

Land Records Modernization – 50 years and Counting

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Forward: This history of parcels, land records, and GIS is a personal reflection from one of the founders of the principles and concepts for automating land records that we still strive for today. Dr. David Moyer is thoughtful and knowledgeable about land titles, the role of landownership to society, and its importance in supporting policy and decision-making. He has quietly taught and influenced many of the leaders in modern GIS principles and programs. He has agreed to put pen to paper for this reflective piece. It is a history through his eyes, derived from his experiences. He has identified some of the critical points in the development of automated, modernized land records, so that those building today's systems understand the paths that have led here. The references in the footnotes provide a guide to key points in history. David is my friend and mentor. The foundational materials he describes contain important information that is carried forward into all of our work on land records today. – *Nancy von Meyer.*

Abstract: Land records are a critical resource in our society. Landownership titles have been a major component of American society since the Pilgrims came ashore from Europe in the early 1600s. Formal land title recording systems were put in place as states matured, adopted state constitutions, and became part of the United States starting in the late 1700s. Over the last 50 years the storehouse of available land title records has grown quite large, as computers, geographic and land information systems, scanners, electronic documents, and global positioning systems have been added to the tool box for improving, maintaining, and making available a wide range of information about land. This document is about the modernization of land records that has occurred over the past 50 years. One major theme of this document is that while much has been accomplished, a substantial amount of work remains to be done. Second, the economic benefits of modernized land records far exceed the cost of making the related improvements.

The structure of this chapter is as follows. Each section reflects a major decade or period of advancement in Land Records Modernization. A benchmark timeline is included in Appendix 1. Finally a caveat -- while every effort has been made to present a balanced view, the view and opinions are based mainly on the observations of one person, the author. While several reviewers have strengthened this document, any and all shortcomings are the responsibility of the author.

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1. Introduction

The underlying theoretical framework for land parcel records in the U.S. is a mosaic quilt that is pieced together from concepts in the fields of property law and title recording, information systems (particularly information theory), and economics (especially the economics of information).¹ To understand the modern concept of property (i.e., rights in a parcel of land), it is important to understand that such rights are the result of an agreement between individuals as to rights in property. It is the relationship between two or more individuals that produced the need for agreements regarding property rights, such as the ownership of some or all of the sticks in what we now know as the bundle of rights.

It is impossible to determine precisely how property rights came about, but the shift from nomadic to cultivated agriculture food production certainly had a major impact. Regular flooding of agricultural lands in the Nile Valley resulted in early written land records and land surveying of parcels so that owners could return to their parcel after each flood.² In England, the gradual shift from Lords holding all rights to land in the feudal system, to communal and village common ownership of certain lands, and finally to private ownership by individuals provide a general view of how property rights evolved. In England this shift took place over several hundred years. The Domesday Book in England (1085-86 A.D.) is generally acknowledged as the first time that land parcel and owner records were linked in a written form.

This is the background that spawned the property and land title recording in the United States. Our ancestors set up a system that used some of the property concepts derived from England, but with the addition of a unique focus on the owner rather than the parcel object itself. The importance of the owner was tied to the tax system established early in our history, with the owner being responsible for the payment of taxes on the parcel. Established in the 1700s, there were little advancement, in terms of land parcels and the handling of

¹ Moyer, D. David, 1980, Property, Information, and Economics: A Foundation for Land Information System Evaluation, Vol. 1, Geoprocessing, pp. 275-295.

² Some of the earliest land boundary descriptions can be found in the Bible, (e.g., Numbers 34:1-12).

information about these parcels and rights therein, until well after the mid-twentieth century. Even with the advent of computers and land and geographic information systems, change was excruciating slow in coming. Payne noted in 1954 that “Traditionally land transfers in this country are a slow, expensive, and uncertain matter ... It is more and more apparent that the system employed is clumsy, wasteful, inefficient, and out of keeping with our demand for social institutions of reasonable effectiveness, and there is general agreement among competent, disinterested observers that conventional procedures, if left unmodified, will soon breakdown of their own weight.”³ Fifteen years later, Ptak saw little change, “In our title system there is a great deal of duplication for which, on way or another, society pays.”⁴

This brings the historical background to the 1960’s. In developing this background, a list of conferences, proceedings, publications, and other land record related events was compiled in a benchmark list. This list is included in Appendix 1. An analysis of these benchmarks led to the conclusion that a grouping of these items by decade would be more useful to the reader for a better understanding of the flow of developments that make up land records modernization over the last 50 years, as well as provide a narrative with a more useful flow than would a long list of short discussion of each benchmark. Finally, it became clear that there was a theme or general subject area that could be used to characterize each decade, and these themes are noted in the text as well.

Before taking a look back at the past 50 years, it might be well to state the goal for “land records modernization” – to give the reader some structure for the discussion that follows. The National Research Council stated in 1980 that the United States was in “critical need of a better land information system” and further that a multipurpose cadastre could provide “a framework that supports continuous, readily available, and comprehensive land-related information at the parcel level”.⁵ Land records modernization involves at least two major concepts: 1) multipurpose, comprehensive systems, for instance, a single system to provide all relevant land parcel information, not separate systems for each function or use, such as land titles, land taxation, land use, zoning restrictions, etc., and 2) the data in these systems must be kept current. Certainly computers and geospatial tools have made multipurpose, comprehensive land records system feasible. But equally important is the stewardship of each data “layer” or theme by a single, identifiable agency or office (authoritative source), to assure that these data are kept current and accurate. Land records modernization also means using the best available technical tools to 1) build these comprehensive systems, and 2) update the data files in a comprehensive system on a regular

³ Payne, John C., 1954, the Crisis in Conveyancing, 19 Missouri Law Review, pp. 214-15.

⁴ Ptak, Laurence J., 1969, Proceedings of a Workshop on Problems of Improving the United States System of Land Title Records, University of Indiana Press, p. 183.

⁵ National Research Council, 1980, Need for a Multipurpose Cadastre, National Academy Press, Washington, DC, p. 1.

basis. As a bottom line, the institutional and political knowledge and will are just as important as technical tools in designing and carrying out any land records modernization effort.

2. The 1960s – A Time of Vision

Imagining What Could Be and What Could Be Accomplished

It is indeed fortunate that those of us interested in land records and how they could be modernized had people precede us with vision on what could be and more importantly, how the vision they developed could be implemented. For instance, URISA's founder and first president Edgar Horwood, who had the ability to see how computers could be harnessed aid in land use planning, must have also recognized the relationship of land ownership parcels and land use planning. Since individual landowners hold rights that enable them to control the use of their parcel, decisions these owners make have a major impact on land use. Others, such as Robert Cook at the University of Cincinnati Law School, and Gene Wunderlich at the U.S. Department of Agriculture, recognized how combining various kinds of land data would lead to more accurate, more powerful analyses. This power could then be applied to a variety of land ownership and land use policy issues to support decision makers ranging from those working at the local to federal government levels. An even more ambitious program was the Land Registration and Information Service (LRIS) shepherded by Willis Roberts and others in the Maritime Provinces of Canada in the late 1960s. Referred to by some as a "Cadillac approach" to land record modernization, LRIS planned to combine a highly accurate cadastral survey foundation with Torrens-type land title registration system. While the provinces were unable to sustain the LRIS after pilot projects were completed (due to the economics of the system), the vision of the LRIS pioneers helped guide many others working in the field around the world.

Early work on GIS software began in earnest in the 1960s, most notably with the work of Howard Fisher who founded the Harvard Laboratory for Computer Graphics in 1965. SYMAP and ODYSSEY software can be traced to the Harvard Lab, and Jack Dangermond's early thinking that led to the now dominant Esri software company came from the Lab as well. Nick Chrisman, Ben Niemann, Carl Steinitz, David Sinton, and others all did pioneering early GIS work at the Harvard Laboratory for Computer Graphics.

2.1 CULDATA - In 1964 the CULDATA (Comprehensive, Unified, Land Data) system was developed in a cooperative project of the Economic Research Service (ERS), U.S. Department of Agriculture and the University of Cincinnati Law School. Gene Wunderlich and Robert Cook were the principal investigators on the project. Following two years of study, CULDATA was unveiled at a conference at the Cincinnati Law School in 1966. The proceedings of the conference, published a year later, included detailed discussions on the technical

requirements and the many functional uses that CULDATA would serve. This is the first comprehensive look at multipurpose land information systems (MPLIS), where data is collected once and then used for many purposes.⁶ CULDATA included computerized systems for handling data, coordinate based parcel descriptions, and standardized, uniform parcel indexes that could support the linking of parcel spatial features with parcel attribute data files.

2.2 CLIPPP - Shortly after the CULDATA conference, Walter Raushenbush, a professor in the Law School, was pursuing research with the American Bar Foundation (ABF) on how to streamline the land ownership transfer process in the U.S. Although that research was never published by the ABF, the work laid the groundwork for the ABF Parcel Identifier Book, described in Section 2.4.

2.3 (USAC) - Urban Information Systems Inter-Agency Committee, 1969 - USAC was an effort led by the federal Department of Housing and Urban Development (HUD) that was a consortium of 10 federal departments and agencies. The objective was to carry out research and development efforts to develop prototype “integrated municipal information systems” (IMIS) that could be transferred to other municipalities. Contracts for software development were given to six municipal consortia. Two of the contracts were for “total systems”, in the Wichita Falls, Texas and Charlotte, North Carolina. The other four contracts were for development of small components (subsystems) for such things as the Long Beach, Calif., public safety subsystem; the St. Paul, MN., human resources development subsystem; the Reading, Pa., physical and economic development subsystem; and the Dayton, Ohio, public finance and administration subsystem. At the end of year two a USAC report “found that work was progressing in each city but that the time and money needed to develop IMIS was greatly underestimated”.⁷

By the time the work on the USAC projects was completed (or more accurately suspended), the project was considered unsuccessful. Charles Kindleberger and Kenneth Topping wrote in the 1992 URISA proceedings (pages 150-151) that “The large scale computer models had been shown not to work; many regarded the USAC to have at best been a failure and, in the eyes of some, a rip-off (USAC Support Panel, 1976)...”⁸

2.4 The Mackinac Conference and ABF Parcel Identifier Book - The American Bar Association, several federal agencies, and several title insurance companies, among others who participated in the CULDATA project, continued to support follow-up efforts over the next several years, hosting and participating in conferences at Mackinac Island (1968) and Atlanta, Georgia (1972). The former

⁶ Cook, Robert N. and James L. Kennedy, Jr., 1967, Proceedings of the Tri-State Conference on a Comprehensive, Unified Land Data System, University of Cincinnati, School of Law, 253 pages.

⁷ Davis, Carl F., O.E. Dian, Eugene Kozik, Kenneth L. Kraemer, and William H. Mitchel, 1972, Overview of the USAC Programs, HUD.gov, bibliographic database, Accession Number 905.

⁸ Wells, Ed, 2011, personal communication, November 6.

conference addressed problems of improving the United States land title record system⁹, and the latter addressed the need for Land Parcel Identifiers for Information Systems. In 1973 the American Bar Foundation published a book on this conference authored by David Moyer and Kenneth Fisher and continued to support the results over the next several years.¹⁰ This book remains the seminal effort in defining the types, use, and benefits of parcel identifiers in the U.S.

2.5 Environment Research Systems Institute (now known as Esri) founded in 1969 - At the end of the decade Environmental Systems Research Institute in was founded as a land-use consulting firm. Utilizing some of the earliest geographic processing software and tools this firm began applying the principles of spatial processing to solving land use decisions.

3. The 1970s – Defining the Needs and Possibilities

Land Record Modernization Pilot Projects

Spilling over from the 1960s, Cook, Wunderlich, and their colleagues at the American Bar Foundation continued to address the needs and possibilities as to data regarding land titles, land tenure and how to make land ownership data, typically hidden away in one of the thousands of county title recording and tax assessment office, more accessible. Eunice Ayers, the Register of Deeds in Forsyth County, North Carolina, launched what was one of the first county land records modernization programs in the nation. (This was one result of Ayers earlier participation in the CLIPPP conference and the Parcel Identifier project by the American Bar Foundation.) Even Congress got into the act, no pun intended, with the (RESPA), the Real Estate Settlement and Procedures Act. RESPA was supposed to reduce the cost of land transfer, but did not address the largest component of transfer costs, the real estate sales commission. Also, concerned over the extent of foreign ownership of U.S. land resulted in Congress commissioning a two-year study by the U.S. Department of Agriculture on ways to monitor the quantity, type, and location of foreign holdings of real estate. (See AFIDA below) Work continued on the development of GIS software as Esri continued development toward their first commercial software product. A study of government costs of maintaining land records in Wisconsin led to a program of land record modernization that continues to this day. The International Institute of Land Information was founded and sponsored two MOLDS conferences in Washington, DC. John Behrens, a long time advocate for improved land records, was a key member of the team behind MOLDS. The University of Wisconsin

⁹ White, James P., 1969, Proceedings of a Workshop on Problems of Improving the United States System of Land Title Records, University of Indiana Press, 201 pp.

¹⁰ Moyer, D. David, and Kenneth P. Fisher, 1973, Land Parcel Identifiers for Information Systems, American Bar Foundation, Chicago, 600 pp.

Land Information Computer Graphic Facility carried out pilot projects that would lead to the multipurpose land information system concept in Wisconsin.

3.1 Eunice Ayers Launches Land Records Information System in Forsyth County, North Carolina. Innovation typically requires a champion or white knight to lead the way. One such innovator at the county level was Eunice Hedrick Ayers, the register of deeds in Forsyth County, North Carolina. She became register in 1949 and served tirelessly for 35 years, retiring in 1984. Ayers was active in local, state, and national groups and associations throughout her career. A master at developing political support for land records improvements, she quickly built on what she learned at the 1972 CLIPPP conference in Atlanta. When the ABF book on parcel identifiers was published a year later, she soon built support for adoption of a parcel identifier standard at the state level and had it implemented as a key ingredient in the Forsyth County Land Records Information System (LRIS).¹¹ Ayers vision for the Forsyth LRIS was not only to modernize her office (land title records), but more importantly, she saw the importance and value of an integrated approach that modernized and linked all records related to land and land parcels (including those in local, state, and federal offices). Ayers continued to support and promote land records modernization in her state, and at the national level through the National Association of Counties (NACo) and URISA. In 1985 she was one of the key resource persons who provided direction to the newly appointed Wisconsin Land Records Committee. She knew what needed to be done and had great expertise in identifying and energizing key personnel to get the job done.

3.2 RESPA - By 1974, a housing price bubble of sorts was causing some angst among buyers and sellers of land about the costs of transferring property ownership (i.e., “settlement costs”). Wisconsin’s Senator William Proxmire was successful in getting the Real Estate Settlement and Procedures Act (RESPA) approved by Congress, which was to address these costs. (Of note, and as a possible indicator of the success, or lack thereof, of RESPA in meeting its goals, a new version of RESPA was passed in 2011 as an aftermath of the recent “mortgage crisis” in the U.S. Enforcement of this new version will be by the newly formed Consumer Financial Protection Bureau (CFPB).)

3.3 Land Titling Monograph, 1974 - A monograph on land title records and recording procedures in the United States was published by the U.S. Department of Agriculture in 1974.¹²

3.4 MOLDS, 1975 - In 1975 the first of two MOLDS conferences was held in Washington, DC. Entitled “Modernization of Land Data Systems (A Multipurpose

¹¹ Forsyth County, North Carolina, 1974, “Land Records Information System”, Winston Salem, NC, 65 pp.

¹² Moyer, D. David, 1974, Land Title Records and Recording Procedures in the United States, Economic Research Service, U.S. Dept. of Agriculture and the Center for Resource Policy Studies, University of Wisconsin, 59 pp.

Approach)", this conference signaled a renewed emphasis on land records modernization by federal government agencies. The MOLDS conference was organized and sponsored by the North American Institute for Modernization of Land Data Systems, whose board of directors consisted of representatives from supporting federal agencies in the U.S. and Canada, professional associations, and the American Land Title Association. The second MOLDS conference in 1978, on the topic "Implementation of a Modern Multipurpose Land Data System", tried to move the discussion forward to how to implement multipurpose systems. MOLDS later changed their name to the International Institute for Land Information, and then subsequently went out of business, transferring funds it had accumulated to support educational scholarships to the American Society of Photogrammetry and Remote Sensing (ASPRS) for advancing land records concepts. As of 2012 three scholarships have been awarded. The primary shortcoming of MOLDS/IILI was that it depended largely on volunteers, sustained federal agency support was lacking, and geospatial associations did not rally to support MOLDS vision and goals. The federal agencies involved with MOLDS/IILI have since come together in the Federal Geographic Coordinating Committee (FGDC) effort, which even with commitments of funds and staff, seems to have lacked the leadership and buy-in from federal agencies that are needed to assure success of such coordinating activities.

3.5 URISA, Kansas City, 1977 - URISA's 15th annual conference in Kansas City marked an important milestone from a number of perspectives. The conference program looked both back and ahead. Planning was a major focus of many papers presented. Moyer has noted that he received more requests for his 1977 URISA paper on "Land Parcel Systems: An Information Tool for Policy Planning and Implementation", than for any other he has presented over more than 30 years.¹³

3.6 Land Information Systems, Annotated Bibliography, 1978 - Near the end of the second decade of research on land information systems, MOLDS and ERS published an annotated bibliography on LIS literature. The many conferences, research projects, and related activities had produced a substantial amount of literature that would likely be a "valuable tool for the many varied disciplines that were interested in and working on land information systems".¹⁴ The bibliography contains numerous citations from the material discussed above. Over 1,400 documents are included, along with indices by author, subject matter, keyword in titles, and key words in the abstract.

3.7 Larson Report, Cost of Wisconsin Land Records, 1978 - By the mid-1970s, it was obvious to many that automation of land records was the key to development of LIS. However, most discussions of building computerized databases raised

¹³ Moyer, D. David, 1977, Land Parcel Systems: An Information Tool for Policy Planning and Implementation, URISA Proceedings, Vol. 3, pp. 162-175

¹⁴ Moyer, D. David, Land Information Systems: An Annotated Bibliography, MOLDS and the U.S. Department of Agriculture, Washington, DC, 195 pp.

questions about the costs of such programs and how these costs could be funded. With the help of a grant from the U.S. Geological Survey (USGS) Resource and Land Investigation (RALI) program, the Wisconsin Department of Administration and the University of Wisconsin were able to address two major questions, in what has been dubbed the “Larson Report”¹⁵

1. What factors inhibit the ability to gain access to and integrate land data and records?
2. What does it cost each Wisconsin citizen to sustain the status quo (i.e. without automation) for collection and management of land data and records each year?

As to the first question, seven technical and institutional inhibitors were identified:

1. Lack of accessibility
2. Lack of availability
3. Duplication
4. Inability to aggregate
5. Inability to integrate
6. Confidentiality
7. Institutional restrictions

In response to the second question, two major findings surfaced. Total expenditures for Wisconsin in 1976 were \$78 million dollars (annually) to collect and manage land records and data. Second, over half (\$42 million) of this cost accrued to local governments each year. The conclusion was that a model needed to be developed to guide the land records automation process in the state.

3.8 Dane County Land Records Project – 1980-1984 - In response to the need for a model, an interdisciplinary team of researchers from the university and from local, state, and federal agencies was assembled. The goal was to develop and implement an MPLIS for one 36-square mile Public Land Survey System (PLSS) township (Westport) in Dane County, Wisconsin. The Westport project was deemed successful (see Moyer, 1982)¹⁶ and based on this success, the team then expanded the project to all 35 PLSS townships in Dane County.

The Dane County project was a four-year effort focused on four areas: institutional reform, cost effectiveness, technological innovation, and product delivery in building an MPLIS. By 1987, the MPLIS concept had been tested by

¹⁵ Larson, Barbara, James L. Clapp, Allen Miller, Bernard J. Niemann, Jr., and Arthur Ziegler, 1978, Land Records: The Cost to the Citizen to Maintain the Present Land Information Base – A Case Study in Wisconsin, Wisconsin Dept. of Administration, 64 pp.

¹⁶ Moyer, D. David, James Portner, and David Mezera, 1982, Overview of a Survey-Based System for Improving Data Compilation in Land Record Systems, Computers, Environment, and Urban Systems Journal, Vol. 7 (4), 349-358.

building legislatively mandated layers for which individual local, state, and federal government agencies were responsible. These data layers were integrated using the National Spatial Reference System developed and maintained by the National Geodetic Survey, part of the National Oceanic and Atmospheric Administration (NOAA). Throughout the project efficiency of data collection and handling was improved with the use of scanners, Global Positioning Systems (GPS), and remote sensing imagery.¹⁷ A report on the Dane County project was the subject of the first release in the URISA Professional Paper Series (number 84-1) published by the Association in 1984. The report outlined the implications of organization of ordinary land records into a MPLIS, and the potential that such systems have for rural landscape assessment and planning.¹⁸

3.9 Agriculture Foreign Investment Disclosure Act (AFIDA), 1979 -Throughout the development of GIS/LIS/MPLIS systems, much progress has been made in study and refinement of concepts and models when issue-specific problems and crises arose. One such case occurred in the late 1970s when concerns about the foreign ownership of lands in the United States became an issue in federal and state agencies, the media, and finally in Congress. In response Congress funded a major project by the Economic Research Service in the U.S. Department of Agriculture to examine the status of information about land ownership and options for modernizing land ownership records that would better meet the needs of policymakers regarding issues such as foreign ownership of U.S. land. The resulting multivolume report documented the results of an exhaustive study that involved a wide range of consultants and subcontractors, ranging from IAAO, private assessors, economists, and the Harvard Lab for Computer Graphics. A recommendation for an MPLIS was one of the major parts of the project report.¹⁹ However, even before the report was finalized, Congress moved forward to put in place a single purpose, stand alone reporting system that still operates today.

4. The 1980s – Serious Research and Development

Much Needed Attention to Institutions

The 1980s was probably the most fruitful decade in modernization of land records over the last 50 years. This is particularly true as to the documentation of the need for such modernization, procedures for carrying out modernization efforts, and publication of a significant number of books and reports to provide

¹⁷ Foresman, Timothy W., editor, 1998, *The History of Geographic Information Systems: Perspectives From the Pioneers*, p. 103

¹⁸ Chrisman, Nicholas R., David F. Mezera, D. David Moyer, Bernard J. Niemann, Jr., and Alan P. Vonderohe, 1984, *Modernization of Routine Land Records in Dane County Wisconsin: Implications to Rural Landscape Assessment and Planning*, URISA Professional Paper Series No. 84-1, URISA, Washington, DC, 44 pp.

¹⁹ Report to Congress, 1979, "Monitoring Foreign Ownership of U.S. Real Estate, AFIDA (Agriculture Foreign Investment Disclosure Act)", 3 Volume Report, Economic Research Service, U.S. Department of Agriculture, Washington, DC.

guidance to LIS/GIS professionals over the next quarter of a century. At the national level the National Academy of Sciences' (NAS) National Research Council (NRC) carried out two major studies -- one on the need for a multipurpose cadastre and one on the procedures and standards for implementing a multipurpose cadastre. The Federal Geographic Coordinating Committee's (FGDC) Federal Geodetic Control Subcommittee followed up the NRC publications with a 25 chapter, multi-volume guidebook on the Multipurpose Land Information System (MPLIS) (a more easily understandable term for the MPC). The MPLIS Guidebook contained details on the various components of the MPLIS and how local and state governments should go about implementing and maintaining these systems. The National Science Foundation launched the National Center for Geographic Information and Analysis (NCGIA), with a mission to focus on the basic science foundation aspects of GIS systems. After a competitive grant process, a three-university consortium of UC-Santa Barbara, SUNY-Buffalo, and the University of Maine were declared the winners and continue to support basic geographic information science research more than 20 years later.

At the state level many states were moving forward with programs to modernize their land records systems and to design and implement multipurpose systems. Maryland, Kansas, North Carolina, and Wisconsin are examples of states with such programs in the 1980s. In Wisconsin, an MPLIS ideograph (the familiar stacked layer diagram) was developed and workshops and seminars were held to promote the concept and benefits of the MPLIS, a statewide land information association was formed with an initial membership of several hundred, a governor appointed committee developed a plan to guide land records modernization at all levels of government, legislation was passed to establish the Wisconsin Land Information Program (WLIP), and a state Land Information Board was appointed by the Governor to provide guidance and policy oversight to the WLIP. At the local level, an MPLIS system was implemented for Dane County, based on the MPLIS system developed by University of Wisconsin-Madison faculty and supported by the state land records modernization effort.

The decade of the '80s also saw greater attention given to the economics of information and information systems. Earl Epstein and Tom Duchesneau published a groundbreaking report on the how demand affects the value of geodetic information. (A follow-up article was published in 1990 in the Journal of URISA.) Moyer's work on the linkage of the concepts of property, information, and economics was published in the first issue of the Journal of Geoprocessing.

4.1 The first ESRI User Conference, 1981 - The first ESRI user conference in 1981 was held in Redlands California with 16 attendees. Esri's early mission was to organize and analyze geographic information to help land planners and land

resource managers make well-informed environmental decisions. These studies resulted in maps that showed constraints and opportunities for development.²⁰

4.2 AID Land Titling Projects: Costa Rica, Guatemala, Albania, Uganda, 1980, 1992, 1993-4, 1995-6, respectively - Beginning in the early 1980s several projects were launched involving land titling and land title reform projects in a number of countries around the world. AID (Aid for International Development) and other agencies funded programs to assist several third world countries in the development of modern land title systems. The basic premise of most of these titling efforts is that secure title to land is a prerequisite for obtaining credit for improvement of the property, obtaining better seed, fertilizer, and equipment to make the land more productive. Results of these efforts have varied with the greatest success in Central and South America and lesser progress in countries in Eastern Europe and Africa.²¹

4.3 Multipurpose Cadastre publications, National Research Council, 1980 and 1983 - By the late 1970s, the interest in developing a modern LIS that included land ownership titles had spread to a wide group of system developers and users. The foundations for this new multipurpose cadastre (MPC) focus could be traced to the work of ERS and the American Bar Foundation on land ownership, land parcel identification systems, the work in the Maritime Provinces of Canada on their Land Record Information System (LRIS) program, and the continued refinement of LIS/MPLIS at annual conferences and in many related information system projects on various aspects of land titles and property tax assessment issues and needs. Seeing a need to coordinate what were often disparate efforts, these interested parties were able to interest the National Research Council, an arm of the National Academy of Sciences, in organizing and hosting the first of two conferences on the MPC. The first study and conference dealt with defining an MPC and the many needs that such a system would serve. After a year of study and debate a report was issued that detailed uses and users needs, as well as laying out a conceptual diagram of key MPC components.²²

Whereas the 1980 NRC report address what an MPC looked like, the second NRC study report in 1983 considered how an MPC should be designed and implemented. Report two on procedures and standards addressed these aspects of the MPC. In addition, a new refinement was made to the model/diagram outlining the MPC, distinguishing between cultural data, such as ownership boundaries, and natural resource LIS data.²³

²⁰ Web Reference, <http://www.esri.com/about-esri/history/history-more>, last accessed 4-1-2013.

²¹ Moyer, D. David, 1980, "An Evaluation of the Institute de Tierras y Colonizacion (ITCO) Land Titling System", AID Costa Rica and the Land Tenure Center, University of Wisconsin-Madison, 63 pp.

²² National Research Council, 1980, Need for a Multipurpose Cadastre, National Academy Press, Washington, DC, 112 pp.

²³ National Research Council, 1983, Procedures and Standards for a Multipurpose Cadastre, National Academy Press, Washington, DC, 173 pp.

4.4 ARC/Info Version 1 Released - Esri developers began formulating concepts that ultimately led to the release in 1982 of ARC/INFO, the first commercial GIS. It combined computer display of geographic features, such as points, lines, and polygons, with a database management system for assigning attributes to these features.²⁴

4.5 Multipurpose Land Information Systems: The Guidebook - Late in the 1980s, several URISA members were key parts of the team that produced the FGDC document: "Multipurpose Land Information Systems: The Guidebook". The first chapter was released in late 1989 and the last of the 23 chapters was published in June of 1997.

The Guidebook was developed to provide details on how to go about developing various parts of the MPLIS. Topics ranged from basic concepts and definitions to steps in building base maps, parcel maps, geodetic networks, and guides to dealing with institutional issues in building and maintaining MPLISs. The Guidebook was published by the Federal Geodetic Control Subcommittee of the FGDC in loose-leaf notebooks that allowed release of individual chapters and clusters of chapters as they were completed, and also to allow updates and refinements as appropriate.²⁵

4.6 Federal Interagency Coordinating Committee on Digital Cartography (FICCDC), 1983 and Federal Geographic Data Committee (FGDC), 1990 - In 1983 the Federal Office of Management and Budget (OMB) recognized that technical changes were rapidly occurring in surveying and mapping products and the technology used to produce them. Therefore, the OMB prepared a memorandum calling for federal agencies to coordinate, digital data activities, develop standards and specification, increase data sharing, enhance data to make it suitable for multiple uses, and assist the private sector in use of these data.²⁶ By 1990 the need for additional tweaking of federal support for spatial data coordination was recognized in a revision of OMB Circular A-16. The revision renewed the commitment to federal coordination and expanded the data component to include all digital spatial data, and continued the responsibility for data coordination on individual agencies. The FGDC established a number of subcommittees, which have varied widely in level of activity and success. For example, the Federal Geodetic Control Subcommittee and the Federal Cadastral Subcommittee have been the most active and have been responsible for a number of useful studies, reports, and projects. The parcel data for use in wildfire management (through the Cadastral Subcommittee) and the MPLIS Guidebook (through the Geodetic Control Subcommittee) are two significant examples.

²⁴ Web Reference, <http://www.esri.com/about-esri/history/history-more>, last accessed 4-1-2013.

²⁵ Brown, Patricia M., and D. David Moyer, 1989, "Multipurpose Land Information Systems – The Guidebook", Federal Geodetic Control Subcommittee, FGDC, Rockville, Maryland.

²⁶ Robinson, Milo, 2008, A History of Spatial Data Coordination, <http://www.fgdc.gov/ngac/a-history-of-spatial-data-coordination.pdf>, 7 pp.

4.8 Land Records Special Interest Group (SIG), 1983-94 (per Peter Van Demark and Will Craig) - Because of the increased land records systems activity of URISA members, and to give more structure to their efforts, a Land Records SIG was formally organized in the early 1980s. Like many URISA activities in the rapid growth period of the 1980s, the date that the Land Record SIG got underway is a little fuzzy. Nevertheless, Peter Van Demark and Will Craig have been able to document that the Land Records SIG was very active in the 12-year period that began in 1983. The SIG was designated as Land Records through 1985, Land Records Systems through 1992, and Land Records/CAMA starting in 1993. Activities organized by the SIG included special sections and even separate volumes in the Proceedings for Land Records Systems and Natural Resources, special issues of several journals in the geospatial field, organized and invited sessions at annual URISA conferences, and award citations for many of the SIG leaders.

Land Records and CAMA activities have continued over the past 15 years, but seemingly with less separate designation that occurred in the 1980s and 1990s. This is probably due to the greater emphasis on multipurpose systems, with data for ownership parcels, tax parcels, resource polygons, transportation networks, and other geospatial data sets all being built on geodetic reference systems such as the one maintained by the National Geodetic Survey (i.e., the NSRS: the National Spatial Reference System).

4.9 Multipurpose Land Information System (MPLIS), University of Wisconsin, 1984 (ideograph), Seminar on Multipurpose Cadastre, 1984 - Based on the work done as part of the Westport Township project, and the Dane County project (discussed above under the “Larson Report”), the team of researchers at the Land Information and Computer Graphics Facility (LICGF) at the University of Wisconsin-Madison continued work in the 1980s to develop concepts in support of an MPLIS system. One important advance in 1984 was the publication of an ideograph that summarized the concept for an MPLIS in Wisconsin.²⁷ This conceptual MPLIS is based on the premise that each agency (whether local, state, or federal) has a legal mandate to store and collect a particular set of spatial information. Further, each agency should also be responsible for maintenance of the data layer in a digital form, and that all of the data layers in the system should be registered together with a mathematical reference framework such as the NSRS or section corners in the Public Land Survey System. The result would be that any two or more layers could be linked for analysis and display.

During a semester long seminar in the spring of 1984, the LICGF organized and sponsored a series of presentations and discussions involving leaders in the LIS/GIS field. As noted in the publication based on the seminar, the seminar was

²⁷ Supra, note 17, page 104

organized to focus on the “technical and institutional issues associated with the creation of modern land information systems”.²⁸ Land information experts from the United States, Canada and Europe participated and over 1,500 attended the seminar series. Speakers from both the public and private sectors included lawyers, planners, economists, landscape architects, and computer scientists.

Because of the interest generated by the seminar, a statewide coalition was formed that spearheaded efforts that resulted in the appointment of the Wisconsin Land Records Committee by the Governor in 1985. In 1986, a second educational effort, a Workshop on Multipurpose Land Information Systems involved 20 speakers from a variety of disciplines. Speakers were asked to “present ideas, discuss their experiences, and offer recommendations on how to modernize our land records systems to produce multipurpose land information of mutual benefit to the public and its supporting institutions”.²⁹

4.10 Separate Section on Land Records Systems in URISA Proceedings, 1984 - By 1984 the Land Records SIG had generated a significant number of papers on land record topics. Therefore, the URISA Proceedings editors setup a separate section for land records papers. For example, the 1984 proceedings included such papers, with one by Ken Dueker and Daniel Kjerne “Two Approaches to Build the Base Layer for a Computer Assisted Land Records System”.

4.11 Epstein, Earl, and Tom Duchesneau, “The Use and Value of a Geodetic Reference System”, NOAA, National Geodetic Survey, Rockville, MD, 1984 - In this groundbreaking study, Epstein and Duchesneau demonstrated that the demand for geodetic information (the foundation for registering all geospatial data) can be used to determine the economic value of this specific layer of data in the MPLIS.³⁰

4.12 Wisconsin Land Records Committee appointed by Governor Earl, 1985; WLRC Final Report, 1987; Wisconsin Land Information Association (WLIA), 1987; Wisconsin Land Information Legislation passed, 1989; WLIP funding legislation passed, 1990 - One of the results of the 1984 MPC seminar was the appointment of the Wisconsin Land Records Committee (WLRC) by Governor Anthony Earl. The WLRC was a 32-member committee with 12 subcommittees. In total over 110 people worked for two years to “to examine and address the immediate needs of state and local agencies regarding land information collection and management and to develop recommendations on how Wisconsin should approach the long-

²⁸ Niemann, Bernard J., Jr., editor, 1984, *Seminar on the Multipurpose Cadastre: Modernizing Land Information Systems in North American*, IES Report No. 123, Institute for Environmental Studies, University of Wisconsin-Madison, 320 pp.

²⁹ Niemann, Bernard J., Jr., and D. David Moyer, editors, 1988, *A Primer on Multipurpose Land Information Systems*, Report No. 133, Institute for Environmental Studies, University of Wisconsin-Madison, 176 pp.

³⁰ Epstein, Earl and Thomas Duchesneau, 1984, “The Use and Value of a Geodetic Reference System”, NOAA, National Geodetic Survey, Rockville, MD.

term issues of land records modernization”.³¹ The WLRC final report contained five recommendations:

1. Establish a Wisconsin Land Information Board (WLIB)(to establish program policy and provide overall direction),
2. Establish and Office of Land Information (LIO) (to administer the program developed by the WLIB),
3. Establish a grants program (to assist counties and municipalities in the development of MPLIS) and to provide technical assistance to support local government efforts,
4. Provide an incentive to encourage each county to establish a county Land Information Office (LIO) (to serve as the single point of contact between the state and county), and
5. Encourage members of the LIS coalition to establish a private, nonprofit, nongovernmental Land Information Association

The first four recommendations were adopted in 1989 legislation that established the Wisconsin Land Information Program (WLIP). Since then a recordation fee has been used to collect and distribute \$150 million to support county land records systems modernization programs. Counties have matched these WLIP grant funds with another \$150 million from other sources. For the next 15 plus years, major advances in moving toward the goals of the WLIP were made. Grant funds were successfully used by many counties for developing data for seven “foundational data layers”. One of the primary thrusts of the grant program was to provide resources to the “have-nots”, those counties with insufficient land recordation fees to complete land information databases. By the late in the first decade of the 2000s, the Wisconsin Department of Administration terminated the WLIP and transferred WLIP administration directly to DOA. Also, due to state budget structural deficits that had been growing over several biannual budgets, \$2 million per year in WLIP fund have been lapsed into the General Fund for the past several state budgets.

Even before the WLIP legislation was passed, the land information coalition that had been key in getting the WLRC appointed and their work supported, undertook recommendation five, the establishment of a private, non-profit, nongovernmental Land Information Association. First, the Wisconsin Chapter of URISA was founded, with an agreement that WI-URISA would provide the incubator for the association, which was named the Wisconsin Land Information Association (WLIA). URISA provided seed funds for mailings, printing, etc. for the first 18 months of the WLIA.

Once the WLIA was on it’s feet, the decision was made for WLIA to continue on its own, with emphasis on land records modernization and land information systems. Because the WLIA and WI-URISA memberships were nearly identical,

³¹ Wisconsin Land Records Committee, 1987, *Final Report of the Wisconsin Land Records Committee*, Institute for Environmental Studies, University of Wisconsin-Madison, 53 pp.

and the limits of time available for members to devote to new associations, the decision was made to terminate WI-URISA.

4.14 First GIS for Transportation (GIS-T) conference held in San Antonio, 1987 - David Moyer organized the program for this conference.³² After a one-year hiatus in 1988, GIS-T has continued on an annual basis, with the 25th annual GIS-T conference held in Loveland, CO in the spring of 2012.

4.16 Wisconsin MPLIS article in Assessment Digest, IAAO, 1987 - This article by David Moyer on the MPLIS, appearing in the Assessment Digest of the International Association of Assessing Officers, was another forerunner to the joint effort of URISA and the IAAO to produce the first GIS for Assessors handbook in 1992.³³

4.17 International Geographic Information Systems (IGIS) Symposium, “The Research Agenda”, 1987 - The IGIS conference was held in Crystal City, Virginia, sponsored by URISA and sister geospatial associations, (the American Association of Geographers, the American Congress of Surveying and Mapping, the American Society of Photogrammetry and Remote Sensing, and the Geospatial Information and Technology Association). The purpose of the conference was to develop a research agenda for the National Center for Geographic Information and Analysis (NCGIA) program that the National Science Foundation was soliciting proposals for. (NCGIA grant was awarded to a three-member consortium of universities one year later – see NCGIA below). The IGIS conference also turned out to be a precursor of the GIS/LIS conferences by the group of geospatial associations that began in 1988.

4.18 First of 11 GIS/LIS conferences, held in San Antonio, 1988 - Over the next 11 years, these conferences provided a forum for the members of the participating geospatial associations to share results of their work on a variety of topics, including research results, progress on land records modernization, and ideas for institutional reform that would enhance the environment for geospatial systems advancement. The final GIS/LIS conference was also held in Texas (Fort Worth), after which the joint association governing board concluded that other venues were available to sharing work in this area and that the GIS/LIS conferences would no longer be held.

4.19 NCGIA initial grant made to consortium of Santa Barbara, Buffalo, and Orono, 1988 - The National Science Foundation launched the National Center for Geographic Information and Analysis (NCGIA), with a mission to focus on the basic science foundation aspects of GIS systems. Following a competitive grant process, a three-university consortium of UC-Santa Barbara, SUNY-Buffalo, and

³² URISA Newsletter, 1987, Number 88, p. 2

³³ Moyer, D. David, 1987, Multipurpose Land Information Systems in Wisconsin: Content and Process”, in Assessment Digest, Vol. 9, pp. 13-18

the University of Maine were declared the winners and continue to support basic geographic information science research more than 20 years later.

NGCIA held a number of “specialty conferences” to gather additional thinking and insight on specific issues and how to address them. One example was the Initiative 4 conference on the “Use and Value of Geographic Information in Decision-Making” held in Bangor, Maine in 1989.

4.20 “Multipurpose Land Information Systems – The Guidebook”, 1989 - As noted earlier, the Federal Geodetic Control Subcommittee of the FGDC published the first chapter of the MPLIS Guidebook in 1989. Edited by URISA members Patricia Brown and David Moyer, the Guidebook marked a continuing, major commitment to the MPLIS by the National Geodetic Survey and the Geodetic Control Subcommittee.

4.21 Launch of URISA Journal (JURISA), 1989 - The idea of URISA publishing a professional journal had been discussed for several years in the latter half of the 1980s. These discussions included whether an additional journal was needed, the economics of adding a journal to the URISA publication mix, editorial support that would be necessary, options for content, and whether URISA members were available to take on the tasks associated with serving as section editors, as well as for the general editorial support. After these extended discussions the decision was made to begin publication of JURISA on a semi-annual basis.

Another key decision in the success of JURISA was the selection of Bill Keenan as the Managing Editor at the outset. Keenan had exceptional editorial skills, along with the ability to bring together the work of the coordinating editors, section editors, and authors of the articles that were published. Serving in this position for the first 10 years of JURISA, Keenan must be credited with a much of the success of the journal.

The inaugural issue included sections for refereed papers, features, feature maps, and reviews of books, publications, videos, and software. There were two major MPLIS articles in the first issue of JURISA: one by Timothy Nyerges on “Information Integration for Multipurpose Land Information Systems”³⁴ and a second one on “Toward a Method for the Evaluation of Multipurpose Land Information Systems” by James Clapp, John McLaughlin, Jerry Sullivan, and Alan Vonderohe.³⁵ All of these authors were part of the URISA Land Records SIG.

³⁴ Nyerges, Timothy L., 1989, Information Integration for Multipurpose Land Information Systems, URISA Journal, Vol. 1, No. 1, pp. 27-38

³⁵ Clapp, James L., John D. McLaughlin, Jerome G. Sullivan, and Alan P. Vonderohe, 1989, Toward a Method for the Evaluation of Multipurpose Land Information Systems, URISA Journal, Vol. 1, No. 1, pp. 39-45

5.0 The 1990s – Land Titles, GIS, and Property Assessment

The Refinement of Institutions for Support of Land Records Modernization

The 1990s might be best characterized as a decade with fewer, more substantive projects and initiatives to build on the land records modernization foundation that was in place by then. Also, the development of MPLIS and guidelines for their development and support had progressed to the point that an MPLIS workshop was developed and presented for the first time at the GIS/LIS conference in California. With support from members of both URISA and IAAO (the International Association of Assessing Officers), a publication on GIS guidelines for assessors was written and published. This publication was also an important step in further cooperative efforts between GIS and assessors that developed the specialty conferences on GIS and (Computer-Assisted Mass Appraisal) CAMA that began in the mid-90s. And finally, the need for improved land title record systems in a number of developed and developing countries provided opportunities for several organizations such as AID (Aid for International Development), the World Bank, and the inter-regional development banks on projects to assist in implementing or improving land title record systems around the world.

5.1 1992, GIS Guidelines for Assessors, 1st edition published by IAAO and URISA -

In 1990 the leaders of URISA and their counterparts at the International Association of Assessing Officers (IAAO) held a meeting to explore ways that the two groups could work more closely together. Seeing potential in educational programs and publications, further discussions led to the suggestion that URISA could help assessors better understand GIS systems. Such understanding is important since in many jurisdictions, the assessor's office is responsible for maintaining the land records. Over the next two years, the first edition of "GIS for Assessors" was developed by the joint association work group and released in 1992.³⁶ The two associations published a second, updated edition in 1999.

5.4 URISA/IAAO workgroup develop 1st GIS and CAMA conference, 1997 - A second outgrowth of the cooperative efforts of URISA and the IAAO was the first GIS and CAMA conference held in North Carolina in 1997. Again a workgroup of URISA and IAAO members began meeting in 1996. The Land Records SIG had already gone through a name change to add CAMA to the Land Records SIG title, and the GIS and CAMA workshop was a natural continuation of these cooperative efforts. The workgroup brought together the URISA members with GIS expertise with the IAAO/CAMA people who had a specific need for the kinds of accurate, timely land parcel information that property tax assessors needed. The 1997 GIS and CAMA conference was a one of the earliest "specialty" conferences. GIS and CAMA have produced strong programming and continue to draw a substantial

³⁶ IAAO and URISA, 1992, GIS for Assessors, 1st Edition, Chicago, 106 pp.

audience, with over 300 attending the 17th annual conference held in Albuquerque, New Mexico in March of 2013.

6.0 The 2000's - Maturing of the Basics of Land Records Modernization

Continued Institutional Challenges and Struggles to Sustain Funding for Modern Land Records Systems

As the new millennium dawned, several land records trends from the 1990s continued, were refined and clarified, or became more dominant. The importance of accurate, timely parcel data was given added emphasis in a number of studies, projects, and responses to particular issues and concerns. For example, the National Research Council revisited their earlier work and published a "vision" report on "national land parcel data". The Cadastral Subcommittee of the FGDC continued their work as the most active, most effective of the many FGDC subcommittees with work using parcel data for wildland fire management and providing guidance to federal executive agencies and Congress on appropriate responses to the mortgage crisis. As has been the case in many instances over the past 40 years, Congress again succumbed to the pressure to do something regarding the mortgage crisis, making relatively minor changes in loan application forms for mortgages and in the Real Estate Settlement Protection Act (RESPA), originally passed in 1974. At the state and local level, several states continued to struggle with how to pay for and finish ambitious land record modernization programs, some which had been on going for 25 years (e.g., Wisconsin and Kansas are two examples). In the private sector, additional refinement of GIS support for land records included Nancy von Meyer's book on the Arc GIS Parcel Model.

6.1 Esri Press releases "GIS and Land Records: The ArcGIS Parcel Data Model", 2004 -

This book by Nancy von Meyer describes applications and uses for parcel information in an ArcGIS geodatabase. It also discusses in detail the data model developed as a framework for land record information in an ArcGIS environment. In addition to discussing the data model itself, examples are included that demonstrate how a parcel data model can be used in support of a variety of GIS applications, including the update and maintenance of databases by tax assessors, planners, recorders, environmental managers, public works officials, safety officials, and others. The book also describes how land records personnel can include parcel attribute information in a geodatabase so work can begin on system design and implementation. The advantages of putting parcel information into a geodatabase are described, and details on how to move existing applications into the geodatabase are provided. Datasets are included that show how the parcel data model has been easily customized to satisfy different requirements.³⁷

³⁷ von Meyer, Nancy, 2004, "GIS and Land Records: The ArcGIS Parcel Data Model", Esri Press, Redlands, CA, 174 pp.

6.2 “Parcel Data and Wildland Fire Management”, Prepared for the FDGC, Cadastral Data Subcommittee, 2005 - In late 2004 the Western Governors’ Association issued policy and guidance for their needs, as well as for national homeland security needs of all agencies as to emergency preparedness and responsiveness. To provide support for these needs, the Cadastral Data Subcommittee of FGDC convened a workshop with the purpose of “examin(ing) the business requirements of wildland fire management and the related need for parcel data in a multi-jurisdictional environment”. Since earlier work by the Cadastral Data Subcommittee had an eastern states focus and because of the specific request of the Western Governors’ Association, this workshop was limited to considerations for the western states. The management of wildland fires was selected because it provided an opportunity to assess the utility of the FGDC Cadastral Data Subcommittee’s parcel publication standard in situations that would be common for emergency planning and response. Among the issues considered were did the standard provide support as to:

1. information about the location of people and the characteristics of individual properties,
2. management issues that transcend administrative and political boundaries, and
3. business requirements that demand cooperation and information sharing among multiple organizations.

Wildland fires are dynamic events that are affected by many factors including terrain, weather, and available fuel. These fires are a unique type of event, since intervention can reduce or prevent the damage. The recent expansion of homes and second home developments in the Wildland Fire Urban Interface means that complete databases are needed for all public and private parcels if mitigation and control measures are to be effective. Therefore, availability and access to parcel data are major concerns for any wildland fire event.

The workshop participants developed four recommendations to address these three concerns:

1. Data availability – need to facilitate data conversion in rural communities
2. Data access – need to facilitate access to local parcel data
3. Ease of use in applications – need to build an infrastructure that facilitates the development of regional parcel coverages
4. Awareness of the value and use of Cadastral Data – need to promote the value and utility of parcel data for wildland fire management

Since the 2005 report, the work of the Cadastral Data Subcommittee has continued to be supported by the Bureau of Land Management. For example, in 2008 a project was begun with the goal of identifying contacts for parcel data in the 414 counties in these 11 states. Further, the goal included acquisition of as

much of these parcel data as possible and pre-deploying it to support the analysis and response to Wildland Fire events by the U.S. Forest Service. Data sharing agreements were executed for all counties that did not require a fee. About three-fourths (305 of 414) of the counties reported they had parcel data, and of those 251 counties made their data available for pre-deployment to be used by the Wildland Fire community. That value of these parcel data for this purpose is significant, and is an example of unexpected/unintended uses for parcel data files once they are in place. With a 2007 fire season that was quite severe, the availability of parcel information provided for rapid response and analysis of each fire event in order to minimize the damage. Being able to explain data sharing benefits to counties and coordinating with counties as to data collection cycles, such as tax assessment and tax collection, were important in gaining cooperation by local governments.³⁸

6.3 National Research Council, “National Land Parcel Data – A Vision for the Future”, 2007 - In 2007 the National Research Council once again turned their attention to land parcel issues. (See earlier discussions above regarding the Multipurpose Cadastre in 1980 and 1983.) The 2007 report acknowledges that many of the problems identified 27 years earlier still existed and that much work remained to be done in order to harness the potential of land parcel databases. The report therefore focused on why greater progress had not been made and looked at the technological and institutional changes that had occurred since 1980 that had at least the potential for moving us forward.³⁹ Unfortunately, there is scant evidence in the intervening six years that the report has had a great impact. One reason may well be that while the ideas on what needs to be done have stood the test of time, the recommendations and ideas on how to accomplish the related tasks were slanted too much toward a top down model (from federal and state agencies), with too little attention to the role of local government and the need for an integrated, transaction-based system for providing the means to maintain a land parcel data base that is both accurate and timely, once it has been developed.

6.4 FGDC, Cadastral Subcommittee Mortgage Study Team, “Land Parcel Data for the Mortgage Crisis: Results of the Stakeholders Meeting”, 2009 -The “mortgage crisis” that swept over the U.S. economy in 2008 provided yet another example of the need for good information about land ownership in general and about many of the individual “sticks in the bundle of rights” that comprise private property rights in the United States. The crisis also provide an opportunity to showcase the power of a modern land parcel information system and how such a system could serve the needs of many parties that are part of the national mortgage market that now exists in this country. For these reasons, the FGDC asked the Cadastral Subcommittee to review the recommendations in the 2007 National

³⁸ FGDC Cadastral Subcommittee, 2008, Parcels and Wildland Fire 2007 Report, January 31 pp.

³⁹ National Research Council, 2007, National Land Parcel Data: A Vision for the Future, National Academy Press, Washington, DC, 158 pp.

Research Council (NRC) report: *National Land Parcel Data: A Vision for the Future* to determine which of these recommendations were particularly relevant to the challenges facing the economy due the mortgages issues and rapidly falling land values. (See the item that follows for more detail on the 2007 NRC report.) The basic result of the Cadastral Subcommittee study was the organization of a Mortgage Stakeholders meeting in May of 2009 and the publication of a report on findings and conclusions from that meet.

As a precursor to the Mortgage Stakeholders meeting, the FGDC Cadastral Subcommittee established a Mortgage Study Team to serve as a Steering Committee for the project. The role of the Steering Committee was to lead an investigation of the role of land parcel data in the mortgage crisis. As the project advanced, Subject Area Experts were added to the six member Steering Committee. These experts had unique knowledge of policy or technical issues and were also important in identifying key stakeholders in the public and private sector who would be invited to attend the Stakeholder Meeting. Throughout the study, a number of agencies and associations provided strong support for the work of Cadastral Subcommittee. These supporters included the National Geospatial Advisory Committee (NGAC), the Management Association of Private Photogrammetric Surveyors (MAPPS), IAAO, and the Coalition of Geospatial Organizations (COGO). For the stakeholder meeting the objectives were to obtain feedback on the data needs of stakeholders, demonstrate existing geospatial tools and sources of data, and produce a report “on the requirements for land parcel data as well as the relationships to other sources of information to support tracking and responding to the mortgage crisis by federal agencies”.⁴⁰ The final report provided three recommendations:

1. Add the local Parcel Identifier to the Home Mortgage Disclosure Act (HDMA) form
2. Develop a Parcel Early Warning System (to provide warning about financially stressed housing and mortgage markets)
3. Complete the standardization and availability of parcel data nationwide (the report indicated that in 2009, about 82% of parcels are available in a digital GIS format, but much of the data is not standardized, distribution policies are inconsistent, and over 1,000 counties to not have digital parcel data).

As of early-2013, the only recommendation that has been implemented is minor changes in the HDMA form to include the local parcel identifier.

⁴⁰ FGDC, Cadastral Subcommittee Mortgage Study Team, 2009, Land Parcel Data for the Mortgage Crisis: Results of the Stakeholders Meeting, Washington, DC, 18 pp.

7.0 2010 and Beyond

Rediscovery of Land Records Basics

7.1 Land Bulletin of the National Consortium for Regional Geospatial Innovations (RGIS), Documentation of Benefits Flowing from Multipurpose Land Information Systems in Wisconsin for Soil Conservation Programs, 2012 - Benefits of improved land records are many and substantial. However, documenting these benefits is often a challenge, since the troops who are best positioned to provide such documentation often say they are too busy to prepare a document or make a presentation documenting land record modernization benefits. Because of this challenge, the Land Information and Computer Graphics Facility (LICGF) at the University of Wisconsin-Madison has made a concerted effort over the years to help document benefits by assisting land record practitioners document these benefits and collecting information to show policymakers that there are measurable payoffs to be had from land records modernization investments.

One documented example is the use of land information contained in the MPLIS in Wisconsin to allow farmers to capture cost share funding when they practice approved soil conservation practices on their farm. While still a work in progress, the MPLIS databases in Wisconsin have been populated through the effort and support of the Wisconsin Land Information Program (WLIP). Data needed to document qualification and compliance to obtain Conservation Security Program (CSP) benefits included land ownership parcels, farm fields, soils, and watershed boundaries. Because watersheds often cross county boundaries, these data must be available for multiple county regions within the state in order to evaluate CSP applications. Because all of the data requirements were met, farmers in several Wisconsin watersheds became eligible for CSP benefits beginning in 2004. In the first four years of the program farm operators for six Wisconsin watersheds received over \$15 million in direct CSP payments. Results like these provide benefits not only to individual taxpayers/farm owners, but also demonstrate to policymakers the importance of support of the underlying WLIP that can yield similar results for a wide variety of land data users and uses within the state.⁴¹

7.2 New version of RESPA consumer protection statute adopted by Congress (See earlier discussion of the original RESPA Act passed in 1974), 2011 - The latest version of RESPA, passed July 21, 2011, is to be administered and enforced by the new Consumer Financial Protection Bureau (CFPB). Like the earlier version, RESPA is in place to provide potential buyers of real estate with an estimate of costs that will need to be paid at time of “closing”, when the transfer is finalized. While RESPA does reduce the uncertainty of costs that a buyer can expect, these

⁴¹ Moyer, D. David, and Renae Anderson, 2007, A Foundation of Digital Data: Wisconsin Multipurpose Database Key to Effective Soil and Water Conservation, Land Bulletin of the National Consortium for Regional Geospatial Innovations (RGIS), University of Wisconsin-Madison, 4 pp.

statutes have had relatively little impact in reducing settlement costs, since real estate broker fees, which make up the vast majority of total transfer costs, are not addressed. In my opinion, there seems to be little likelihood that the latest version of RESPA will lead to major changes in the cost of mortgages and ownership transfer, or provide additional protection against fraud and abuse, in spite of the claims made on the web page of U.S. Department of Housing and Urban Development.⁴²

7.3 Some Observations and Conclusions

I suggest that even the rather cursory review of the history of land records modernization presented here could well lead to a number of conclusions. For example:

- Our recent history suggests little new has emerged as to basic concepts for a considerable period of time - the concepts on which we built land records system modernization in the first 25 years are still valid. The basic ideas developed in CULDATA, MOLDS, and the 1980s MPC reports have stood the test of time.
- What is lacking is the political will and institutional framework to bring these concepts to fruition in widely available operating systems. For example, the Wisconsin Land Information Program (WLIP) was founded 25 years ago, with a goal of modernizing the land records in the state. Much progress has been made at a cost exceeding \$150 million in retained fees and grants to counties. However, over the course of the program, foundational elements were changed, too much latitude was given to various agencies and levels of government, institutions came and went and the political will to complete tasks was wanting. Another historical benchmark analysis will be necessary to see if the many partners in Wisconsin learned from their history, or will in fact repeat it once again.⁴³
- No agreement has been reached on the foundational elements of a multipurpose land information system – as to what elements are foundational, who uses them and for what, and who should pay to build and maintain the requisite geodatabase. Alternatively, if and when will parcel data rise to the level that cause it to be recognized as a basic infrastructure component that should be built and maintained because it is a public good? Yet the multipurpose land information system (MPLIS) continues to receive attention.

⁴² HUD.GOV, RESPA – Real Estate Settlement Procedures Act, effective July 21, 2011

⁴³ Miller, Allen H., Bernard J. Niemann, Jr., and D. David Moyer, 2012, “Recommendations for Consideration by the WLIA Board of Directors: An Approach to Realizing the Full Potential of the Wisconsin Land Information Program”, WLIA Annual Conference, Stevens Point, WI, 7 pp.

- In a similar vein, we keep spending dollars to acquire parts of the multipurpose system and the data in it – analogous to the plumbing and electrical for a new house, but thus far we have been unable to find dollars to build the foundation on which all of the other MPLIS components rest. For example, each year we make gains on parcel data available for certain applications like title insurance, wildland fire management, hurricane recovery, or a mortgage crisis. But progress has been painfully slow, as evidenced by the RESPA legislation of 2011 showing that many of the problems that existed in 1974 still had not been addressed in a meaningful way 37 years later.

Technology has changed rapidly, which means a fine-tuning may be required, but the data needs, user needs, and applications have not undergone much change.

So based on the many and varied land records projects, systems, and program over the past 50 years, what are the important lessons to be captured as we move forward?

First, land records are important to our society for many reasons.

Second, modernization of these records is important for a wide variety of analyses and decisions.

Third, as records are modernized, maintaining the “chain of records” is essential for long-term sustainability.

Much progress has been made since the 1960’s yet questions remain. Why should we build statewide parcel? What is the benefit of national parcel data? Should the data have a fee or license?

Appendix 1, Land Records Benchmark Timeline

Date	Item
1400 B.C.	“Original land grant from God to the Children of Israel”, see Numbers, chapter 34:1-12; see also Exodus 23:31, I Kings 4:21, 24, Joshua 14:1-2,
1964	CULDATA Project (Comprehensive Unified Land Data System)
1966	CULDATA Conference, University of Cincinnati Law School
1967	CULDATA Proceedings
1968	Symposium on Land Registration and Data Banks, Fredericton, New Brunswick conference (see Canadian Surveyor, 1969)
1968	Mackinac Workshop: “Problems in Implementing Improved Record Systems”
1969	Mackinac Island Proceedings: “Problems of Improving the United States System of Land Titles and Records”
1969-74	HUD USAC projects – “Integrated Municipal Information System Data Processing” (Charlotte, NC, Long Beach, CA, Wichita Falls, TX, St. Paul, MN, Reading, PA, Dayton, OH) 5 smaller systems considered Lane County, OR, Des Moines, IA, Los Angeles, CA, Long Beach, CA, New York, NY
1972	CLIPPP conference, Atlanta, Georgia (Compatible Land Identifiers -- Problems, Prospects, Payoffs), as the next step after Mackinac Conference
1973	Book, American Bar Foundation, Land Parcel Identifiers for Information Systems
1974	Eunice Ayers, launches Forsyth County, North Carolina Land Records Information System
1974	Moyer, D. David, 1974, Land Title Records and Recording Procedures in the United States, Economic Research Service, US Dept. of Agriculture, in cooperation with the Center for Resources Policy Studies, University of Wisconsin-Madison, 59 pp.

- 1974 RESPA (Real Estate Settlement Procedures Act), a consumer protection statute, passed in 1974 due to the efforts of Senator William Proxmire, Wisconsin. (See also 2011, RESPA)
- 1975 1st MOLDS conference, Washington, DC (North American Conference on Modernization of Land Data Systems (A Multi-Purpose Approach)
- 1975 Moyer, D. David, 1975, Real Estate Assessment and Land Records Systems, URISA Proceedings, Seattle, 11 pp.
- 1976 Land Records Symposium, University of Maine, Orono
- 1978 U.S. Dept. of Agriculture and MOLDS publish: Moyer, D. David, Land Information Systems: An Annotated Bibliography, 195 pp.
- 1978 2nd MOLDS Conference, Washington, DC (Implementation of a Modern Multipurpose Land Data System)
- 1978 Larson, Barbara J., James L Clapp, Allen H. Miller, Bernard J. Niemann, Jr., and Arthur L. Ziegler, "Land Records: The Cost to the Citizen to Maintain the Present Land Information Base, A Case Study in Wisconsin, Dept. of Administration, State of Wisconsin
- 1979 Three Volume Report to Congress, "Monitoring Foreign Ownership of U.S. Real Estate" AFIDA (Agriculture Foreign Investment Disclosure Act), U.S. Congress
- 1979 Moyer chapter in AFIDA report to Congress: "Multipurpose Land Data Systems", Volume 2, Chapter 1, pp. 1-62
- 1980 Moyer and Wunderlich, "Foreign Landownership in the United States" Economic Issues, University of Wisconsin-Madison
- 1980 Moyer chapter in book, Computers in Local Government: Urban and Regional Planning, "Land Record Reform and the Future of Land Records Systems", Auerbach Publishers, 20 pp.
- 1980 Moyer, AID report for AID, Costa Rica: "An Evaluation of the Institute de Tierras y Colonizacion (ITCO) Land Titling System", 63 pp.
- 1980 Moyer paper at the BLM Cadastral Workshop, Phoenix, AZ: "Using a Multipurpose Cadastre to Monitor Foreign Ownership of Land", 25 pp.
- 1980 Moyer URISA paper, "A Multipurpose Land Data System: Structure, Content, and Capabilities, pp. 185-196

- 1980 Moyer paper in Geoprocessing Journal, Vol. 1, Property, Information, and Economics: A Foundation for Land Information Systems Evaluation, pp. 275-295
- 1980 National Research Council, "Need for a Multipurpose Cadastre", 112 pp.
- 1980 ILI formed (Institute for Land Information)
- 1981 Oslo conference, UDMS: Moyer paper, "Summary of Automated Land Parcel Records Systems: Present and Proposed", Mike Kevany paper "Interactive Graphics as the Mechanism for Communication Between Information and User"
- 1981 Moyer, D. David, et al, 1981, Overview of a Survey-Based System for Improving Compatibility in Land Record Systems, URISA Proceedings, New Orleans, LA, pp. 264-279
- 1981 Moyer, D. David, 1981, The Forsyth County [NC] Land Records Information System: National Implications, 33rd annual conference of the National Association of County Recorders and Clerks, Louisville, KY, 15 pp.
- 1980-82?? URISA Land Records SIG (Special Interest Group) formed
- 1982 URISA Proceedings, separate section on Modernizing Land Records Systems, containing 8 papers
- Portner and Niemann, (Beliefs Regarding Issues)
 John Behrens, Land Values and Land Parcels:
 Eunice Ayers, Developing Political Support for a Modern LR System
 Gilbert, A. Lee, Data Sharing as Politics:
 Robert Swank, Data Sharing through ADLIB:
 James Carlson, ADLIB: A multi-function site address library
 Ed Crane, Ronald Domsch, Steven Hall, Implementation of a MPC for Wyandotte County, Kansas
 P. E. Claassen, A municipal property data system
- 1982 National Research Council, "Modernization of the Public Land Survey System", 74 pp.
- 1983 Moyer, D. David, et al, Report of the Committee on Land Records Management, Dane County, Wisconsin, County Board, 149 pp.
- 1983 National Research Council, "Procedures and Standards for a Multipurpose Cadastre", 173 pp.

- 1983 Land Records SIG launched (Per Peter Van Demark, personal communication, Feb. 28, 2012) Continued active through ~ 1994
- 1983-86, called Land Records SIG
 1987-1992, identified by several names
 1993-1994, called Land Records/CAMA
- 1983 Barr, MacDonald, 1983, "Standards for Cadastral Survey Control in the Space Age", URISA Proceedings, Page 27-36, Atlanta, GA
- 1983 Moyer paper at XVIII FIG Conference, Sofia, Bulgaria, "Land Identification Systems: Their Evaluation and Selection", pp. 301.3/1 to 301.3/10
- 1983 Niemann Paper at Sofia FIG conference
- 1983 Epstein paper at Sofia FIG Conference
- 1984 MPLIS Overlay Diagram published, Land Information and Computer Graphics Facility, University of Wisconsin, Madison (Niemann, Chrisman, Moyer, Sullivan, et al)
- 1984 Niemann, Bernard J., Jr., "Seminar on the Multipurpose Cadastre: Modernizing Land Information Systems in North America", Report 123, Institute for Environmental Studies, University of Wisconsin-Madison, 320 pp.
- 1984 Dueker and Kjerne, "Two Approaches to Build the Base Layer for a Computer Assisted Land Records System", URISA 1984
- 1984 Barr, MacDonald and D. David Moyer, 1984, "Current Issues in the Development of Land Records Systems", Special Issue of Computers, Environment, and Urban Systems, Pergamon Press, Vol. 9, Numbers 2 and 3, pp. 111-241`
- 1984 Epstein and Duchesneau, "The Use and Value of a Geodetic Reference System", NOAA, National Geodetic Survey, Rockville, MD
- 1985 Green and Moyer, URISA paper, Ottawa, "Implementation Costs of a Multipurpose County Information System", Vol. 1., pp. 145-151
- 1985 Jacobs, Moyer, and Dickhut, report on "U.S. Rural Land Transfer Study", for Economic Research Service, USDA, 61 pp.
- 1985 Moyer, D. David, and Gene Wunderlich, editors, "Transfer of Land Rights: Proceedings of a Workshop on the Transfer of Rural Lands", The Farm Foundation, 178 pp.

- 1985 Wisconsin Land Records Committee (WLRC) appointed by Gov. Tony Earl (Prof. James Clapp, chair)
- 1986 First GIS/LIS conference, hosted by 4 major geospatial associations: AAG, ACSM, ASPRS, URISA), continued for 13 years, through 1998
- 1986 URISA Proceedings, Land Records Systems and Natural Resources, Volume I, edited by Bernard J. Niemann, Jr.
- 1987 First GIS for Transportation conference held in Texas (Bacon, Fletcher, Moyer) 25th conference in 2012, Colorado
- 1987 WLRC Final Report presented to Governor Earl
- 1987 Multipurpose Land Information Systems in Wisconsin: Content and Process”, in Assessment Digest, Vol. 9, pp. 13-18
- 1987 URISA Proceedings, 1987, Vol. 1, Land Records/Natural Resources, 179 pp. (includes 18 papers, and an introduction to the volume by Editor, Ed Crane)
Niemann, et al = instructional video/slide set on MPLIS
- 1988 Niemann, Bernard J., Jr., and D. David Moyer, editors, “A Primer on Multipurpose Land Information Systems (MPLIS)”, Report 133, Institute for Environmental Studies, University of Wisconsin - Madison, 176 pp.
- 1988 National Center For Geographic Information and Analysis (NCGIA) launched (UC-Santa Barbara, SUNY-Buffalo, University of Maine – Orono)
- 1988 Clapp, Niemann, and Moyer, paper at GIS/LIS on “The Wisconsin Land Records Committee: Its Background, Status, Impact, and Future, Vol. 2, pp. 766-773
- 1989 Moyer and Brown, “Multipurpose Land Information Systems: The Guidebook”, Federal Geodetic Control Subcommittee, FGDC, Rockville, MD (first chapter of the MPLIS Guidebook published)
- 1989 Moyer, D. David, 1989, Use and Value of Geographic Information in Decision-Making, in proceedings of Initiative 4 Specialist Meeting, NCGIA, Bangor, ME, 4 pp.
- 1990 Launch of URISA Journal (JURISA) Dueker, Niemann and Moyer co-editors for 1st 10 years, Bill Keenan = Managing Editor

- 1991 Ventura, Stephen J., 1991, Implementation of Land Information Systems in Local Government – Steps Toward Land Records Modernization In Wisconsin, Wisconsin State Cartographer's Office, Madison, 83 pp.
- 1991 NSGIC (National States Geographic Information Council) established
- 1992 GIS/LIS conference in San Jose, California
- 1992 GIS for Assessors, 1992, 1st Edition, IAAO and URISA, Chicago, 106 pp.
- 1993 Moyer and J. D. D'Onofrio, 1993, Improving Land Information in Guam: A Status Report and Recommendations, Report to the Government of Guam, Department of Land Management, 34 pp.
- 1993 Dorothy Bomberger, Organized "GIS for Eastern Europe", Conference in Budapest, Hungary.
- 1993-94 Moyer/Stanfield/Barnes, AID land titling project in Albania
- 1994 Bomberger, GIS for Eastern Europe, Conference in Budapest, also Wellar, Moyer, Stanfield
- 1994 Barnes, Grenville, D. David Moyer, Gezim Gjata, 1994, Evaluating the Effectiveness of Alternative Approaches to the Surveying and Mapping of Cadastral Parcels in Albania, in proceedings of the GIS/LIS 94 Central Europe Conference, "Computers, Environment, and Urban Systems Journal", Volume 18. No. 2, pp. 123-121
- 1995-96 Moyer AID land ownership project in Uganda
- 1996 URISA/IAAO work group development of 1st GIS and CAMA conference (held in North Carolina in 1997, and regularly since.)
- 1998 Foresman, Timothy W., editor, The History of Geographic Information Systems: Perspectives from the Pioneers, 415 pp.
- 1999 GIS Guidelines for Assessors, 1999, 2nd edition, IAAO and URISA, Chicago, 77 pp.
- 2002 Dangermond, Jack, Scott Oppman, and Nancy von Meyer, "The Urban Data Model: A Solution for Local Government", annual URISA conference Proceedings, Chicago, Illinois
- 2004 von Meyer, Nancy, "GIS and Land Records: The ArcGIS Parcel Data Model"

- 2005 Stage, David, Nancy von Meyer, and Bob Ader, "Parcel Data and Wildland Fire Management", Prepared for Cadastral Data Subcommittee of FGDC with funding by the Bureau of Land Management, September, 33 pp.
- 2007 National Research Council, "National Land Parcel Data – A Vision for the Future", Washington, DC, 158 pp.
- 2007 Moyer, D. David, and Renae Anderson, 2007, A Foundation of Digital Data: Wisconsin Multipurpose Database Key to Effective Soil and Water Conservation, Land Bulletin of the National Consortium for Regional Geospatial Innovations (RGIS), 4 pp.
- 2009 FGDC Cadastral Subcommittee, "Land Parcel Data for the Mortgage Crisis: Results of the (May, 2009) Stakeholders Meeting"
- 2011 New version of RESPA consumer protection statute adopted by Congress (see also 1974). The new version of RESPA, passed July 21, 2011, is to be administered and enforced by the new Consumer Financial Protection Bureau (CFPB)