, service, and statistical boundaries of areas. Utility companies and special districts would be responsible for their layers of their infrastructural networks, and resource agencies for the resource layers, e.g., soils, hydrography, and land cover.
Although institutionally independent layers are encouraged, some standard methods and data definitions are necessary to achieve the data sharing potential of the MPLIS concept. Organizations have to agree on street addressing standards, roadway classifications, the classification of soils, etc. Also, organizations will have to agree on data structure standards in order to relate data across layers. For example, soils data and land ownership parcel will have to exist in a polygonal structure to mathematically overlay them to determine the quality of land by parcel. This requires the application of GIS concepts and technology.

Computer-aided mapping is used to generate new paper maps by overplotting selected layers of data. The relationship among layers is discernable by visual inspection. If we want the computer to calculate the relationship among layers, say floodplains and land ownership, we need the power of GIS. GIS functionality is characterized by the ability to:

- link locational and attribute data for objects,
- relate data across layers, by point-in-polygon or polygon overlay,
- support topological data structures to facilitate data editing and enable routing applications.

GIS technology extends computer-aided mapping by combining databases with the power of computer graphics.

Financing and implementing the recommended program requires new institutional arrangements. The following section outlines a legislative opportunities to finance and implement the program.

THE FINANCING STRATEGY

Although a comprehensive legislative program to modernize Oregon's land records is desirable to achieve internal consistency, it is not appropriate for two reasons. The issues are not well articulated making it difficult to develop a constituency of interest groups, and it is too late in the legislative process to build the program into their legislative agendas. Modernizing land records in Oregon consists of a number of steps, one of which is to enable the inter-relating of land records by use of County Geographic Indexes.

The TIGER file developed by the U.S. Bureau of the Census provides cost-effective framework for the development of the County Geographic Indexes. A primary function of the Indexes will be to serve as a database for emergency dispatching. Consequently, they could be financed by a telephone tax. Constructing the E911 database from TIGER is a cost-effective approach, which will serve as a basis for its use as a County Geographic Index, with many other applications.

The building of county indexes involves a number of related steps, such as extension of street and road addressing systems to all parts of the state, and the changing of the process of assigning addresses from the time building permits are issued to the time of subdivision. Until these changes are fully implemented, it will be necessary to digitize the locations of all rural dwellings and vacant tax lots. Coordinates for locations of all tax lots and addresses are needed for emergency dispatching and for search of information about land ownership parcels. This will also require that all instruments referencing real estate filed with County Clerks shall be coded with the tax lot number. These are needed changes to existing processes. The rural addressing should be financed as part of the E911 program while the recording of tax lot numbers on real estate instruments should be financed by legislation to return property tax reappraisal and assessment to the six-year cycle.

Although the County Geographic Indexes will serve many needs, more accurate land records are needed by public works, utilities, and for site planning and layout. A program to provide technical and financial assistance to local governments to build multi-purpose land information systems (MPLIS) is needed as the second program element. In the absence of a comprehensive program an incremental strategy will have to suffice. MPLIS requires improved large-scale mapping, which in turn requires an improved geodetic control network to bring geodetic control to PLSS section corners. The improved geodetic control will facilitate and accelerate the DOR cooperative mapping program with counties to replace the worn out assessor's maps. Improved geodetic control can occur by cooperative programs with federal agencies, such as BLM, the U.S. Forest Service, USGS, and NGS to develop a geodetic control network. Similarly, reliance on existing programs, such as the Section Corner Preservation program for permanent geodetic control referencing, can be used toward implementation of the MPLIS concept.

The OLRC recommends that the real estate transfer fee be reserved for land records modernization activities, such as to fund indexing of tax lots and improved large-scale maps and geodetic control, and the recording of tax lot numbers on instruments filed with the County Clerk pertaining to real estate. Similarly, beneficiaries of land records modernization programs should pay for those improvements by means of fees and appropriations, such as county building permit fees to fund the use of GIS for screening for secondary lands designation, state utility franchise fee to fund improved geodetic control and large-scale mapping improvements, and an appropriation of lottery revenue to help fund the development of the County Geographic Indexes and vacant land inventories.

A real estate transfer tax is a target of opportunity that is being sought by various interest groups to finance various programs. If such an approach is taken to finance infrastructure, we urge that information about infrastructure be an allowable cost. After all, the information to inventory monitor the performance of infrastructure is essential to a program of infrastructure finance.

Financing land records modernization will require a partnership of state, local, and private organizations. More analysis and discussion will be needed to insure that single-purpose programs will be consistent with broader benefits of land records modernization

CONCLUSIONS AND FUTURE DIRECTIONS

The recommendations of the OLRC serve as a guide for local governments in the introduction of GIS technology to meet their needs of land records modernization. In 1989, the OLRC will seek to clarify the state interest and role, leading to a recommended state program for land records modernization. The emphasis is on database issues which underlie the application of technology. If the databases are well conceived constructed, GIS technology can be well utilized.