Enabling Real Estate Businesses on the Web: From E-Business Model to The Application Services

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Abstract: This article presents how COMMREX, a web-based information system for real estate businesses, is designed in corporate with the e-business ideas.

Keywords: Application service provider, web-based database, real estate brokerage, e-business.

Among successful e-businesses, real estate is one of the most promising and fast growing areas, empowered by the strong market demand.[4] The impact of e-commerce on real estate is similarly significant and multi-faceted as it is on other e-business categories, with the propensity coming from two sides of e-business, an increasing population of online customers and more e-business involvement and investment from real estate industry [5]. According to Greenberg's study in 2000 [2], up to 50% of prospective American homebuyers would use the Internet to search for new homes within the next two years, encompassing more than 9% of households online, or about six million visitors, to various real estate sites. These users have accessed the real estate sites on an average of 1.8 days per month or a total of 13.9 minutes each day. Realizing the public's increasing acceptance of online home buying, revealed by Karris and Pike [3] in a study on real estate e-commerce, many realtors are rushing to the web. From 1996 to 2000, more than 400 business models were created across the entire real estate spectrum (i.e., leasing, financing, development, management and investment sales), offering a range of functions including content/information, process/workflow enablers and procurement, and resulting in increasing employment in the real estate industry [5].

The growing demand of application development for online real estate businesses opens a new market to *application service providers* (ASPs) [1, 4], which develop standardized Internet application

systems and information services supporting a specific set of business processes. Real estate companies/realtors purchase these ASP application products, most commonly together with web hosting and data management. In this way, ASPs help level the playing field for smaller e-business players that formerly could not afford investments in high-cost client/server or customized software.

The successful stories in e-commerce told that every successful e-business must have a feasible business plan complying with some model. Then the questions are: What is the business model an ASP may adopt? How to transform the model into a web-based application? How to make decisions among different choices of information technologies for a cost-effective application system? In this article, we investigate the design of a web-based real estate information system, named COMMREX (COMMercial Real Estate eXchange, http://www.commrex.com) to answer these questions.

IMW's E-Business Model

Based in Austin, Texas, Internet Media Works! (IMW, http://www.ineworks.com) is specialized mainly in web-based application implementation, database integration, and web development and hosting for all kinds of businesses. With its expertise and experience in the real estate business, IMW has been more successful in selling its e-business services to real estate agents. Its services include lead generation, real estate transaction management, property listing, realtor membership management, real estate indices, real estate auctions, etc., with COMMREX representative of a complete e-business solution.

IMW designs its services targeting at three types of clients: real estate companies, individual realtors, and proprietary property sellers, which are called service subscribers, or subscribers in short. IMW's revenue comes from application development, mainly the customization of current application packages, and annual service fees from subscribers according to their use of services and the rented network computing resources. The number of subscribers is a critical factor to increases in IMW's revenue since most of the online services have been standardized. The initial cost for servicing a new

[4] According to National Association of Realtors (NAR), 2003 will be the fifth year that existing-home sales exceed the 5.0-million benchmark, and new-home sales are forecasted to rise 5.6 percent to a record of 960,000 units in 2002

subscriber is setting up a site and configuring profiles to enable the features contracted for in the agreement. The key to better sales is how to deliver COMMREX services in accordance with a customizable set of *service level agreements* (SLAs) which satisfy different needs from individual real estate companies [7].

Focusing on web-based information services, IWM applies an e-business model driven approach to the COMMREX design, which leads to the adoption of a multi-organization data allocation scheme. IMW's services for the commercial real estate industry can be characterized in a four-level structure (Figure 1). The first level is a common web site structure with HTML/XML scripting, web graphing, page styling, etc. A professional ASP like IMW can provide cost-effective and quality services because the majority of realtors and small real estate companies do not have the expertise or funds to do such services.

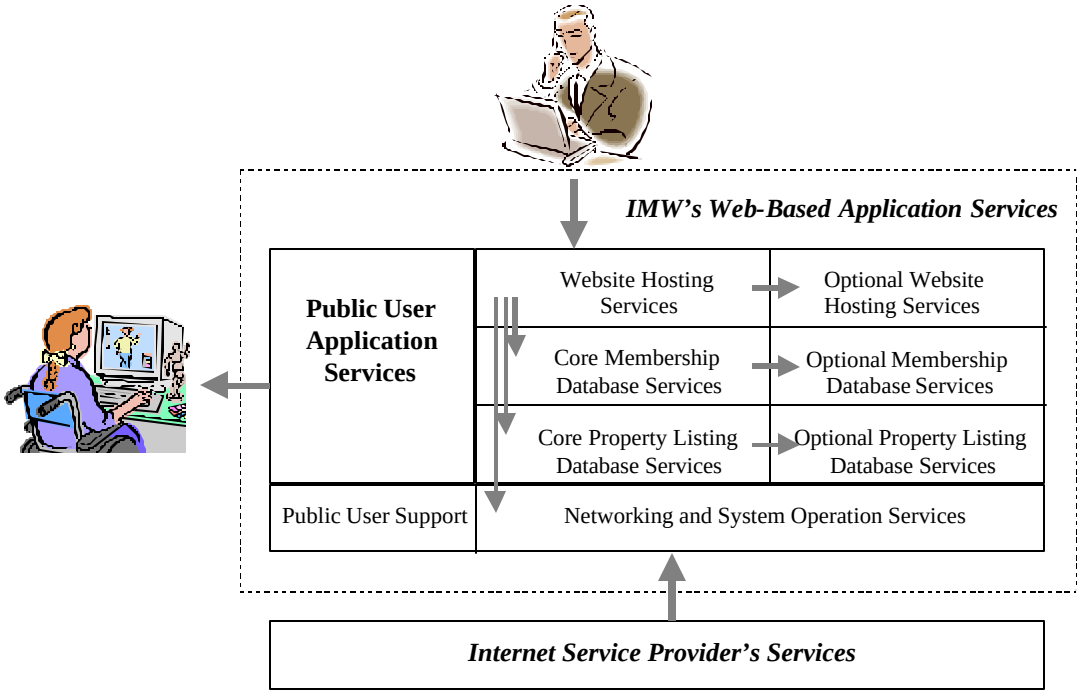

Figure 1: Four-layer Web-based Real Estate Information Service Model

The second level is the development and maintenance of web-based membership databases. This is an extension of the first level of service. A membership database has been an important service for realtors and real estate companies/organizations to advertise themselves and their real property products

(http://realtytimes.com/rtnews/rtcpages/20021205_homesales.htm).

and services. It is obvious that the marginal value can be enhanced with an extra investment for a real estate company to have a searchable membership database accessible from the company website.

The third level is the development and maintenance of online property listing databases. This level further extends the service on the two levels above. The prerequisite of this service is a membership database. So, each member of the client company has an account to access the property listing features. With this level of service, they can post, modify and delete property listings from their password-protected account. The posted online property listings can be searched by the public on the web. This is the main channel for realtors to advertise and conduct e-businesses on the Internet. Therefore, the property listing database has a high business value and becomes the most important service that bring IMW major incomes and reputation.

The fourth level of service is the networking and system operation service, which allows clients to have personalized web domains and services set up at other locations as specified by them with the technical support of IMW. The first three levels of services contain a standardized core package and several advanced options that make up additional customized services.

Managing Multi-Organization Data From Distributed Websites

Successful real estate companies in e-business commonly share three characteristics [3]: 1) offer niche sites that address clear "point of pain" in the process; 2) employ business models that work with slow implementation rates and that can sustain profitability even if only a handful of new customers are added at a time; and 3) offer applications that solve data-integration issues - systems that can connect islands of data and information from different sources or sites. A high priority addressed in COMMREX's design is the allocation of data resources, for the purposes of business operation, system performance, and user management. The tasks include: primary data distribution, distribution for response time, distribution for availability and distribution for storage space.

The requirement analysis for COMMREX suggests that the application of multi-organization data management structure be one of the decisive factors to the success of IMW's e-business services [8]. The

multi-organization features of the property listing database ensure that members from different subscribers can contribute property information to the same database, which strengthens COMMREX' information services because the abundance of publicly accessible real estate property data will attract more users and increase the reputation of COMMREX. The high exposure of COMMREX provides more business value to subscribers. Therefore, multi-organization data management for property listing information is a common need from real estate information users, the realtors who provide the information, and IMW who brings them together.

In contrast, the requirement for a membership database is different. The membership database controls the access of contents in the property listing database. Only members of subscribers are authorized to post property listings on COMMREX. Even though a multi-organization data management structure is applicable to a membership database, practically, membership databases for different subscribers is distributed in nature.

The requirement for the distributed membership database comes from some subscribers. At the first level of service, a subscriber must have a website that is the entrance point for membership database access. Using an independent web domain with good security, a subscriber automatically requires its standalone membership database under its direct control.

The usability and effectiveness of a property listing database for multiple organizations are determined by the design of the membership database and the access control between the two databases.

In 1999, as the requirement for global reach became prominent, another centralized multi-organization database - COMMFind was added to the data allocation scheme. COMMFind is consolidated from the distributed COMMREX membership data and is actually a mirror database integrating all fragments of membership data to provide more efficient and convenient realtor information retrievals for the public. COMMFind is currently being automatically updated everyday.

In summary, IMW has adopted multi-organization data allocation scheme for both the property listing database and the search-only mirror database of membership, to optimize COMMREX operation and e-business services (Figure 2). The property listing database is the kernel component of the whole

database system and the membership database provides the entrance for COMMREX members to access the former from distributed websites. As an extension of the membership database service, COMMFind provides convenient membership information search capabilities for the public with the help of multi-organization data management.

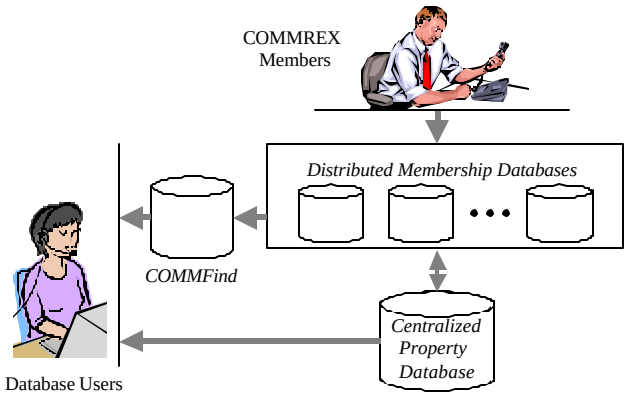

Figure 2. COMMREX Data allocation

COMMREX DESIGN AND IMPLEMENTATION

System Structure

Mapping to the service structure in the last section, COMMREX consists of six subsystems (Figure 3):

?? Real Estate Web-Hosting Services (REWS)

?? Membership Database Services (MDBS)

?? Property Listing Service System (PLSS)

?? Public Real Estate Information Services (PREIS)

?? Meta Data System (MDS)

?? System Maintenance Utilities (SMU)

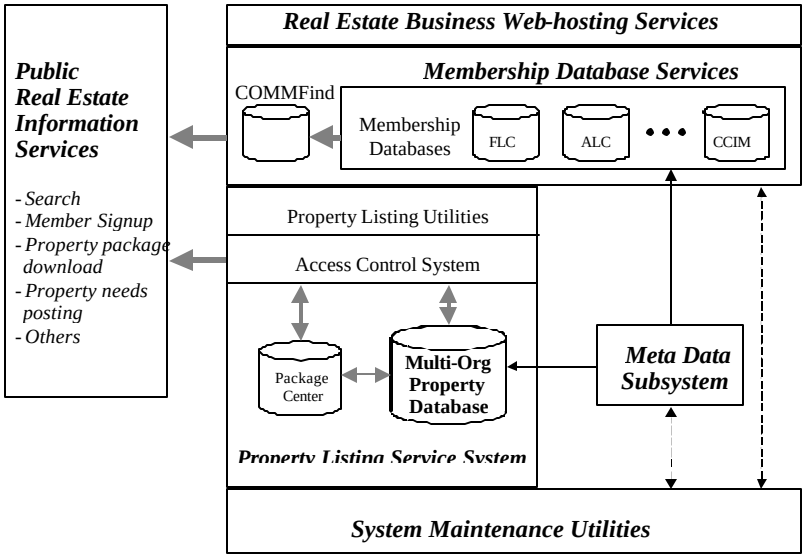

Figure 3: COMMEX Logical Structure

REWS is a set of basic web development and hosting services. It is particularly suitable to novice subscribers who have limited knowledge of Internet technologies. Advanced subscribers can request service expansions from REWS to MDBS then to PLSS, which are top-down includable. In this case, each membership database in MDBS is associated with a specific website in REWS that is customizable for the functions and features contracted between IMW and the subscriber. This structure is intended to meet the requirements of different business operations and systems management. It has proved to be a versatile and flexible framework for functions and processes required by clients for different business needs, with reusable application modules throughout the system. In addition, its flexibility allows adding new organizations or removing old organizations that join or leave the service. COMMFind uses the same data structure as the distributed membership databases and is updated periodically from the latter.

PREIS contains some popular web-based database access functions for public users:

?? Property listing search, supported by PLSS

?? Membership database search, supported by REWS

?? Public member signup - This allows any realtor to set up an individual account to exploit the advantage of COMMREX's membership benefits. The difference between this type of user

accounts and the subscriber member accounts is they fall into another service charge category with a different rate.

?? Property package download – This is a service for serious property buyers and agents. An agent posts detailed information about a real property that is in a set of electronic packages into a utility called *Lead Generation System*, which retrieves files from *Package Center* in MDBS. A serious buyer will download the package(s), after completing a short registration form containing contact information. The buyer's information is then emailed to the agent for prospect follow-ups and data control.

?? Property needs posting – This is another buyer-oriented service allowing them to post what they are looking for in the real estate market.

MDS, a typical meta data service, defines and maintains the structure of both the membership database and the property listing database. SMU can be used for regular database maintenance tasks such as backup, recovery, modification, repair, logging, transaction audit, data import and export, etc. It is designed for three types of users: COMMREX system administrators, COMMREX database administrators, and subscriber database administrators. Each type of administration user has different database access privileges. The COMMREX system administrator is superior to others and is the only user authorized to create and configure a new subscriber's site.

Multi-Organization Database Access Control

The complexity of access control for a property listing database lies in the complicated relationship between different types of members. COMMREX's services must comply to the contracts signed with different types of subscribers with various service requirements and constraints. The authorization of subscriber privileges reflects IMW's pricing policy in accordance with differentiated services. The access control system bridging between MDBS and PLSS plays an important role for the business strategy.

COMMREX subscribers are mainly commercial real estate related companies and organizations, such as the Certified Commercial Investment Member (CCIM), CCIM chapters, and regional real estate organizations:

1) CIREI (Commercial Investment Real Estate Institute). A national organization that is a division of the National Association of Realtors (NAR) whose central purpose is to provide education and certification of Commercial Real Estate professionals. There are two types of members in CIREI:

?? CCIM Designees – Members of CIREI who have completed the educational requirements and are the highest accredited designation in commercial real estate.

?? CCIM Candidates - Members of CIREI in the process of taking courses and completing requirements to attain the CCIM designation.

2) CCIM Chapters. Local or state level associations operating under the CIREI umbrella and comprised of four levels of membership (CCIM, Candidate, Associate, Affiliate).

?? Associate - Real Estate professional who is not a member of CIREI

?? Affiliates - A non real estate professional, but is an industry related affiliate of the commercial real estate industry (e.g. tile companies, lenders, appraisers, attorneys, inspectors).

3) Regional Realtor Organizations. Other boards of realtors or associations of realtors or chapters of other NAR affiliates whose commercial investment division joins a state level COMMREX site.

The above three kinds of subscriber sets are not independent of each other. Overlaps between them exist and transfers from public individual subscribers to others are constant. As agreements to different real estate organizations vary, how to control the database access privilege of a realtor with multi-membership appears as the critical issue in system design.

The multi-organization property listing database access policies are:

?? Subscriber members are allowed to input/modify/delete property listing information from their own website.

?? Property posting is a free service for the members of client companies. Other individual users can create an account in a public database. Posting property listings will be charged per listing.

?? Property needs information can be freely posted from any subscriber's web site.

?? All property listing information including needs information is freely searchable by the public.

?? Searching from a chapter site or a realtor organization site only pulls out the listings posted from the site or by the member of the site who posted from another authorized site.

?? CCIM designees are allowed to post property listing at any chapter sites as well as CIREI's web site – CCIMNet.

?? Some subscribers in each type may raise other additional access restrictions for their internal fee charging policy.

The property listing database access privileges are configured in a subscriber's website profile using *cross access* (`xaccess`) directive. When there is a PLSS database access request from a registered user, Access Control System (ACS) checks the subscriber's profile and compares the privileges with the predefined access control tables. Then the request is granted a proper right to access property listing database. `xaccess` provides two groups of parameters for alternatively predefining search, data housing and user access permissions (Table 1). The following are some `xaccess` coding examples in use:

```
CCIMNet:                LHND
Florida COMMREX:        PD
Austin COMMREX:         S
COMMREX:                H
```

Table 1: `xaccess` Coding for Property Listing Database

	Cross-domain Search	Data Housing	Public Access Control	CCIM Access Privilege
Global operation	**Default**: global cross server search	**Default**: save CCIM listings to CCIMNet	**Default:** Open to public	**Default**: No privilege
Local operation [5]	**L**: search local DB only	**H**: save listing into local DB only	**P**: Not allow non-member input listing	**D**: Designee accessible
Restricted cross-domain features	**R**: restricted server search	**S**: Candidate listings are housed locally.	**N**: Allow public input needs listings	**C**: Designee and candidate accessible

In the case of multi-membership of an individual user, ACS will handle his/her database access request with the highest privilege set from the affiliated memberships and the ID is also converted to the one in the highest privilege category.

The Performance of COMMREX

COMMREX's performance can be assessed in four aspects: scalability, portability, operation ability, and availability, owing to current multi-organization data allocation scheme.

COMMEX is scalable according to subscriber's customization needs. Both membership and property listing database services provide optional functional modules for customization, which include data model extension, optional advanced functions, and other business services. This feature benefits from the core data model of PLSS and the use of meta data management.

COMMREX has been customized and ported for several major subscribers:

?? CCIMNet – This is the version for CIREI

?? Chapter COMMREX, a state level COMMREX site licensed to CCIM Chapter that sells membership to participating organizations as defined above, such as Florida COMMREX, and Alabama COMMREX.

[5] "Local operation" is referred to the functions available to Chapter COMMREX, a regional version of COMMREX for a CCIM Chapter, from which only relevant property listings in PLSS database are searchable.

?? Metropolitan COMMREX, such as Austin Real Estate Connection (AREC), San Antonio Real Estate Connection (SAREC) and Austin Central Texas COMMREX.

?? Sold Property Information Services which maintains a collection of property listings that have been marked “sold” and is searchable for comparable sales data.

?? Vacation Home Exchange Service that allows short-term house seekers to exchange housing internationally.

COMMREX’s design is also portable to different network operating system platforms. The original implementation of COMMREX is on Unix using CGI scripting. It has experienced four major upgrades starting from early 1996. Since 2000, COMMREX has been ported to the Windows platform using MicroSoft SQL Server, Internet Information Server, and Cold Fusion scripting. The first customization of Window-based COMMREX is called MAR COMMREX for Massachusetts Association of Realtors. The system was made operational in 2001.

The operation ability refers to the smoothness of COMMREX to IMW’s business model for e-commerce. The first challenge of IMW’s business is the frequent joining and exiting of subscribers. In the last six years, about 50 membership sites and 10 property listing sites have been set up. Currently about 25% of them are still using COMMREX services. In past years, adding or removing new subscribers has never been a cause for concern for IMW. Recent database statistics indicates that the property listing database is holding more than 8,000 listings with total asset value of 8 billion dollars and commercial lease of 30,000,000 square feet in January 2002 (http://www.commrex.com/cgi/lstfig.cgi). The number of COMMEX members maintains at about 25,000. Monthly hits of COMMREX databases ranges between 25,000 – 60,000 during 1999-2001.

METHODOLOGICAL IMPLICATION

COMMREX’s system development has been a progressive process with many trace-backs. From the very beginning when the first client called IMW for the possibility of setting up a web site for a real estate business, the response from IMW has always been positive and suggestive. The challenges are:

?? A potential client may not know its requirements well. Usually requirements are vague and uncertain.

?? In mid 1995, the majority of clients from the real estate industry had little or no knowledge of the Internet and web applications. They started to learn from ASP's services. Then their requirements began evolving.

?? Different users may have different requirements of system features and functionality. However to provide a single set of functions for a diversity of users is the key.

Challenges to the ASP's service structure and database design then occur. The system development methodology for COMMREX falls into the fast-prototyping category. Time is the main factor that justifies the benefits from fast-prototyping methodology, such as holding a client and leading other ASP competitors. Slaughter et al [6] suggest there exists a trade-off between software quality and time investment. Understandably, COMMREX was far from perfect at the beginning. The process that caused COMMREX to become better designed and more satisfactory is also the process that allowed the subscribers to get more familiar with the Internet and more adaptive to COMMREX. During this evolutionary process, the multi-level service model and multi-organization data management structure has proved to be the best choice to couple to the methodology.

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