

# IT Systems Development Best Management Practices for State Trust Lands

July 2017

## Background

As an incident of statehood, most states west of the Mississippi River received grants of federal land to assist in the funding of public education facilities and other governmental programs. Known as school lands, trust lands or grant lands, these properties were scattered throughout the various states.

The grants by which the states were given the public lands are solemn trusts. These trusts provide that proceeds from sale or use of the land be applied specifically to education and other various purposes. Thus, these lands may not be used without compensation to the state. These lands are managed by state agencies called land offices, land commissions or land boards - collectively identified as commission. Five are headed by statewide elected officials. Most commissioners also manage lands under navigable waterways to protect resources and produce revenue. Some land commissioners also act as the fire prevention and control agency for their state.

For 60 years, most of these states west of the Mississippi River have relied on the Western State Land Commissioners Association (WSLCA) to bring them together. Twenty-one of these states are part of WSLCA, and in total they oversee the administration of over 440 million acres of public and school trust land assets. These states have benefitted from having the opportunity to join together and solve joint problems. While every state is different, they often deal with similar issues.

The member states are unique state agencies that must generate revenue for their beneficiaries, keep track of their assets, and manage their leases and contracts. In this way, they act like a business and have business-like needs. Various Information Technology (IT) Business Systems are used across the states to perform this Asset Management function.

### Purpose

The goal of this whitepaper is to be a source of Best Management Practices for all things related to IT Business Systems for Asset Management, specifically how it relates to the needs of State Trust Land Agencies.

This document will:

- Provide some examples of the systems that some states currently use for Asset Management. These examples will describe the main types of system development and configuration as well as the functions that they need to include to allow the states to manage and generate revenue from their assets.
- Explore the ways that member states can procure new Asset Management systems, particularly through a Request for Proposal (RFP) to contract with a vendor.
- Recommend the best ways to work with software and service vendors to ensure a successful project and a functioning product.
- Identify the best practices for implementing a system to generate sufficient user acceptance.
- Consider the ongoing system maintenance and enhancements.

Much of the report information was identified and discussed at the Winter 2017 WSLCA Conference in Arkansas in the Asset Management Committee breakout session. Participation included both in-person attendees and virtual webcast participants.

#### Highlights from the Winter 2017 WSLCA Conference

The Asset Management Committee met for 1.5 days and focused discussion on IT Business Systems currently in use, lessons learned through system development, and procurement strategy and components. These discussions formed the impetus for this paper. Following is a list of highlight comments regarding best practices from the session:

- 1. Consider organizational culture
- 2. Executive leadership support
- 3. Push Boundaries (from exec)
- 4. Customer Centric
- 5. Full time Project Manager (internal and external)
- 6. Agile strategy (break the project into small sections with constant testing and adjustment based on learning)
- 7. Ask why? (who asks?)
- 8. Review existing processes
- 9. New systems open up possibilities (sometimes optimal business processes from a system is not optimal for the system)
- 10. Avoid scope creep (never ending projects)
- 11. Consider staff abilities
- 12. User stories
- 13. Technology moves quickly (plan to replace at least every 5 years)
- 14. Who and how to deliver change message (change involves loss)

- 15. Look at whether licenses are available within the state
- 16. Understand what you are trying to achieve
- 17. Ease of customization
- 18. Need representatives from the business group
- 19. Data, Data, Data
- 20. Create simple checklist of questions
- 21. Talk to everyone!
- 22. Funding stream/timing of system implementation
- 23. Understand that change includes loss
- 24. Ownership of system is not just IT

Following the general discussion of issues above, several committee members and guests presented their IT systems and related topics. Complete presentations are available on the WSLCA website <a href="http://www.glo.texas.gov/wslca/presentations/index.html">http://www.glo.texas.gov/wslca/presentations/index.html</a>



• Client Server Solutions - Ed Reyes, IT Director Oklahoma Land Office

• Customer Portals - Lynell Rogeri, Managing Director Opportune LLP



# UNIVERSITY LANDS PORTAL SOLUTION

Map System Innovations - Brent Jones, ESRI



• Cloud Based Solutions - Steve Young and Nancy Marvin, Washington Department of Natural Resources



• Enterprise Resource System Solutions - Tobin Follenweider and Bill Gaertner, Colorado State Land Board



• Example of a MOTS dashboard user interface - PCC Land Information Management System (LIMS)

ashboard File - Accou	unting - Reports - Mainten	ance - Administ	ration -			
Dashboard						
Last Visited	Ownership Leases	QC Proc	ess Fie	168 Id Request Notifications	3	
TRS		8	8	Lease		
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11S34E12 NW4NW4	4/17/2017 2:27:28 PM	Subdivision	0	B0 7072 0005 (Base Lease)	4/17/2017 2:27:36 PM	6
32S16W01	4/17/2017 2:23:15 PM	Ownership	0	GT 2580 0000 (Base Lease)	4/4/2017 3:01:25 PM	
01N02W01	4/17/2017 2:22:54 PM	Ownership	0	GR 2295 0000 (Base Lease)	2/20/2017 9:51:53 AM	
01N02W18	4/4/2017 2:50:24 PM	Ownership	0	GM 3246 0000 (Base Lease)	1/18/2017 3:33:36 PM	6
01N02W05	02W05 2/20/2017 9:51:21 AM		0	R1 7301 0000 (Base Lease)	1/11/2017 3:15:00 PM	6
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11S34E12	34E12 1/18/2017 2:57:54 PM		0	B0 9446 0010 (Assignment Lease)	1/11/2017 3:14:15 PM	
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Total Records: 10				Total Records: 10		
Reports		8		23 23 C. B. C.	1982 St. 198	32
Last Visited Reports	Last Visite	d Date and Time	Action			
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Agriculture Lease by County 3/6/2017 2:5		7:16 PM	0			
Telecom By Location 9/20/201		7:02 PM				
Lease Renewal Dates by Year 9/1/		3:53 PM	0			
Active Leases By Type 7/26/2016		:12:56 AM	0			
Performance Measures 7/26/2016		:12:01 AM	0			
Business Lease Portfolio 7/1/2016 1:5						

#### Types of IT Business Systems

IT Business Systems can be grouped into 3 main categories:

- 1) custom software application,
- 2) Commercial Off the Shelf (COTS) software, and
- 3) Modified Off the Shelf (MOTS) software.

	Figure 1.	Comparison	of system	types in term	s of development	t flexibility	and time	(fast)
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	Custom	сотѕ	MOTS
Flexible	Higher	Lower	Medium
Fast	Lower	Higher	Higher

A fully custom solution entails writing computer code to build the system from the ground up. It begins with developing a project needs analysis and system requirements for the agency business model. During this phase the software language and infrastructure needs are also determined for the project and then a software development company is engaged to begin writing code. The strength of a custom system is that it is can be built to perfectly mirror an agency's business requirements and it can be changed as the agency sees fit. The negatives of custom development include higher costs, and longer implementation timelines.

Implementing a COTS system means taking an already generated product and configuring it for the specific needed business requirements. The implementation is often done by a vendor who is an expert with the COTS software product. COTS strength is that it is a pre-built product, so it can be implemented more quickly than custom development. The weakness is that COTS solutions are less flexible. In many cases one must change business configuration or process to fit the product. Also, enhancements are controlled by the vendor, not the owning agency. Examples of COTS software are NetSuite, Salesforce and Trimble's Spatial Dimension.

A term for a variation of a COTS software is a Modified Off the Shelf (MOTS) system, which better describes some of the COTS software that is more heavily customized, especially for the unique needs of a state trust land agency. Such implementation still fully uses the COTS software, but also takes advantage of available customization options within the software product to a much higher degree than normal. A strength of this approach is that you have a software product foundation to begin, but plan ahead to customize it more in line with business needs. However, one is generally still confined by some strict functions that can't be modified. An example of a MOTS solution is the system developed by PCC, as well as NetSuite, Salesforce and Trimble's Spatial Dimension if there is significant customization completed as part of the implementation.

Across the various examples of what states are using, or would like to use, there is a mix of systems that accomplish all the needed functions and examples of states that use a combination of compatible systems to fill all the needs.

North Dakota State Lands contracted with Major Oak Consulting in 2016 to survey other State Trust Land Agencies regarding their Asset Management Systems. Figure 2 shows some of the results of that survey. Out of nine surveyed states, three had COTS systems, five had custom systems, and one had a combination of the two.

			System Status					
State	LM and Accounting Integration*	System Type**	System in Operation and Maintenance Mode	Planning for System Replacement or Major Enhancement	Implementation of New System or Major Enhancement in Progress			
Colorado	INT	COTS	X					
Idaho	SEP	COTS			x			
Montana	INT	CUS	X	X				
Nevada	INT	CUS	X					
New Mexico	SEP	COTS/CUS	X		X			
Oklahoma	INT	CUS	X					
Texas	SEP	CUS	X	х				
Utah	SEP	CUS	X					
Wyoming	INT	COTS	X					

Figure 2. Existing State Trust Systems (N. Dakota/Major Oak Business Survey Results 2016)

#### **Examples of Existing State Systems**

#### Colorado

Colorado's system, Automated Trust Lands Accounting System (ATLAS), is a customized implementation of the cloud-based Enterprise Resource Planning (ERP) software, NetSuite. ATLAS is the primary accounting, land management, and leasing database of the Colorado State Land Board. Land inventory is tracked as assets within the system and tied to a corresponding feature within a GIS database. Each asset is associated with a trust beneficiary and as assets are leased, and customers are invoiced by the system, the revenue flows to the owning trusts. The NetSuite database allows for easy customization including: querying, adjustments of forms, adding of fields, creation of new tables, and all without coding knowledge. However, some more advanced customization does make use of JavaScript. Overall it is a wellfunctioning system that covers most parts of the Colorado State Land Board business needs.

#### Idaho

Idaho is currently implementing a multi-part enterprise solution generically called Land Information Management System (LIMS). The solution is based on integration of four COTS solutions:

- Trimble Forestry Land Resource Manager (LRM): Manages forest trust land functions including forest improvement, inventory, and timber sales, as well as forestry- and fire-related regulatory functions on state and private lands.
- Trimble LandAdmin Landfolio: Manages land records (ownership and entitlement of all state lands), and non-timber leasing and permitting functions. Landfolio is integrated with the ESRI parcel fabric for maintenance of state land cadastral information.

- Microsoft Dynamics NAV: ERP system for managing fund accounting payables and receivables and billing calculation for leasing, permitting, and sales activities.
- M-Files: Enterprise Content Management (ECM) solution handles all agency electronic records and is tightly integrated with both LRM and Landfolio.

The goal of these four systems is to integrate seamlessly enough that they appear to most business users to be a single large system.

#### Washington

Washington's business system for managing 2 million acres Aquatics lands, Aquatics Contract Document Center (ACDC), is a custom configured application on top of the Salesforce platform. ACDC annually processes over 1,000 leases per year from beginning to end including all associated documents, email messages, maps, and client management information. The output is a richly formatted and editable lease document based on inputs that determine the correct template from a family of 1,200 possible templates. ACDC was initially integrated with the agency's accounts receivable system and ArcGIS Online using the ESRI-Salesforce connector. ACDC has since transitioned to a custom developed ESRI webapp viewer for the display of agency spatial information.

To manage Washington's 2.5 million acres of forested lands, Washington is currently implementing Trimble's Land Resource Manager (LRM) business application to replace our current legacy agency custom developed OracleForms application. LRM will integrate with other agency business applications using a host of other technologies such as ArcGIS, SAP, Microsoft SharePoint, and .NET. The end goal is a business application that has the ability to track the history and performance of each forest management activity on the ground from seed production to final harvest.

Washington DNR uses NaturE, the SAP Business Suite ERP with the Flexible Real Estate module, for its accounts receivable and agency lease management system of record. ESRI's ArcGIS family of products is Washington DNR's standard GIS mapping application.

#### Potential Functions of Asset Management IT Business Systems

While the member states all have different responsibilities and needs for an asset management system, a core set of required functions can be identified. The information detailed below provides examples of several types of functionality. Each state must determine the appropriate scope of their needs for an asset and lease management system. Figure 3 portrays two ways in which the following functions can interact with each other. Point-to-point interfaces are weaker than a hub and spoke type model where everything revolves around a central repository or feature. To implement a system with a hub and spoke model, one must plan a

complete system in advance as it would be difficult to piece together different systems at different times.



Figure 3. Systems integration hub and spoke model (Lynell Rogeri, Opportune, 2017)

Point-to-Point

Hub and spoke

#### Land ownership

As landowning state agencies, State Trust Agencies need an asset management system that can track land ownership. Historically, the member states would have used plat books, generally with a township/range on each page to display ownership. These plat books would be updated when land was newly acquired or sold. Around the 1980-1990's some State Trust Agencies started entering ownership records into the first databases. Early databases set the stage for bare-minimum needs of Asset Management systems in regard to land ownership tracking. Today's systems still must be capable of tracking basic survey information, such as:

- Meridian
- Township
- Range
- Section
- Aliquot (what part of a section is owned)
- County
- Water body name
- Trust or Beneficiary of the asset
- Acres of ownership within parcel
- Sovereign or Trust land

In addition to land or surface ownership, Asset Management systems need to be able to track the specific types of interest that an agency owns within the land tract, such as oil, gas, coal, sand and gravel, other minerals, navigable waters, or others depending on the needs of the state. These requirements can be met using a tabular data structure and/or a spatial data structure. The tabular data structure uses traditional database tables to list the land ownership through the legal description. Each record in the database can be a section of ownership or other unique identifier depending on the state. The record would include all or most of the information included in the list above. While this method works well for most ownership, it lacks the ability to provide a visual representation of the land tract.

The other method that an Asset Management system can track land ownership is through spatial data. Spatial data represents a parcel of land using a polygon on a map in a digital format. Attribute, or tabular, information is tracked along with the spatial representation to store the information listed above. The spatial data allows for a detailed parcel to be stored when the legal description is not easily described. The storage of spatial data and related attribute information is accomplished through the use of Geographic Information Systems (GIS). Most modern land management systems include both tabular data and GIS.

#### Integrated GIS

In addition to the needs of spatial data for land ownership tracking, an Asset Management system must also make use of Geographic Information Systems (GIS) in other ways. GIS is a system designed to capture, store, manipulate, analyze, manage, and present spatial or geographic data. Figure 4 shows some of the features and capabilities of GIS.



Figure 4. GIS functions as it relates to Land Records (Brent Jones, ESRI, 2017)

In asset management systems that use tabular information as their basis, land ownership either needs to be regularly exported to GIS, or in some cases, a parcel ownership map layer is managed in GIS, separately from the asset management system. However, having the GIS information closely integrated, so the spatial data is managed within the asset management system, is preferred.

In addition to ownership data, leasing information can also be utilized in GIS to visually display where leasing is occurring. Using ownership and leasing GIS data, along with other external datasets, can lead to robust analysis regarding the state trust land assets and activities. The possibilities include the following:

- Site selection analysis using GIS to determine the best area for a specific land use activity.
- Land valuation county transaction data can be used within GIS to estimate value of state trust lands.
- Revenue analysis mapping revenue data can help visualize where revenue generation is exceeding or underperforming expectations.

An industry standard data format is using ESRI's suite of GIS software, utilizing ArcGIS Desktop, ArcGIS Server and ArcGIS Online, as well as other products. ESRI has a little less than 50% share of the GIS market, and most state agencies use their products. While not required, having that standard across member states also allows for better collaboration.

#### Lease Management

As most states are constitutionally required to produce revenue, having an ability to track and store what lands and minerals are being leased is a prime aspect of an IT Business System. The system must be able to:

- Relate a lease to one or more assets
- Handle scenarios where only a portion of that asset is being leased
- Relate multiple leases to a single asset because sometimes multiple leases can occupy multiple different portions of a parcel.
- Layer leases spatially (in terms of leases on the surface and subsurface ownership).

The system also must have the ability to track leases on other non-land assets, including commercial buildings, water rights, lease improvements, etc. While storing contact information for customers is essential, some other Customer Relationship Management (CRM) features are useful as well.

#### Document Management

Document management systems can be fully included with the IT business system or as an integrated third-party application. These systems must be able to attach documents to records, index the documents accordingly, use many different file types, and need to have reasonable storage costs. According to Gartner, Inc., a leader in information technology research, the average annual cost of storage, per terabyte (TB) is \$1,593 on premise. And, Cloud storage can range from \$.03-\$3.25/gigabyte (GB)/month, depending on a wide array of pricing factors.

#### Financial Information

The IT Business System should support fund accounting or trust-based accounting and the transactions required to manage the business leasing activities mentioned above. This functionality includes:

- Deferred revenue (e.g. advanced minimum royalties),
- Accounts Receivable tracking,
- Invoice generation, at varying intervals
- Asset depreciation and amortization schedules,
- Rent and royalty revenue recognition, and
- Tracking by lease and well, including allocations of expenses.

In most cases the financial component should also export or interface with the State's primary accounting system managed by the State Treasurer or State Controller, and be capable to produce financial statements and other configurable reports to help that State provide financial information to other entities. It is acknowledged that off-the-self products typically lack necessary financial functionality. There is often third party financial software used to meet agency accounting needs.

#### Growth and yield models

The amount of reserves in oil and gas field develop or stand based timber inventory models are typically separate stand-alone systems. Consideration should be given to how needed information from these systems is integrated into GIS and land valuation models or systems, as well as annual financial projections for resource based revenue.

#### Customer portal

A customer portal should be available for lessees and applicants to complete the following activities, generally using e-checks, credit cards, or other industry standard electronic payment methods:

- Pay bills or invoices
- File applications

- Submit bidding leasing requests
- View inspection reports
- Nominate parcels for oil & gas or other uses

The customer portal should also support interactive use and inquiry by interested members of the public who do not have a specific relationship (contract, permit, lease, etc.) with the state.

#### Query reporting, and dashboards

Querying and reporting abilities are integral to a functioning system. Data will always need to be manipulated and exported from a system. Query capability should be customizable in a graphical user interface (GUI) and not require knowledge of programming languages such as

SQL. The query and reporting tools should allow for easy customization and sharing with other users. For example, a clever user in one business unit who comes up with a useful query should be able to save it and allow other users to run and further modify the query for their own use. This type of customization and extension should be possible without traditional IT assistance, but should be managed in accordance with the agency's governance mode. Dashboards are helpful for providing a graphical tool to easily communicate information to others.

#### Field Reporting/GIS Data Collection Functionality

Some systems allow field inspectors to report in real time by uploading reports and photos to the system remotely, directly from their field computer or tablet. This can save time and money while promoting accurate reporting. Uplink to online reporting eliminates the time lapse between the site visit and the recollection of the reporter, once settled back in the office. It also permits field staff to cover more ground by reducing the need for office visits to file reports. This can result in either diminished field inspection staffing, or else more efficient ground coverage deploying the existing field inspectors. Inspections yield more accurate lease values and help the state land office to eradicate common lease price killers, so more efficient inspections can translate directly into more money earned on state trust lands.

GPS units can also be used to collect data points in the field for inspections and improvements. Data is often then downloaded from the device back in the office. It allows for more accurate spatial data than field computers or tablets.

#### Acquiring an IT Business System for Asset Management of State Trust Lands

You are in the initial stages of replacing an IT business system for Asset Management. What things need to be considered? What can be learned from other State Trust agencies? Having discussed what an IT Business System needs to include, we now shift to how to go about the process of acquiring one.

#### Budget

Budgeting is an important first step. Are funds available internally within the organization? Most likely an agency will have to seek legislative approval to obtain funding. When requesting legislative appropriation, internally estimated costs might not be trusted, so it is recommended to obtain independent consultant estimates. A consultant can help to produce critical information that will strengthen requests, such as:

- Cost estimate
- Potential project scope
- Cost benefit analysis
- Business case

Proving to a legislature that the project has been thoroughly considered, and that it represents potential cost savings, efficiency gains, or even opportunities to generate additional revenue could be the difference in receiving funds, or being denied.

The budget request should consider the desired system architecture (cloud, SaaS, on premise, hybrid) that aligns with organizational objectives and applicable state standards. Cost structures for on premise solutions typically require an initial capital budget for hardware, with periodic replacement costs. Cloud and SaaS typically require ongoing operating expense budget and may come with other challenges such as bandwidth limitation. Hybrid solutions may require both operating and capital expense budgets. Needs analysis, requirements gathering, and implementation costs should be factored into the budget, as well.

Figure 5 shows estimated costs for an IT Business System based on a survey of multiple states and vendors providing such software. It includes all start-up and project preparation costs, including contractor support, all vendor software and implementation services, and operational use for 5 years. The costs estimates do not include staff time or costs incurred within the state.

<u>Cost in thousands</u>	Land Management			Accounting		
Cost Projection Totals:	Low	High	Avg	Low	High	Avg
Implementation Timing (months)	30 months		12 months			
Implementation Cost	\$1,500	\$2,400	\$1,900	\$125	\$150	\$140
Total Annual Costs Post Implementation	\$300	\$350	\$325	\$440	\$440	\$440
5-year Costs (Implementation Cost + Total Annual Cost)	\$1,800	\$2,700	\$2,200	\$565	\$600	\$575

Figure 5. Cost estimates (in thousands) for an IT Business System for Land Management and Accounting (North Dakota/Major Oak Business Survey Results 2016)

According to the 2016 survey data, with Land Management and Accounting modules combined, a low estimate is \$2.3 million and a high estimate is \$3.3 million for total implementation cost plus annual costs for 5 years. It is essential to have the budget in place before getting too far into Request for Proposal (RFP) development. This section is intended to provide general guidance only. It is not possible to provide precise pricing guidance because every state has very different needs, project scopes differ, development time frames, project schedules, and software platforms. Also, initial and ongoing maintenance and support can be priced separate or included in project. It is recommended agencies consult with vendors and other states prior to project budget setting.

#### Data Considerations

When selecting a new IT business system, one of the first considerations is what to do with the data from the business system it is replacing. Is the data migrated from the old business system into the new IT business system? Do we start fresh with data in the new IT business system? Is there a hybrid approach? Here are some considerations to think about when deciding what to do with data from the old business system:

- Is the data worth migrating into the new IT business system? Older business systems
  will most likely not have the business rules in place for data integrity so many data fields
  will have incomplete or erroneous data that did not have an edit check to ensure
  integrity.
- How much is the vendor going to charge to migrate the data from the old business system to the new IT business system? In many cases, vendors will be happy to do the migration, but the cost could well outweigh the benefits of the historical value of having the old data in the new system. In some cases, the cost of data migration is more than the cost of the new IT business application. Specific data migration activities include defining conversion specifications and processing requirements such as:
  - ✓ data cleanup to match new system
  - ✓ amount of data to be converted (e.g. data range, # records, etc.)
  - ✓ data source
  - file structure and data format
  - ✓ conversion rules
  - ✓ dependencies

- ✓ acceptance criteria
- ✓ the file and/or database name & description
- ✓ validation rules
- ✓ exception handling
- ✓ data element mapping
- ✓ access requirements
- If the decision is made to migrate the data, how much clean up and cleansing of the old data will be required before it can be cleanly integrated into the new IT business system? If the old business system has been in use for a number of years, the time it takes to cleanse the data and get it into the new format before data migration could well outweigh the benefits.
- After the decision is made to migrate data, identify the necessary tools and scripts to perform data conversion, intermediate data processing, and loading cleansed data into the destination data repository. Options for conversion include both automated

procedures (conversion programs) and manual procedures (data entry procedures). After data conversion, testing verification procedures are recommended.

• Can you archive the old data and use another tool to retrieve the data when needed and start the new IT business system from scratch? In many cases, the value of the old data decays rather quickly as time moves forward and may be the least cost alternative.

When building a new IT business system, one of the basic requirements will be around needed data, data relationships and data integrity. Data integrity essentially means will the data field be locked down to specific values from a drop-down list or will it be a free-form field that users can enter whatever they like. If specific requirements are clear as to the needed data, locking down the options ensures data integrity. If the particular record needs an area for an inspector to write comments about a site visit, then maybe a free-form field is the best. In either case, always be thinking about what you want to be able to report out as that will drive the method chosen. As the business partner defines the data requirements, serious consideration needs to be given about migrating data from the old business system and whether it is really valuable or even needed. Your selected vendor should be able to help through the vendor interview process on their methodology for data migration and should be able to offer a recommendation given their research into the old business system.

#### Procurement

States have different procurement rules that can impact systems acquisition. Research with procurement employees on staff or with applicable statewide procurement authorities is a positive first step. Some issues and questions that should be considered:

- 1. Is a Request for Proposal (RFP) needed? What are the requirements?
- 2. Is there a certain budget that requires an RFP?
- 3. Contracts for licenses can be difficult. Is that a concern?
- 4. Review options within the state. Are there already any contracts for licenses of certain systems existing within the state?
- 5. The state's central IT function (if there is one) might have a strong preference for a certain piece of software, which needs to be taken into account.
- 6. Cloud based applications require high quality network/internet connections to function efficiently. Depending on the location of offices, especially satellite offices, infrastructure upgrades may have to occur, which could be a hidden cost. Additionally, some applications are not designed to function well in the cloud.

#### Request for Proposal (RFP) Development

An RFP is the document used to solicit for product or services when a decision needs to be made on something more than price. Often these are used for highly specialized products or

complex services. A purchasing agent on staff with the agency or with the State accounting group will likely have information on what is required with an RFP.

The same independent consultant that helped to identify the budget can also help with generating the RFP. Be aware that in many states, procurement law prohibits contractors who have participated in the RFP development process from responding to the RFP.

The most important portion of an RFP is the list of requirements, which can be quite detailed, and will help set expectations. Be aware that a simple statement like, "Must be linked and able to interface with GIS" can be interpreted in many ways and the interpretation of the vendor might not be the same as the State Trust Agency. A very clear list of requirements can help avoid scope creep. The main business process workflows must also be included. An option to work in a sandbox/development environment should be a requirement as it makes further development work easier and more accessible for the agency to complete inhouse.

#### Selection of Product and Vendor

The dedicated project manager can help streamline the selection of the vendor. Be sure to include multiple levels of employees in the selection process. Having only upper management involved in the selection process sets up a possibility for employees and users to begin distrusting the change. Seeing variety represented on the vendor selection panel helps provide peace of mind that everyone's needs will be met.

Requirements serve as the foundation for the software selection process. Based on these requirements, and agency research or procurement responses, the vendor candidate list is generally narrowed a top three to four vendors. Each of these vendors would be given an opportunity to demonstrate product capabilities. The demonstrations should be scenario-driven based on key state business processes (especially if a BPM has already been completed) rather than canned vendor scripts. Sample agency data for each of the scenarios would enhance ability to evaluate product based on a consistent dataset.

#### **Project Team Selection**

A full-time, dedicated project manager with experience implementing enterprise software solutions is a key component to successful software implementation. Other critical project team members are a full-time dedicated business analyst and a tester. The exact composition of this team will depend on the size of the agency and the availability of internal staff to be detailed to the system implementation. Often, one or more business advisors with strong domain knowledge and well-established relationships with internal business units will also be an important part of the project team.

Selecting a representative set of external customers (lessees, operators, permitees) is important to having a solution that will meet most external customer's needs. Identification of the participants can be based on both a hand selection of key customers, and an open invitation in a newsletter or other similar communication. The participants should represent both large and small users, and should address a technically diverse set of companies, as well as a broad range of leases or properties held by the customers.

To be the most effective, the project team should start during the initial scoping and requirements gathering phase of the project and continue through implementation and go-live. This will accrue substantial domain knowledge in the team and help ensure continued momentum throughout the project lifecycle. It is also critical that ongoing and long-term maintenance needs be considered early. Whether this support is directly provided by in-house resources or through managed external resources, the maintenance and support process should be well-exercised to ensure continuity through go-live.

#### After Selection of Product and Vendor- Design and Build

Whether the selected solution is a fully custom solution or a COTS solution, the State will likely be working with a vendor to do the development or configuring. This stage of information gathering prior to development and configuration is arguably the most important portion of the project. The most highly lauded vendor can fail in this stage if either they, or the customer, do not accomplish the needed tasks.

#### Design process

Even though a list of requirements was developed for the RFP, it is now time to drill down into the details of each of the requirements. At this stage it is important for the vendor to talk to all staff members of the agency that will interact with the new system. Not only is it useful due to the fact that everyone's opinion is important, it also begins to instill a sense of ownership in the project for all involved on staff.

The design phase should also determine whether a single phase or multi-phased approach is best for each state. Each state has different goals, budget issues, business requirements and time constraints. It is important to choose the approach that will provide a balance between cost and acceptable risk tolerance. The number of employees, the number of customers, the amount of data, the ability of the old system to continue to be supported, the ability to create interfaces to the old system, and the number of state agencies involved are all considerations in determining what is best for each state. The following chart provides general guidelines on the differences in the approaches:

	Single	Multi-
	Phase	Phased
Consistency across departments	Х	
Higher Pain levels, but shorter duration	Х	
Typically lower cost	Х	
Highest Risk	Х	
Focus on Details		Х
Focused testing and training		Х
Ability for users to absorb the changes		Х
Learnings from each phase allows improvement in next		Х
Frustration or confusion on continual changes		Х
Concurrent Systems (legacy and new)		Х
Redundant Data		Х
Interim interfaces		Х

#### Project Management

Specific project management on the side of the vendor is key and can be an Agile development process, a modified waterfall approach, or a similar method of project management and software development. Agile stresses a collaborative effort between developers, business managers, and customers. A large part of Agile development includes regular product checkins. The customer needs to see the progress as it is occurring and must be able to comment along the way to ensure a desirable and accurate final product. Constant project check-ins and the sharing of working product also allow for change to occur throughout design and development. Regardless of the extent of planning that goes into the initial stages of the designing process, changes will be unavoidable and Agile development allows for and supports adaptation. Agile projects can encounter cultural difficulties in governmental settings in particular, where staff are accustomed to starting with a more traditional requirements gathering, then moving onto a set build phase. A modified waterfall approach, with multiple release cycles (each with their own requirements/design process), can be a better fit for more conservative organizations. Regardless of the project management used, it is vital that the vendor is never allowed to "go dark" and spend a period of time, whether it is weeks or months, developing product without input from the customer.

#### Testing Phase

Even though Agile development has hopefully included periodic testing of working product, there will still be a time of dedicated testing. This allows for users, hopefully nearly everyone in the agency, to see the product and test their specific workflows on the product. Some states

will carry out testing simultaneously along with work in the legacy system. While this extra expenditure of staff time needs to be accounted for up front in the project, it could be valuable to determine issues before the only option for completing one's job is in the new system.

Engaging one or more dedicated professional testers is highly recommended to ensure that the system functions as intended. This also reduces the frustration level with staff who can then focus their testing efforts on business process instead of software minutiae.

Ideally, the project would provide a customer engagement program. The goal of the customer engagement program is to engage lessees, permitees, operators, payors, or other 3rd party users of the state's customer portal during development and implementation efforts to ensure early adoption of the new tools and processes. Early involvement is key. The customer engagement program may include the following types of activities: provide feedback on initial design concepts, pilot Customer Portal Training, and Pilot Customer Portal Go-live.

#### **Training Period**

As projects progress, it is important to assess an ability to achieve the target go-live date and to ensure training is able to occur before go-live. It is likely that the go-live date will be scheduled for the change at the beginning of a fiscal year, so accounting and finance staff could be extremely busy. However, business staff is vital to the new system success so time needs to be allotted for this group to be part of the training. There should always be tight coordination with business units to minimize negative impact during expected busy times of the year. Training procedures should be built around actual business processes to help staff understand how their regular tasks will change.

While much training can take place remotely, it is recommended that field staff come into a main office if feasible, especially staff that will be using the system heavily. Remote users also need to be made aware of the potential performance differences between a central location and more rural areas due to connection speeds.

It is important during the training and roll out that staff expectations are kept within reach. Change is always to include some loss and some employees are going to be resistant to the learning of the new system. All staff, especially the resistant ones, should be felt to have ownership in the system. Any needs they do not feel were met during the testing stage can be addressed during the training stage. If they see changes they recommend being made on the fly, they will see that the ownership of the system does not only fall within IT staff. Training materials should be adapted to changing workforce demographics. The detailed user manual can be a useful tool, but so can three-minute self-service video clips explaining how to perform an individual function, and internal user forums. The key to success is recognizing, understanding, and adapting to the current and near-term workforce expected to use the system.

#### Time to Go Live?

A vendor employee, or multiple employees, should be on-site in at least the main office during the first few days or week of the new product being live. When issues crop up or questions occur, it is helpful to have the vendor within close reach to fix and address issues. One way to support this need is to build specified response timeframes into the vendor contract specifically during the go-live stabilization period. One such strategy to ensure success is to release the new system in parallel with the "old" system. This entails using both systems for a short period of time. Doing this allows verification that the new system is truly ready to use. If time shows that major issues persist, the old system remains up and running to service needs. Typically, an agency would not run parallel for more than two weeks, at most. During a parallel period, it is critical that all transaction types be executed in both systems. This approach does result in a large increase in staff time needs.

Another way to mitigate risk during a production launch is to launch system modules one at a time. For instance, launch the land management module only. Once it is verified as working, bring online the lease module. Later, bring on the customer portal. A staged launch allows the implementation team to focus on a small piece at a time. This leads to faster defect resolution, and at the same time, is easier for users, as they are not overwhelmed by a huge new system on day one.

#### The Period Between Go Live and Maintenance

Using Colorado as an example, their ATLAS database was not a 100% fully, efficiently functioning system after the go live date. The first year of the maintenance contract focused on some system functions that needed to be made more efficient. After the first year, work transitioned to more maintenance and completion of individual improvement projects. A similar situation might happen in other states and can be used to improve efficiencies and take further ownership over the new software.

#### Maintenance

Depending on the project, about 6 months to 1 year or longer after the go live date, the system is fully functioning and the general maintenance and upkeep stage is entered. Improvement and enhancement projects may present themselves at various times, but most of the work consists of general maintenance, examples of which include:

- Producing queries and reports
- Adding fields or tables to adjust processes based on changing business needs
- Upkeep with application account/access permissions

- Address performance issues
- Operating Systems upkeep
- System and Application back-ups

Sometimes an implementation contract includes a year or more of continued maintenance. Service Level Agreement (SLA) can be negotiated during the contracting process if it fits business needs. It is important to consider the following:

- Who will provide that support?
- Will it be an employee on staff with the State Trust Land agency, a vendor, or a combination? Depending on the system, an employee on staff can easily provide most of the support.
- How easily is the system manipulated?
- Can forms be adjusted through a Graphical User Interface (GUI) that does not require coding knowledge?

Application support would entail a required software development skill level and/or person trained to support the technical application aspects, depending on a COTS or custom application. Most likely a Data Analyst, or similarly classed position, is tasked to perform application and report enhancement, this person would work with the IT staff for the upkeep of the system. A COTS software product requires some customization that could be done thru a GUI; but one needs good understanding of the system. Whereas, a custom application needs a higher level of technical expertise to make appropriate code changes or recommendation of code changes to a development contractor.

Plan for complete system overhaul on a 5-10 year basis. Systems will not be able to keep up with technology for 15-20 years. For any system, an application roadmap is required to establish future changes that affect technical aspects and to develop a budgetary plan.

#### A Solution that is a Combination of Products

Some state land management organizations have such broad and varied missions that their needs cannot be met by any single software solution. Often, the financial component of land management software is insufficiently robust to meet the needs of a state trust land management organization. Similarly, most financial packages (ERP) lack the land management capabilities most trust land managers require. Existing enterprise solutions, such as document management systems and other "core" technology, may already be in place and functioning at a high level.

As an example, a "system" that integrates multiple products could have the following components:

- Land & Lease Management Module custom built
- Document Management COTS solution (like SharePoint)
- Accounting/Finance System COTS solution
- Growth and Yield System

Using a blended approach allows an agency to choose products that fit multiple needs. This is often referred to as a "best of breed" approach. It is especially beneficial to agencies that have other duties outside of land and lease management. In such a scenario, all agency business could share an accounting system and a document management system, while only the land and lease management function used the land and lease management system. At the same time, the land and lease management system would be integrated with document management and accounting, providing a near-seamless experience for those users.

#### Conclusion

A well designed, well implemented, and well-maintained IT Business System for Asset Management is vital to how a State Trust Land agency functions. To achieve this goal is challenging and can be a very expensive process monetarily, as well as regarding staff resource time. The member states of the Western State Land Commissioners Association need to use these systems to manage their ownership, generate revenue from that ownership, and accomplish other business functions.

This paper is not an endorsement of any one product or vendor. The preceding information describes the different types of IT Business Systems for Asset Management, how to contract with a vendor, how to design or configure a system with a vendor, how to implement or startup a new system, and how to maintain the system. No one system can fit every proposed need because each organization has different visions, culture, and budgetary and legal requirements. Key conclusions gathered from the work are summarized below.

First, to ensure a successful project, early on in a project the budget must be established and timeline milestones set for:

- Needs analysis
- System software platform
- System hardware platform
- Vendor or software development selection

Second, given all the needed system functions and the uniqueness of a State Trust Land agency, a complete Commercial Off the Shelf system is not reasonable. In addition, the higher costs, along with the potential for issues with support, make a total custom solution not the strongest candidate either. It is most likely that the best type of system for State Trust Land agencies is a Modified Off the Shelf system. It is similar to a COTS system, but the degree of customization likely required results in a completely different product than originally presented by the vendor.

The third, and the most important conclusion, is that no matter what sort of system, the work with the vendor is the most important portion of the project. It is a must to document the needs and requirements and constantly confirm that the vendor understands and is meeting the needs and requirements. A dedicated project manager helps to establish and maintain consistent and quality correspondence and meetings with the vendor, and should be competent in working with technical (IT) professionals as well as financial and natural resource professionals.

The steps, ideas, recommendations, expected problems, and other relevant information included in this paper will assist the member states of the Western State Land Commissioners Association in the development of successful IT Business Systems for Asset Management.

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