Real Estate Information Technology

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This section advances the frontiers of Real Estate Information Technology. This is a forum for discussion on how technology is changing: (1) real estate and land economics research and education; (2) forecasting; (3) real estate practice; and (4) real estate itself, including issues and problems associated with the adoption of new technology. Annotations of data from public and private sources available via the Internet are also published in this section, as well as in-depth software and data reviews. Articles must be relevant to both collegiate scholars and practitioners. Manuscripts must be rigorous since they will receive anonymous peer review. Email manuscripts and data annotations should be sent to the editor.

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Data Standards and Service Standards: Helping Businesses in Real Estate, Mortgage, Appraisal, and Related Industries Function More Efficiently

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Abstract

Much work is being accomplished globally in many industries to standardize data and online services. Benefits of standards include decreased operational costs, increased employee and workplace productivity, improved accuracy, more open exchange of information, increased flexibility, reduced risk, and more real-time transactions. This article discusses the standardization efforts of four standards bodies working on information technology standards to benefit the real estate market and related markets such as mortgage, property valuation, architecture, engineering and construction markets. These standards bodies are the Appraisal Institute, Mortgage Industry Standards Maintenance Organization, Open Standards Consortium for Real Estate, and the Open Geospatial Consortium. The article also addresses each organization's interoperability focus, some of key areas of collaboration, and where they see convergence occurring.

Real estate is one of the last digital frontiers—one of the last major components of the economy to take advantage of the standardization of data and online services that has been revolutionizing business operations in other sectors.

Technology has already revolutionized the way real estate information is retrieved, analyzed, transmitted, reported, and stored. But few would debate the massive costs, time lost, and reduced productivity that result from users manually re-entering data several times into various applications.

Advances such as credit scoring and automated credit decision tools have accelerated the cycle time for mortgage transactions, and new developments such as electronic mortgages (e-Mortgages) are just beginning to come to market. As in any e-commerce application, these innovations depend on the efficient, rapid, and error-free transmittal of data from trading party to trading party. Indeed, data and service standards can be seen as the lubricant for the engine of e-commerce.

According to Grant Thrall, professor at the University of Florida, "It can be said that GIS[1] is 90% data. In business geography, issues of data are paramount. Business geography differs from, say, planning geography or other applied divisions of

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geography, in that in business geography, it is seldom economically feasible to build unique databases strictly for the purpose of geographic analysis.''

The big challenge facing the real estate industry is that no one speaks the same language. Terminology and core business elements have a bewildering array of varied nomenclature, with different descriptive field names and definitions applied to the same processes and data. Massive costs and time lost from the lack of a standard ''dictionary'' leads to redundant manual entry and other inefficiencies. In addition, the lack of standards constrains users from changing vendors and suppliers.

When different companies use similar data field naming conventions to handle the same type of information, they are freed from the requirement to develop costly, dedicated data conversion systems in order to interface with other businesses in the same industry. Such interfacing has become a priority in the industry as its continuing integration with the public capital markets has increased the pressure for rapid, consistent, and accurate transfers of data.

If real estate is to move away from its current status as a ''cottage industry'' to an inter-networked industry, it must overcome these barriers to data sharing and process communication between different systems.

Having this strong data foundation will permit the use of enabling tools to enhance the speed and accuracy of real estate data entry and permit the transformation of raw data into relevant knowledge.

What We Need

In order for information to flow freely, systems need to perform interoperable exchanges. People would like to be able to enter data once and have it to flow among different organizations and their different systems, with necessary protections, of course, but without unnecessary intervention by humans having to correct formats and make other tedious adjustments. The concept of full integration of disparate sources of information, based on the underlying premise of data and process standardization, has become the holy grail of global commerce. It enables a host of opportunities to harmonize business processes and it opens up healthy competition by giving users the ability to rapidly change vendors without changing processes, terms, and definitions. It makes it possible for business partners and supply chain participants to more fully integrate with each other. Technology vendors can implement open interfaces that expand their markets, and they do not need to develop their own interface specifications. Customers do not have to maintain vendor relationships they do not want, or make large bets on technology that locks them into a vendor. Ultimately, it permits the real estate industry to embrace component-based information technology (IT) solutions that provide supply chain freedom, as has become common in other industries. Moreover, different users could have different names for their data fields, such as Postal Code versus ZIP Code and still have interoperability as long as everyone enters the data using a published standard.

Why XML is Important

XML (eXtensible Markup Language) has become the universal language for data and services and it is becoming the primary medium for business interchange. XML is not just for hardcore developers. The way it describes information can be understood by someone without any programming experience. For example, here are three computer programming formats for the same $245,900 Purchase Price data element: 1) MCD*245900, 2) 07A 245900, and 3) <PurchasePriceAmount>245900</PurchasePriceAmount>. Which would you rather use?

Current Standards Approaches

There are several standards organizations serving different standardization needs of the real estate industry. Standards organizations whose purviews overlap in real estate have much to gain, and their stakeholders have much to gain, from cooperating to provide seamless crossover and portability between business verticals.

Four significant standards organizations with an interest in real estate are the Appraisal Institute (AI: www.appraisalinstitute.org), Mortgage Industry Standards Maintenance Organization (MISMO: www.mismo.org), Open Standards Consortium for Real Estate (OSCRE: www.oscre.org), and the Open Geospatial Consortium (OGC: www.opengeospatial.org).

Appraisal Institute

The Appraisal Institute initiated its first data standardization projects in 1998 with the development of an appraisal data standard for residential properties, followed in 2001 by a set for commercial properties. It became clear at that point that more and more real estate valuation information would need to be communicated electronically and, while AI had no desire to speak to broader standards issues, there was a clear commitment to developing a framework for interoperability with other standards development organizations.

The Appraisal Institute's development of these standards improved efficiencies in the industry vertical of appraising real estate, and helped streamline the interchange of data between different residential appraisal software packages.

The Appraisal Institute has long recognized that clients demand more sophisticated analysis in a world filled with greater information availability on real estate than ever before. As the real estate markets become more data rich, and as the data is increasingly standardized, the ability to predict future performance and accurately gauge present performance will be demanded by the clients that valuation professionals serve.

The Appraisal Institute recognizes that outreach to other elements of the real estate market is critical if acceptance is to be achieved. The organization currently has a

formal alliance agreement with MISMO and actively serves a leadership role in both the MISMO Real Estate Property Information Workgroup (REPI) for residential transactions and the MISMO Commercial Appraisal Workgroup for commercial property.

In addition to the formal alliance agreement with MISMO, AI serves an active leadership role with OSCRE. The AI also maintains ongoing efforts to reach out to several other organizations with data-based initiatives including OGC.

By enlisting the participation of a broad spectrum of industry groups, the Appraisal Institute has taken the lead in bringing standards in the valuation process to the industry, while supporting the electronic commerce efforts of all participants in the real estate marketplace.

Mortgage Industry Standards Maintenance Organization

Chartered by the Mortgage Bankers Association in 1999, the Mortgage Industry Standards Maintenance Organization is a non-profit subsidiary of the MBA. It develops XML-based data standards for the mortgage industry and operates in an open, transparent, and vendor-neutral manner.

The Mortgage Industry Standards Maintenance Organization has published specifications that support mortgage insurance application, mortgage insurance, secondary, bulk pricing, real estate services, credit reporting, and underwriting process areas. The specifications are freely available via the MISMO website for industry implementation.

The Mortgage Industry Standards Maintenance Organization has identified two deliverables that will enable the mortgage industry to share data among trading partners: (1) an XML architecture that encompasses data origination, secondary market, and servicing data; and (2) a data dictionary to provide business definitions and corresponding architecture data element tag names.

The Mortgage Industry Standards Maintenance Organization supports community collaboration by providing the www.mismo.org website, electronic balloting, listservs, conference calls, three face-to-face meetings per year, and periodic interim meetings.

A Governance Committee, elected from a cross-section of the industry, provides oversight for MISMO's administration and policy development. Through an open and democratic process, MISMO delivers a common format for the electronic transfer of mortgage industry data. With the MBA's support and subscriber company participation, MISMO is the premiere standards development body for the real estate finance industry.

The Mortgage Industry Standards Maintenance Organization recognizes that the systemic changes underway in the capital markets only increase the need for efficient

data interchange in the mortgage industry. Because there are so many cross-over points where the MISMO data standards interface with other standards efforts, there is market demand for developing standards that are portable across industry verticals.

Generally speaking, standards are developed within constituencies with common interests, such as lenders, title companies, insurers, and appraisers—all stakeholders in the greater lending marketplace. It is within a community of users that standards become true efficiency tools. However, the use of a standard outside of the target community is an important consideration since interoperability extends the benefits of efficiency. Different standards bodies achieve interoperability in a multitude of ways, ranging from formal arrangements to ad hoc transformations of data from one format to another. Their different policies and procedures do not necessarily prevent cooperation among the standards bodies. The Mortgage Industry Standards Maintenance Organization is committed to working with other standards bodies to attain interoperability in methods that work for both.

Taken generically, standards efforts fall into two categories. One category—horizontal efforts—includes organizations that seek to reduce complexity across a technology that touches on multiple areas. An example of this is the work of the World Wide Web Consortium (W3C) in establishing and maintaining standards for the Web. Another category—vertical efforts—includes organizations focused on developing interoperability within the context of a single industry (e.g., the mortgage industry). MISMO is a vertical standards organization.

The Mortgage Industry Standards Maintenance Organization operates within the context of the mortgage industry vertical. But the mortgage industry's needs alone are not sufficient to define the scope of MISMO's work. This is because the mortgage industry operates in numerous areas that involve numerous sets of non-mortgage industry stakeholders. The mortgage industry's requirement to communicate with these groups increases the complexity of MISMO's data and service interoperability mission.

Consider, for example, the role of property appraisals in the lending process. To evaluate a potential mortgage, one key factor is the determination of the value of the property in the transaction and the ratio of the property's value to the requested mortgage. Determining the value of a property involves a set of processes most often performed by an appraiser. The appraiser operates in a different industry than the mortgage banker, with different business processes and information systems. Yet, the valuation determination must be integrated into the credit process.

In a manual paradigm, this was easily accomplished. But the inherent inefficiency of manual processes has led the mortgage industry to automate and streamline the flow of data.

Facing this need, individual firms can create dedicated electronic interfaces with their trading partners. This solution, however, is not scalable, and as the number of

interfaces grows so too does complexity and cost. Very quickly, the value proposition of e-commerce is reduced by the expense and trouble of maintaining the infrastructure. Data standards are one way to reduce this burden.

The MISMO Real Estate Property Information Workgroup (REPI) for residential transactions is responsible for mapping the XML data definitions to the appraisal forms used by Fannie Mae and Freddie Mac. These firms are government-sponsored enterprises that together provide significant mortgage capital and liquidity to the real estate market.

Although the data tags are mapped to standard industry appraisal forms from Freddie Mac and Fannie Mae, the process is data stream centric, not form centric. Users will have the ability to share real estate property data and appraisals from diverse sources.

Having this strong data foundation will permit appraisers to leverage tools in valuation modeling, geographic information systems and business geography.

Open Standards Consortium for Real Estate International

Open Standards Consortium for Real Estate International (OSCRE International) is a not-for-profit (501c6) consortium that drives the development, synthesis, and adoption of e-business standards that enable the real estate industry to function effectively and efficiently.

The Open Standards Consortium for Real Estate International began as ''Operation eCRE'' in September 2000 at the IDRC Silicon Valley Discovery Forum. Operation eCRE was organized and operated by a group of corporate real estate technology managers from companies such as Cisco, Microsoft, Sprint, Sun Microsystems, Citigroup, Capital One, and Intel. The success of Operation eCRE led to the creation and launch of OSCRE at RealComm 2003 on June 4, 2003.

The Open Standards Consortium for Real Estate International's goal is to facilitate a greater level of coordination, standardization, and collaboration across the key stakeholders in the real estate industry—corporations, public agencies, service providers, management consulting organizations, software vendors, and suppliers. Web-based technology is central to this effort. The need for a standard methodology and language is fundamental for the corporate real estate 'supply chain' to operate and communicate within today's e-business environment.

The supply chain represents all the players involved in the corporate real estate business, such as corporate real estate departments, owners, developers, property management firms, broker firms, various service providers, and suppliers. Regardless of the industry, all real estate groups face the same needs. They require methodologies, systems, and tools to plan, buy, build, sell, lease, and manage real estate portfolios. The problem is that the various stakeholders have different work processes, priorities, and even different vocabularies, so that any solution developed for one organization

is not easily deployed at another, much less integrated between the two. Without industry agreement on standards for high level real estate business processes, effective technology solutions and tools to achieve supply chain efficiencies cannot be developed and deployed.

Open Standards Consortium for Real Estate International is committed to work with all real estate stakeholders to drive standards adoption—not just standards creation—throughout the industry.

Open Geospatial Consortium

The Open Geospatial Consortium, Inc. (OGC) is a non-profit (501c6) international voluntary consensus standards organization, founded in 1994, that is leading the development of standards for geospatial and location based services. ''Geospatial'' online services provide data or information about things and events that are referenced to a specific location. Geospatial data might describe a land use zone or flood zone; the business occupying a specific floor in a building at a particular street address; the position, orientation, and technical specifications of a surveillance camera, etc. ''Location-based services'' are services that tell you, for example, via your cell phone, that the nearest gas station is four blocks ahead on the right-hand side of the road.

The OGC is a horizontal standards organization whose standards are important in multiple industries. Why do geospatial standards matter in the real estate industry? The real estate industry involves commerce related to geospatial features: land parcels and permanent man-made improvements and structures on the land. Commerce in these depends on communication between diverse parties and communication between diverse information systems. Communication requires common systems of representing information, and standardization means agreeing on common systems.

Standards are particularly important in the world of information technology, because massive networking of information systems potentially yields powerful benefits, and networking is impossible without standards. The benefits of network-based information systems are obvious in many industries, but widespread and thorough application of such systems has been slow to arrive in the real estate industry and related industries. This is partly because the standards issues are more complicated. But these issues are now being addressed by the organizations described above, and by the OGC.

A large number of OGC members are particularly interested in Building Information Models (standard schemas for recording and conveying virtually any information about a building), CAD/GIS Integration (integration of computer-aided design and geographic information systems), and Open Location Services standards, all of which will benefit stakeholders in real property value chains. The OGC is involved because all of these types of standards have an essential geospatial or geographic location component.

The OGC's Real Property Initiative

In its overall geo-processing standards program and throughout its history, the OGC has reached out to other standards organizations to weave a coherent set of standards across industries and industry sectors. The OGC has worked closely with ISO TC 211 (the International Organization for Standardization technical committee focused on geospatial issues) to develop a foundational approach to defining such things as spatial reference systems and an abstract definition of ''geospatial feature.'' The OGC relies on the World Wide Web Consortium (W3C) for the framework of Web service and semantic language standards, and relies on OASIS for such things as Common Alert Protocol (CAP) and Security Assertion Markup Language (SAML). The OGC works formally with many other partners such as IEEE Technical Committee 9 on its 1451 family of sensor standards and ISO TC 204 for telematics. The OGC is in discussions with AI, MISMO, and OSCRE regarding formal cooperation.

The CAD-GIS Working Group in the Open Geospatial Consortium, Inc. (OGC(R)) provides an important forum in which progress advances toward CAD/Geospatial integration. In this Working Group, most of the major vendors of CAD and GIS software are present. They are familiar with the OGC standards process and with each other because they have worked together in OGC for many years.

OGC members are working on projects such as:

1. Integrating Building Information Models (BIMs) with the OpenGIS(R) Geography Markup Language Encoding Specification (GML), the main industry standard eXtensible Markup Language (XML) encoding language for geospatial information. (As described above, XML is the W3C's widely used human-readable and machine-readable encoding language.)
2. Helping to develop TransXML, a U.S. national effort to develop broadly accepted public domain XML and GML schemas for exchange of transportation data.
3. A major testbed activity to advance and integrate several types of geospatial standards. The interoperability between geospatial and BIM environments is an important ''thread'' in the fourth OGC Web Services Interoperability Initiative (OWS-4), a major interoperability testbed activity that began in June, 2006. A look at some of the other threads in OWS shows that CAD/Geospatial interoperability is just one theme in a larger symphony of geospatial standardization relevant to real estate. Those threads include:
   - Sensor Web Enablement (SWE), which deals with standards to enable access to networks of Web-resident sensors such as surveillance cameras, security sensors, ''smart building'' sensors, and environmental sensors.
   - GeoProcessing Workflow using Simple Object Access Protocol (SOAP). SOAP is a key W3C XML standard for connecting services over networks.

- GeoDecision Support Services (GeoDSS): standards for integrating diverse kinds of information to support decision makers.
- Multi-lingual OGC Web services.
- Geospatial Digital Rights Management (GeoDRM): standards to help data providers control or track who has access to their data and how it is used. The standards enable automated execution of such rules by the client software.
- Spatial Media: standards to support ''mass market'' geospatial Web services. MapQuest and Google Earth are examples of mass market geospatial Web services.
- Open Location Services: standards to support location-based mobile services, such as those delivered through location-aware devices to wireless customers.

Obstacles to Sharing Real Estate Information

Municipal planners, real estate developers, appraisers, architects, builders, utility companies, permitting agencies, building managers, maintenance contractors, owners, bankers, brokers, insurers, attorneys, CPAs, and first responders—all need information about buildings and building site infrastructure. Most of these communities create new information on top of information provided by others.

The activities of all these professions involve workflows, that is, the flow of activities and interactions in a project. Much of this ''flow'' is information flow. Today, corporations and agencies of all kinds seek to engineer more efficient workflows that take full advantage of information technology. Where workflows involve the cooperation of multiple participants in independent organizations, working on multiple tasks, the only reasonable approach is to agree on an open architecture and an interoperable software environment. Having once established a comprehensive set of open, consensus-derived information technology standards, one step can flow smoothly into the next and all project components and documents can be integrated to enable workflows in an ad hoc manner.

Unfortunately, much of the information that has already been collected by others is not available, so it needs to be collected again, redundantly. Even data in incompatible formats has value. Data could often be reused, but all of these professionals typically develop data, deliver it to those who paid for it, file their copy away, and eventually discard it. The data does not get registered in an online catalog and stored online, behind an access control system, where it could be efficiently discovered and accessed by anyone who has a need and a right to access it. The reason for this lack of data sharing is simply that until now, implementing shared library systems for building information just has not been a practical goal except in limited situations. In our legacy, technical and institutional environments:

- Integrating data from different types and brands of software has been difficult, requiring batch conversion of files, with significant manual intervention.

- ■ Different data producers have used different and incompatible BIMs that define, for example the encoding of ''window'' or ''water main.''

- ■ Appropriate data sharing and archiving policies have not been put in place because data coordination has simply not been a high priority for the organizations that need to be involved. There are many reasons for this: Middle managers may drag their feet to protect their data fiefdoms, fearful of being ''disintermediated'' by modern information systems. People need to be assigned to do the work, which takes money out of budgets. Long-term data management policies need to be agreed upon by different companies' and agencies' high level policy makers, who may not understand such issues or be accustomed to working together on them. In general, institutional barriers and inertia yield very slowly to data sharing and system interoperability initiatives, even when it is obvious that data sharing and interoperability will save time, money, and lives.

Despite these obstacles, old ways are yielding to financial drivers as business requirements make data sharing a requirement and as standards-based technical solutions become available. Batch file conversion is giving way to direct communication between networked software systems. This progress is enabled by the advent of a unified Internet and Web services infrastructure and open software interfaces and encodings that are cooperatively developed in open standards consortia and then widely implemented by vendors.

Conclusion

Ultimately, data standards reduce costs, streamline processes, improve accuracy, and increase data transparency.

Consensus on standards ultimately needs to be made explicit in specifications, but the first steps involve organizations agreeing on goals. This happens when standards organizations reach out to each other to collaborate in meeting new challenges.

As in any e-commerce application, these innovations depend on adoption to achieve efficient, rapid, and error-free transmittal of data between business parties.

Data standards represent agreement. The agreement is one between individual firms—often, competitors—to use a common format for data interchange. This agreement does not threaten any competitive advantage held by these firms. Rather, reducing unnecessary complexity in an area common to all firms allows innovators to concentrate on their core competencies. Put another way, when is the last time anyone saw an advertisement promoting a firm's ability to re-key data faster than their competitors?

Endnote

1. Source: AGI glossary. http://www.geo.ed.ac.uk/agidict/welcome.html, ''Geographic Information System. A computer system for capturing, storing, checking, integrating,

manipulating, analyzing, and displaying data related to positions on the Earth's surface.'' Both vector and raster GISs are available.

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