



Oregon

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July 1, 2012

TO: Land Conservation and Development Commission

FROM: Jim Rue, Acting Director
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Jon Dunsmore, Network Administrator
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SUBJECT: **Agenda Item 3c, July 19, 2012 LCDC Meeting**

COMMISSION REVIEW OF INFORMATION RESOURCES MANAGEMENT PLAN

I. AGENDA ITEM SUMMARY

This item includes an opportunity for the commission to review and acknowledge the department's 2013-15 Information Resources Management Plan and authorize the department to submit this plan to the Department of Administrative Services (DAS), Enterprise Information Strategy and Policy Division (EISPD) with its 2013-15 Agency Request Budget.

For more information about this agenda item, contact Teddy Leland at (503) 373-0050, ext. 237, or e-mail Teddy.Leland@state.or.us.

II. RECOMMENDATION

The department recommends the commission review and acknowledge the 2013-15 Information Resources Management Plan proposed by the department. The plan may undergo further minor refinements as it is prepared for submission to DAS.

III. PROPOSED INFORMATION RESOURCES MANAGEMENT PLAN

Information technologies, processes, and products are essential to the DLCD mission in three ways:

Jurisdiction Services: Information products are the heart of technical and planning services to local government land use programs and to the public. DLCD is responsible for some unique sets of information, such as urban growth boundaries, and is uniquely positioned among state agencies to acquire, integrate, and enhance certain information to assist local government planning activities statewide.

Internal Management: Information resources and technologies are critical to efficient operations and business management practices within DLCD. These practices range from grants management and budgeting to acquiring and archiving a wide range of information to support program services and agency operations.

Accountability and Transparency: Accurate, timely, and accessible information is essential to ensuring that DLCD and the statewide land use program are accountable to the Governor, the Legislature, its federal, state, local, and tribal partners, and the public. The department must have the capacity to capture, assess, synthesize, and report using a vast array of data and information to answer questions about program performance, planning outcomes, and decision alternatives. Information is also required to assist the Governor and the Legislature in developing new and tuning or revising existing policies.

The department's Information Resources Management Plan provides an operational framework for the department to implement and maintain a robust information infrastructure aligned with the department's mission and statutory responsibilities. This framework also ensures departmental information technology enables efficient sharing of information, tools, and applications across the Oregon's land use enterprise partners and customers and supports proposed budget proposals related to the department's information infrastructure.

In summary, the Information Resources Management Plan describes the Information Technology Strategic Plan and vision for the department. This plan must be provided on August 31, 2012, to the Department of Administrative Services, Enterprise Information Strategy and Policy Division.

IV. COMMISSION OPTIONS

The commission may:

1. Accept the department's Information Resources Management Plan as described; or
2. Provide advice to the department to revise or modify the Information Resources Management Plan.

ATTACHMENTS

- A. 2013-15 Draft Information Resources Management Plan
- B. 2011-13 Draft DLCD Info Resources Umbrella
- C. 2011-13 Draft IMMI Business Plan

**DEPARTMENT OF LAND CONSERVATION AND DEVELOPMENT
STATE OF OREGON**

**Information Resources Management Plan
2013 – 2015 Biennium**

June 2012

Document G of the Information Resources Master Document



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I. Agency Profile, Plan Purposes, and Context

A. AGENCY PROFILE

Name: Department of Land Conservation and Development, State of Oregon

Organization Chart:



1. Total number of employees: 55
2. Total number of regional solutions centers or satellite offices: 8
3. Name of IT section: Information Technology Unit
4. IT Organization: ISS7 and ISS4, managed by the ASD Manager
5. Summary of IT programs and services

Total number of ISS series employees within the IT unit: 2

Total number of ISS series employees in agency program areas: 2

Note: There are two senior GIS analysts in the Coastal Division that are classed in the ISS series. There are two GIS analysts in the Natural Resources series, and one GIS analyst in the Planner series.

Total number of agency staff supported: All personnel

Description and total of other users supported: zero

Summary of agency business processes and applications enabled by information technology: See Documents E1 Assets within agency purview, and E2-Enterprise assets outside agency purview. (Note: E1 Assets are currently described in Document F, IMMI Plan.)

6. Summary of priority projects for upcoming biennium (Document F, IMMI Plan, Appendix D, Priorities 2 and 3)
7. Summary of investment achievements of current biennium
 - Deployed Windows 7 OS agency-wide and Microsoft Office 2010
 - Hired dedicated resource (IMPC)
 - Developed five-year plan for information resources modernization
 - Purchased SharePoint licenses and established Intranet homepage
 - Internet migration to SharePoint
 - Ongoing server virtualization
 - Acquired business case
 - Acquired geospatial investment recommendations
 - Upgraded ESRI users to version 10.x
8. IT-related contracts
 - Measure 49 Database contract
 - Interagency agreements support Measure 49 activities
 - ESRI/State of Oregon Enterprise License Agreement participation

B. PLAN PURPOSES

The purposes of this Information Resources Management (IRM) Plan are to:

- Provide an operational framework to implement and maintain a robust information infrastructure aligned with DLCD's mission and statutory responsibilities.
- Improve the life-cycle management of information resources within the department and used by our partners and the public.
- Facilitate access to and efficient sharing of information, tools, and applications.
- Support proposed budget proposals related to DLCD's information infrastructure.

C. CONTEXT

Information resources technologies, processes, and products are essential to DLCD's mission in three contexts:

Jurisdiction Services: Information products are the heart of technical and planning services to local government land use programs and to the public. DLCD is responsible for some unique sets of information, such as urban growth boundaries, and is uniquely positioned among state agencies to acquire, integrate, and enhance certain information to assist local government planning activities statewide.

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Legislature, its federal, state, local, and tribal partners, and the public. The department must have the capacity to capture, assess, synthesize, and report using a vast array of data and information to answer questions about program performance, planning outcomes, and decision alternatives. Information is also required to assist the Governor and the Legislature in developing new and tuning or revising existing policies.

II. Operational Goals for Information Resources Planning

For the overall context of our information infrastructure planning, please refer to Documents A-C of this series. DLCD’s **operational goals** *vis-à-vis* information infrastructure are:

1. Assure that all aspects and components are available, responsive, current, and effective.
2. Implement practices that increase continuity, security, and resilience.
3. Facilitate appropriate internal, jurisdiction, partner, and public access.

Land Use Program Partners and Customers



Information Needs



III. Improving Enterprise Functions and Program Support

This section describes how information and information technologies have been used in the department and how some of them could be applied in the future to improve the execution of its mission. For a comprehensive treatment of future improvements, see the IMMI Plan, Document F.

Information is the fuel that makes DLCD programs work. Information about land uses and conditions, zoning designations, proximity to transportation, and development potential and constraints is necessary to support local planning and development decisions and to reduce the risk associated with development investments. The same information aggregated at the regional or statewide level can support assessments of the statewide land use program overall and

The department's information resources strategy is to provide access to a modern collection of data, tools, and applications tuned to support the efficient and effective delivery of its land use programs to its employees, partners, and stakeholders.

can enable the analysis and mapping of such things as the location and quantity of vacant industrial lands, the rate of farmland conversion, and the effect of changes to Oregon's land use laws. Such assessments are difficult or impossible now. Additionally, Oregon's investment in land use planning the past 40 years has yielded a wealth of information about land, land use, and land use planning. However, access to that information is limited by a variety of factors which can be addressed with specific investments. The recommended investments are described in Document F.

A. DLCD SETTING FOR INFORMATION TECHNOLOGY

1. DLCD's Functional Responsibilities

DLCD is the principal coordinator of the partners and the principal regulator of the jurisdictions in the statewide land use planning program. The department has a significant interest in facilitating the use of land use information by *all* program partners and jurisdictions. The department has five functional responsibilities toward that end, all of which could be improved.

- Custodian and provider of statewide land use and related planning information.
- Repository for local land use plans and ordinances, aerial photos, maps, and other information related to planning and development.
- Policy developer and implementation supporter for planning actions of local jurisdictions.
- Data synthesizer and analyst of complex local, regional, and statewide land use issues.
- Manager of federal and state funds for grants to local governments for land use plan improvements and plan implementation, coastal plans, and transportation plans.

2. DLCD Operations

In order to fulfill its functional responsibilities of its land use planning mission, the department relies on internal capabilities, which, in turn, rely on information resources. These capabilities include:

- Providing reliable communications for field offices
- Administrative management of grant funds
- Responding to requests for information from customers and partners
- Aggregating data on land use
- Synthesizing and analyzing information about land use change
- Analyzing the impact of changes to land use laws
- Monitoring the status of local planning and periodic review
- Mapping and visualizing land use and other information
- Monitoring vendor contracting and performance
- Managing all IT assets, including lifecycle planning.

- Maintaining contact lists and fostering communities of interest
- Coordinating data and information exchange, and
- Providing access to information and document collections.

B. STATUS OF INFORMATION TECHNOLOGY IN THE DEPARTMENT

The scope of traditional information technology (IT) has broadened and the pace of change has quickened over the past two decades. Most of the department’s programs and polices were developed prior to the advent of desktop or agency-wide connectivity and information systems in wide use today. During the last twenty years or so, the department’s investment in information resources was used primarily to maintain basic computing capabilities and services. Another stream of technology investment flows to local governments in the form of technical assistance grants. Historic funding levels have constrained DLCD’s ability to enhance its information resources generally. More recently, budget reductions and the pressing need to approve local plans have limited the department’s ability to invest beyond the basics. Deferred investment in the department’s information resource capabilities has adversely impacted the land use program’s accountability, customer service, risk management, efficiency, and innovation. Due to differences in funding sources, GIS capabilities are uneven, with the Coastal Division able to offer better and more abundant data, tools and applications than the rest of the department. Despite earnest attempts to address the needs, multiple rounds of budget reductions have captured the dollars set aside for this purpose.

In November 2011, DLCD hired an Information Management Project Coordinator to focus on modernizing the department’s information infrastructure and the resources that are a part of it. A five-year plan (Document F) will soon be in place to guide the development and management of new and improved resources. It also incorporates ways of managing the introduction of these resources and the changes in the workflows around them. DLCD is now poised to make significant investments modernizing and enhancing information resources to better support DLCD’s mission.

1. Historic IT Budgets

Historically, the department has spent less than one percent of its General Fund budget on IT. Budget information for the past three biennia is as follows:

a. 2007-09:

Expenditure agency-wide including hardware, software and expendable property:

Federal Fund: \$64,135	
General Fund: \$218,199	Total: \$282,334

b. 2009-11:

Expenditure agency-wide including hardware, software and expendable property:

Federal Fund: \$63,386	
General Fund: \$158,025	
Other Fund: \$9,284	Total: \$230,695

c. 2011-13:

Expenditure agency-wide including hardware, software and expendable property:

Federal Fund: \$57,692

General Fund: \$126,844

Other Fund: \$2,093

Total: \$186,629

2. Current Situation

For a description of the current situation, see the IMMI Plan (Document F, Section 2; note that the assets currently described in that section will become Document E1 when the Master Document approach is fully implemented).

C. IMPROVING CAPACITY TO MANAGE INFORMATION

The projects needed to modernize existing and develop new information resources are identified in the Information Management Modernization Initiative (IMMI) Plan (Document F). Many of the required hardware, software, and network resources are already in place. However, over the next biennium, the following additional investments are needed to complete the information infrastructure:

1. Data Needs

Most data needs will be identified through several IMMI projects. A gap analysis will identify the specific data items and sets required. Statewide zoning and comprehensive plans layers have already been identified as high priority needs.

2. Application Needs

Generally, all current land use database “applications” are in serious need of redesign and enhancement during this biennium. Most of them need to be enhanced spatially and historically. Specific applications are online submission of PAPA, Periodic Review and Farm/Forest documents. Many simple services are also needed, such as displaying geo-referenced projects and decisions on maps, alone or in combination with other data.

3. Technology Needs

The department’s technology infrastructure capacity continued its improvement during the 2011-2013 biennium. A commitment to regular replacement and upgrades is essential to maintaining a strong IT foundation.

a. Hardware

All DLCD personnel are equipped with desktop computers or laptops. The department intends to adhere to the life-cycle replacement plan in place for these devices, replacing general desktops a minimum of every four years. Any break in lifecycle replacement spawns technical difficulties and causes extra expense, additional workload for the

department-wide IT positions, and eventually adversely impacts capacity for assisting local jurisdictions.

The department is monitoring the trend of smaller and more mobile computing devices and anticipates following DAS's lead. DLCDC is also tracking the State's movement toward cloud services and plans to leverage opportunities as appropriate.

b. Software

Workstation operating systems and applications need to be updated and/or replaced at regular intervals. System upgrades will involve the purchase of new software licenses, such as database management and administration tools.

c. Telecommunications

The department's current mobile phone solution is BlackBerry. Given the dominance of other solutions and the weakness of Research in Motion, DLCDC is actively evaluating other mobile phone solutions. The estimated cost of transition to smartphones is \$5,000-\$7,000. An increase in service costs is expected to be \$4,200 annually. At this time no mobile device management solution is requested; however, it is highly desirable for optimal deployment and would cost between \$2,000 and \$5,000 annually.

4. Security Needs

Security needs over the next biennium are relatively modest given the current known threats. Recent upgrades and improvements to our network architecture have provided some enhancement to DLCDC's security profile. Mobile devices are an increasingly common way of accomplishing agency business. We are evaluating use of various mobile devices and the requisite security measures that accompany that use.

5. Organization Needs

a. Workforce

In order to support a more robust information infrastructure, DLCDC needs at least one additional FTE at ISS6 to provide database administration services. This position would also contribute to the range and depth of current IT services, which are spread too thinly. The department's current data entry personnel and database stewards need additional training to be fully capable and competent in their appropriate ranges of database responsibilities. Ongoing training needs to be provided as new versions of software are released and installed.

b. Training highlights:

Enterprise Platform Development & Maintenance

IT Unit: Network and server administration, mobile device security, Intranet development and management

GIS for administrators, developers, analysts and users per Esri Training Plan

6. Related Performance Measures

- ❖ See Document F, IMMI Plan, Section 6
- ❖ Percentage of information technology resource replacements made based on scheduled life-cycle (not deferred)
- ❖ Number of information technology resources not on life-cycle management schedule

Information Resources Master Document

From Statutes to Plans to Operations

Department of Land Conservation and Development

State of Oregon



As of June 2012

Draft v 0.3



PURPOSE

This umbrella provides cohesive access to an array of documents and information that describes the current, planned and future information resources required to support all aspects of the Department of Land Conservation and Development's (DLCDC) statutory responsibilities and its organizational goals. The content ranges from minimally to highly dynamic and from high to low impact when change is introduced. The documentation is organized in modules that, together, paint the whole picture but the parts of which can be swapped out at different refresh cycles. This approach was selected to reduce redundancy, bring cohesiveness to internal and external reporting, better support budget requests, and to more easily identify and capture information as it changes.

UNDER THE UMBRELLA

The documents included within this Information Resources Master Document are:

- A. Land Use Statutes and Regulations (ORS and OAR) Citations
- B. Land Use Planning Goals and description of programs
- C. DLCDC's Strategic Vision
- D. Annual Performance Progress Report (APPR)
- E. Current Information Assets
 - E1 – Assets supporting programs that are largely within the agency's control or influence
 - E2 – Assets related to enterprise functions that are largely outside the agency's control, including budget, human resources, IT reporting tools
 - E3 – Information Technology Asset Management (ITAM) annual report
- F. Information Management Modernization Initiative Plan – a five-year plan for updating existing and developing new information assets and implementing a strategic approach
Note: This document currently includes E1 items.
- G. Biennial Information Resources Management Plan – status and needs at two-year detail
- H. Business Continuity Plan
- I. Incident Response Plan
- J. Asset Classification Plan
- K. Information Security Plan
- L. Relevant Policies
- M. Life Cycle Plan – hardware, software, systems, databases, applications, data stewardship
- N. ESRI Training Plan

EXECUTIVE SUMMARY

This umbrella connects a chain of documents about information resources from the well-spring of the groundbreaking 1973 legislation establishing Oregon's land use planning program to the delta of operational detail. Taken together, these documents illuminate the agency's current information assets, its plans and activities over the five years of the IMMI Plan (F), with richer details about the projects to be undertaken over the biennium. Also included are documents treating various aspects of agency asset vitality, continuity, and security, along with essential references and context.

Information Management Modernization Initiative

Strategic Action Plan

2012-2017

Department of Land Conservation and Development

State of Oregon



June 2012

Draft v 0.4

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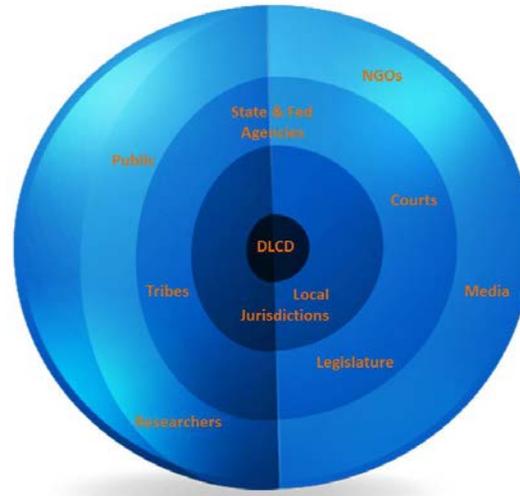
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Executive Summary

How does the land use program affect decisions and outcomes—at the community level, regionally and statewide? How have Oregon communities changed since the 1970s? What would Oregon look like if Measure 37 had played out? What information do local jurisdictions need to help satisfy State requirements? How can we help elected officials appreciate our unique land use planning program? How can we adapt and improve the program? The Department of Land Conservation and Development (DLCD) cannot answer these questions with existing data, tools and systems. With access to better information and improved ways of using it, DLCD will be able to respond to these critical questions quickly and reliably, providing the answers in easily understood form and calibrated to the audience.



The common thread through all the needs is visualization and manipulation of location-rich information organized for maximum utility and accessible within a robust yet flexible information infrastructure. This plan attempts to identify and prioritize the projects and activities required to bring these advanced information resources front and center. These resources will be built on a solid technical architecture that is scalable, extensible, service oriented and properly supported.

In embarking on a deliberate effort to introduce new information, tools and applications, serving ourselves first will permit DLCD to experiment with new capabilities, tailor resources to serve a wide range of audiences, and learn in a lower stakes environment. When we are finished, we will be able to better gauge our impact on land use planning, share Oregon’s land use story, improve performance reporting, propose program adjustments with confidence, publish authoritative data, and determine what’s possible on a property within a few minutes. Each audience and stakeholder group will have appropriate access to customized resources to assure that they can find what they need without having to launch a hunting expedition and understand without having to invest precious time learning. More specifically, the major outcomes of this initiative will be:

Tangibles	Intangibles
All program and grants tracking databases on enterprise database platform and all data with a locational component spatially enabled	An agency that can plan and execute projects and adequately support a robust information infrastructure
Land Use Planning Web portal and Hazards Planning Web portal on Oregon Explorer, with relevant data, tools, maps and apps	An agency that is a valuable resource for local governments and for policy- and decision-makers
Digital index to Planning Document Library (and	An agency that treats data as a strategic asset and

Tangibles	Intangibles
potentially a complete digital library, replacing the Acknowledgment Room's paper collection	incorporates it into all aspects of agency business
Document management system that conforms to the State's standard and agency policy for record retention	A vibrant collaborative of agencies and other partners that continue to work together for mutual benefit
Online submission of planning and other required documents	Realization of efficiencies equivalent to at least one FTE
Tools and techniques for assessing land use planning outcomes and for spinning scenarios	Information resources fully aligned with agency business needs
Visualization of Oregon's land use planning history--to the extent data exists to support it	Resources available to foster a well-informed citizenry
Intranet supporting internal communication, collaboration and resource sharing	Thriving internal collaboration fueled by Intranet
Management and publication of three Framework elements: UGBs, Zoning, and Comp Plan Maps	An agency with the experience and flexibility to adapt to constantly changing circumstances

DLCD excels in process activities for getting the daily work accomplished and for predictable cyclical occurrences like budgeting. In order to meet new information challenges, it must also develop the ability to plan and execute projects and support information resources as strategic assets. Bringing about a balance between projects and process, strategy and tactics, planning and execution includes adopting new methods and capabilities and letting go of some practices and ways of thinking that no longer serve us well. This is not easy for any organization and is especially challenging in government. It takes unwavering support from executive sponsors and the persistence of principals to break through the predictable wall of resistance to change so that our common vision can become our everyday reality. It will also require everyone's cooperation and contributions.

In an era of scarcity, DLCD must derive greater value from its resources to meet its mission more effectively. This Plan describes and recommends a modern information infrastructure to meet the current challenges and be better prepared for future challenges. Implemented over the next five years, with the understanding that the work is never done and adjustments will be made along the way, this plan sets us on course. The outcomes will empower us and every Oregonian, every Oregon business, and all Oregon governments to achieve the best possible statewide land use planning program.

1. Introduction

1.1 Overview

Accessible, current information is required for every activity at the Oregon Department of Land Conservation and Development (DLCD), and location intelligence is essential to achieving the mission. Most existing information resources are inadequate, antiquated, and isolated. This recognition, along with increasing demands for more and better information and ways of using it, are driving this Information Management Modernization Initiative (IMMI). All information resources, whether legacy or new, tangible or intangible, analog or digital, human or inanimate, comprise our information infrastructure. While there are many potential pathways, this plan lays out a coherent set of projects and activities for transforming our current information infrastructure into a responsive, interactive, adaptable suite of data, tools and applications that better inform decision-making, illuminate land planning history, leverage location intelligence, and help calibrate the land use planning program.

DLCD has completed several plans in recent years, each shedding light on different aspects of the information situation. It also provides DAS with reports. The first three documents listed in Table 1.1 are highly relevant to this initiative and contain recommendations and ideas that have been incorporated into this plan for the most part. The other documents identify some of the current assets and provide an administrative context for the current situation at DLCD. This plan builds on that previous work and adds a comprehensive vision, fills in gaps, makes priorities explicit, and lays out a phased improvement approach over a five-year period.

Document Name	Date	Purpose
Data and Information: Scoping and Road Map Development Project Report	2011	Needs assessment and recommendations for improvements
PACE Report	2011	Assess ROI for information management system and identify funding sources
Needs Assessment Related to Geospatial Capabilities	2011	Highlight and prioritize options to best improve geospatial capabilities
Asset Classification Plan	rev 2010	Identify, classify and protect information assets
Information Resources Management Plan	2011-2013	Identify IT assets and set replacement schedule primarily for budget development
Information Technology Asset Management Report	2011	Detailed inventory of hardware and software submitted to DAS annually
Business Continuity Plan	2011	Identify priorities and steps to resume business functions and services after interruption
Incident Response Plan	2009	Respond to and investigate information security breaches; make improvements
Information Security Plan	2009	Secure and protect the integrity and prevent misuse of information systems and physical things
Enterprise Resource Management Systems relationship diagram and State government authority structure	Undated circa 2006	Depict interrelationships among fiscal, payroll and HR systems, with associated hierarchy of authority

Table 1.1 Information Infrastructure Plans

DLCD's strategic goals, articulated in its 2010 strategic plan, are to:

1. Secure Oregon's legacy
2. Promote sustainable, vibrant communities
3. Engage citizens and stakeholders in continued improvements of Oregon's Land Use Planning Program
4. Provide timely and dynamic leadership, and
5. Deliver resources and services that are efficient, outcome-based and professional.

These goals have information infrastructure implications, and the recommendations and activities in this plan address those implications.

DLCD's IMMI Business Plan is aligned with the department's strategic vision and embodies the following tenets:

- Agency business purposes drive the information infrastructure, and all its components are clearly connected to those purposes
- Information is managed and protected as an enterprise strategic asset
- Best practices are incorporated into all aspects of the information infrastructure
- Collaboration with partners and stakeholders is essential to achieving the best results
- Staff participation in State, statewide, and regional IT and GIS collaborative efforts is supported
- Resources and expertise are made available to all DLCD programs and divisions
- This plan and all activities flowing from it are consistent with the relevant statutes, rules, policies and standards of the State of Oregon.

1.2 IMMI Vision

Our information infrastructure connects people with high-quality data, tools and applications that are easy to find and use, professionally managed, and enhance the ability to carry out our mission and empower others.

1.3 IMMI Goals

The goals of IMMI are to:

1. Align existing and future information assets with business needs
2. Enable the treatment of information as an asset
3. Establish an ability to plan and execute projects
4. Enhance outcomes by deploying talents and information resources across the department
5. Visualize land use planning alternatives and outcomes
6. Empower land use program evaluation and improvement
7. Enhance citizen access to information and promote engagement
8. Contribute to accountability, transparency and equity
9. Support better-informed decisions

1.4 Keys to Success

In order to succeed in this undertaking, certain essentials must be present throughout implementation:

- ❖ Strong leadership commitment
- ❖ Cooperation and contributions from DLCD personnel and external partners
- ❖ Determination to transcend organizational and program barriers
- ❖ Persistence and a willingness to tackle difficult issues
- ❖ Clear decisions, roles and responsibilities
- ❖ Adequate, well-timed resources
- ❖ Resource sharing and distributed responsibilities

1.5 Problems & Opportunities

Real operational problems have been identified in previous plans and through interviews. These problems include:

- Paper collections of official records remain inaccessible to most potential users
- Isolated applications trap data that is unavailable for other uses
- Data cannot be integrated without protracted manual effort
- Different platforms, development environments, and software are used for similar purposes, resulting in greater costs for licensing, maintenance and training
- Geospatial capabilities are fragmented and uneven
- Antiquated database software is housing vital information assets
- Numerous barriers prevent efficient discovery, access and use of information
- Need for better tools and the training to use them effectively
- Reliance on paper documents and manual processes for mission-critical tasks.

With these problems, DLCD is unable to adequately assess the land use program performance, unable to respond to questions in a timely manner or to certain questions at all, and unable to be a consistently valuable resource for local governments. Since recognizing that we must address our information problems, the conditions for improvement have never been more opportune. These conditions are:

- Executive commitment
- Dedicated information management position
- Capable partners willing to collaborate
- Capable employees willing to contribute
- New investments in hardware and software
- A modest budget

The opportunities germane to this effort are:

- The persistence of scarce resources encourages more and deeper partnerships.
- Growing acceptance of resource sharing, interdependence, and distributed responsibilities opens new avenues.
- Technological advances make it easier to do everything we need to do.
- Fresh inspiration brings new opportunities to the fore.

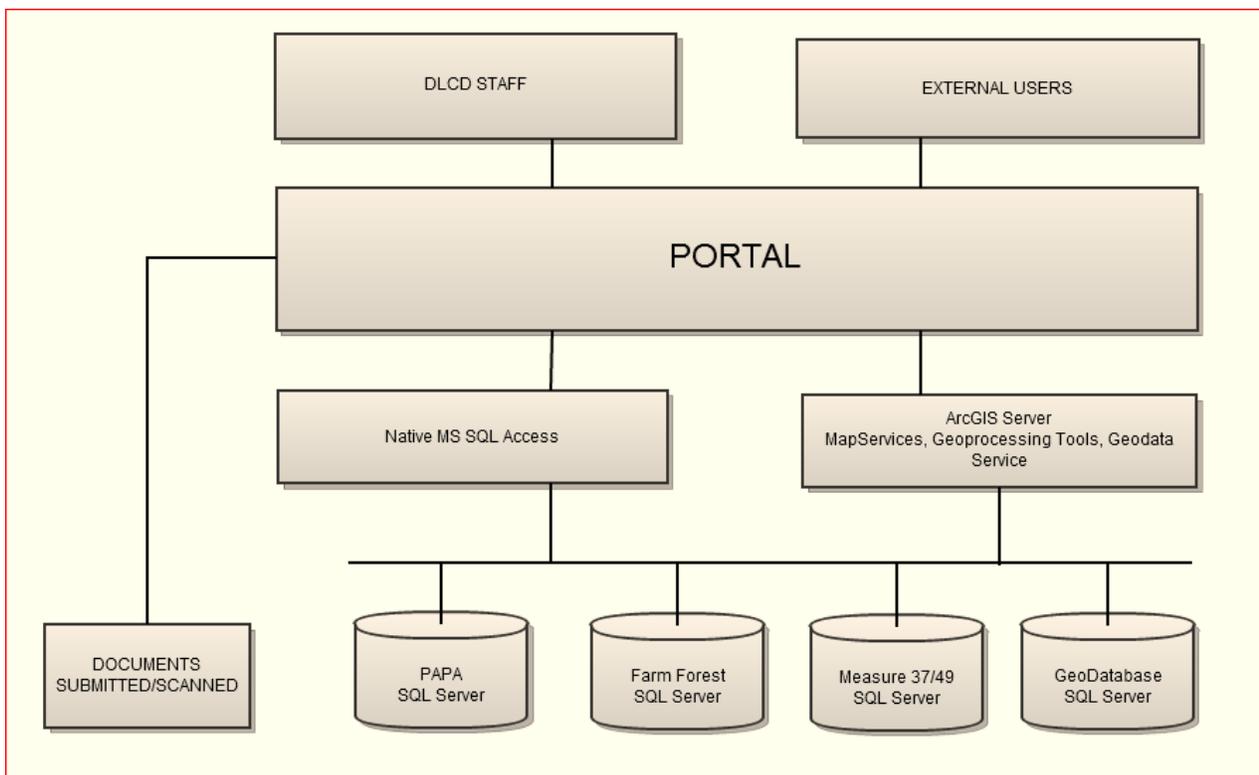
With this backdrop, we are poised to move ahead with the IMMI Business Plan.

2. Information Architecture

Nearly all activities performed to achieve DLCD’s mission are about locations in Oregon, making the spatial context essential to most decisions. In addition, the land use history for each location tells a vital story about how we got where we are and can guide our decisions for better outcomes tomorrow. Exceptional land use planning outcomes can be routinely achieved by effectively harnessing the twin dimensions of location and time.

This section describes five components of DLCD’s information infrastructure (data, applications, technology, security and organization), the current challenges of each, and strategies to meet those challenges. Descriptions of the major assets are also included. Section 5 lists the projects suggested to resolve the challenges. Appendix A depicts the department’s current information assets related to its core mission.

Figure 1.1 is a conceptual “future state” data storage and publication architecture recommended by The Gartrell Group in its Needs Assessment study for DLCD in 2011. This diagram serves as a high-level



reference architecture for major aspects of our future information architecture.

Figure 1.1 Conceptual Data and Publication Architecture

2.1 Data Architecture

Data architecture provides the framework for integrating, managing and accessing DLCD's data. It includes data standards, storage, and stewardship. Data are independent of applications.

2.1.1 Challenges

Data development and management at DLCD has largely been informal. Key data sets do not exist statewide and are difficult to collect from all jurisdictions. Data resides on multiple systems, at multiple locations, is managed by different people, and the spatial data is in multiple formats to support at least two separate platforms. Nearly every tabular database is isolated and not spatially enabled. Access to data is limited due to lack of effective discovery tools and permission structures, instability of data stores, old media and formats, or paper collections available in only one location. Life cycle management of data assets has not been fully incorporated into department practices. It is difficult for people to find the best data for their needs. Moreover, most of the spatial data gathered from external sources has been detached from its source and may not be the most current version. Some databases are not being used, are duplicative, or both. Finally, database administration capability is insufficient now and will be needed even more as modernized and new resources are made available.

2.1.2 Strategy

- Implement a modern data infrastructure
- Lead development of key statewide data sets
- Implement a document management system
- Establish policies, standards and practices for treating data as a strategic asset

Many of the challenges can be addressed by building a modern relational database management system (RDBMS) solution on SQL Server and leveraging its spatial capabilities. Data voids can be filled by making significant contributions to collaborative development of needed information assets, such as statewide zoning and comprehensive plan maps. Also important is the capability to publish and consume Web services. A detailed database plan will address needs, design, migration, functionality, and linkages. The plan can encompass unifying the spatial data library, spatially enabling tabular databases, and making paper collections digitally accessible by scanning and hyperlinking them to locations. Additional strategies include establishing data stewardship best practices (Figure 2.1), adding database administration services, designing a comprehensive metadata framework, standardize data collection



Figure 2.1 Data Stewardship Life Cycle

and development methodologies, and evaluating existing data holdings. A document management system implemented in SharePoint will make unstructured data assets accessible and more usable internally.

2.1.3 Description

The balance of this section describes DLCD's significant organized digital data assets and paper collections. Some of the assets included here have characteristics of applications but are not sufficiently developed or usable to be included with the application assets. Unstructured data are not specifically described but are generally acknowledged as present, voluminous, and significant.

2.1.3.1 Spatial Data

These spatial databases are developed and maintained by DLCD using mostly ESRI software. Many additional data sets are collected from other sources and modified or enhanced by various personnel prior to storage and use. Scores of spatial data sets are converted to KML for use in open source applications and for download. The Coastal Web Applications Developer has responsibility for making sure the metadata associated with certain spatial data complies with state and federal standards, but not all data sets are thoroughly documented. She is developing a portal tool for managing and accessing spatial metadata.

Urban Growth Boundaries Framework is a statewide, authoritative database of Urban Growth Boundaries (UGBs) and part of Oregon's base map program, navigatOR. The UGBs are essential to many queries, analyses, and reports DLCD needs to perform in order to analyze and monitor land use decisions and the overall program. DLCD updates UGB Framework annually based on plan amendments and other required documentation from jurisdictions. DLCD's Urban Planner stewards UGB Framework in an ESRI geodatabase and shares it as a shapefile. Annual versions are available at the Oregon Geospatial Data Clearinghouse for download or as a Web service. The 2010 version is also available through Oregon Explorer as a download or as a Web map service combined with other administrative boundaries. The 2011 version has been submitted to the Geospatial Enterprise Office (GEO) in the Department of Administrative Services for publication as Framework.

Floodplain mapping arises out of the Natural Hazards Program at DLCD, funded by FEMA. A current, statewide database of floodplains has recently been submitted by the Floodplain/Natural Hazards Mapping Specialist. It will soon be published by GEO as a Web service and available for download as a shapefile. As better elevation data, updated land use information, and restudies are available, the floodplain delineations are updated, usually by local governments, and compiled by DLCD. It is not fully settled as to whether the floodplain database submitted by DLCD is accepted as Floodplain Framework, but we are working toward that outcome.

Public Access Points Inventory is a collection of point locations for access to the Oregon coast. It is managed in Access, shared as a shapefile, and used in an online map application. The Coastal Web Applications Developer is the steward.

Goal 18 Inventory of beaches and dunes is derived from cadastral (tax lot) data, with additional attributes. The inventory is managed by the Coastal Web Applications Developer in a personal geodatabase, shared as a shapefile, and used in an online map application.

Estuary Levee Inventories consist of dikes and levees (lines), tidegates (points), diking district boundaries (polygons), and land protected by dikes (polygons), all managed in a geodatabase. This data is shared on the Oregon Coastal Atlas as shapefiles. The NOAA fellow is the steward with backup from the Coastal Web Application Developer.

Estuary Management Plan maps are being updated and integrated into a single, regional geodatabase by the NOAA fellow, to be completed by August 2013. These estuary plan maps support the implementing measures of comprehensive plans. They delineate management units and shoreline zoning, as well as estuarine habitats and protected sites. The 1980s data sets are currently shared in shapefile format through the Oregon Coastal Atlas.

Rural Lands Database is a county by county view of lands outside of UGBs infused with the USDA Natural Resources Conservation Service's SSURGO soils information. The collection is on a series of CDs assembled about ten years ago. Although the data is stale, the queries related to soils are still valuable and will be included in plans for integrating and enhancing the Farm-Forest database. They can also be included in whatever land use planning tool(s) are developed to support land use planners, and the queries will be against NRCS's online soils database so that the most current version is always engaged.

In addition to the unique data sets itemized in this section, the Coastal GIS Development Coordinator maintains an internal library of base data for GIS power users. The same data sets are offered in a pre-rendered format (.lyr) for casual users. In addition, many people keep individual data stores, and the ocean and coastal data store primarily supports external users and is separate from this library. A metadata library is also maintained, and an updated version is being prototyped.

2.1.3.2 Tabular Data

The database most critical to DLCD's mission tracks the **Post Acknowledgment Plan Amendment (PAPA)** process from proposal through adoption--and beyond in some cases. The data and limited interface are stranded in Paradox 5.0, which is no longer supported. Receiving a proposal triggers a process clock with several calendar dates. Some dates are calculated by the database program, and some are calculated manually. Database integrity is a constant concern, and special measures must be repeatedly applied in order to reduce the risk of data corruption. Restorations from backup copies have been required many times. The Community Services Division's Administrative Specialist currently acts as the steward, and the Workgroup Support Specialist performs data entry and simple queries. Access is limited to these two specialists and the Network Administrator to protect data integrity. This system is long overdue for migration and redesign on SQL Server.

The **Periodic Review** database is used for tracking the series of activities prescribed in the review process. A couple of attempts have been made over the years to develop a database application. In 2000, a contractor created a database with a simple user interface for data entry, query, and reporting in FileMaker Pro 5 (current version is 12), but the result was judged to be short of the mark.

Shortcomings were cured by IT personnel, but the database has not been used apparently due to a lack of communication. Periodic Review is tracked by the CSD Administrative Specialist in a series of Excel summary spreadsheets containing all active programs and tasks. Periodic review tracking has been identified for folding into the overall information foundation to be implemented in SQL Server.

The **Farm-Forest** database, also in FileMaker Pro 5, is used for tracking local government land use decisions in farm and forest zones. Access and use of this information resource is limited, and the database no longer supports business needs adequately. It is maintained by the Workgroup Support Specialist and used by the Farm and Forest Lands Specialist as a starting point for compiling information needed for the biennial reports to the Oregon Legislature. No other current uses are known; however, the potential uses are powerful and numerous once the information is accessible and spatially enabled. This legacy system is ripe for design review and migration to SQL Server.

Coastal grants are tracked in an Access 2010 database by the Federal and Local Grants Coordinator for the Ocean and Coastal Services Division. This database is referred to simply as the **Grants Database**, even though only Coastal Grants are tracked in it. A record is created at the time of award and updated each time a payment is requested. The OCSD Grants Coordinator maintains the same information in Excel spreadsheets, called grant log files, and she uses those for financial tracking rather than the database. As far as she knows, the database is not used for anything.

The **General Fund Grants Database** tracks DLCD grants awarded to jurisdictions for planning projects. This database is in Access, supplemented by Excel spreadsheets and Word documents. The spreadsheets are a workaround for shortcomings in the Access system. The CSD Administrative Specialist is responsible for maintaining these resources and tracking general fund grants.

DLCD contributes to a grant tracking database hosted by ODOT supporting the Transportation Growth Management Program. TGM personnel have FileMaker loaded on their PCs.

Bubba refers to the Ocean and Coastal Program's library of paper documents housed in the Salem office and the database catalog used to access the collection. Originally developed on a Mac, and currently navigated using Access, this database has a simple user interface for new entries, queries, and reports. Wildcard searches are supported. Shelf locations associated with the matching records make for easy retrieval. New additions to the collection are entered into the catalog by the OCSD Administrative Assistant. Since most materials now arrive in digital form, very few new entries have been made to the catalog in recent years. It isn't clear why the catalog has been limited to the paper collection. The Bubba database might be a good early candidate for entry into our document management system, but records for digital documents would need to be added to complete the set.

The Natural Hazards program maintains an Oregon version of **The National Tool**, FEMA's database of flood-insured buildings. The Floodplain Program Manager periodically downloads records for buildings in Oregon, adds additional attributes, and periodically uploads the records back into the federal database. The state version is maintained in Access and is used to support mitigation compliance monitoring. Due to privacy concerns, this asset is currently kept on a thumb drive. Effectively accommodating privacy concerns through the department's established IT environment is a high priority

and can be addressed in the near term or, alternatively, within the context of the database planning activity described in Section 5.

The Coastal Zone Management Act requires that federal agency activities and shoreline permits adhere to the State's approved management plan. To assure this requirement is met, the Coastal Division maintains a **Federal Consistency Database**, containing a detailed history of closed projects, including decisions made and documents. The Coastal State-Federal Relations Coordinator is the custodian, and The OCSA Administrative Assistant maintains it in Access. In addition, the Federal Relations Coordinator keeps a spreadsheet with hyperlinks so that she can quickly look up and track open projects and access relevant documents. Once the projects are closed, the Administrative Assistant enters them into the database. Historical records in Excel go back to about 1997.

2.1.3.3 Images and Audios

Through the combined efforts of the NOAA fellow, the Coastal Web Applications Developer and the Coastal Conservation Projects Coordinator, DLCD maintains a library of photographs on flickr depicting the extent of tide water inundation occurring during king tide events. The purpose is to depict the high water levels of winter tides as a preview of what future conditions may routinely be like as sea levels rise. This collection is part of a larger effort known as the **King Tide Photo Project**. Each photo is associated with a specific location that permits easy mapping. This is the only crowd-sourced asset in the architecture.

The Oregon Coastal Management Program (OCMP) created a catalog of digital camera images and scanned photo archives, with metadata, in Access. This **photodatabase** contains thumbnails and full resolution photos for each record. Since the initial population, selected sets of photographs have been added primarily related to the coastal access inventories. The database is searchable from OCA so users can incorporate photos into atlas reports. This resource was good for its time but now would be developed and maintained more like the King Tide project.

Other assets in this group include: 1) an image catalog and spatial index of all the imagery the Coastal GIS Coordinator could locate that serves internal customers but is not actively maintained; and 2) an extensive collection of recordings of public meetings on DVDs or stored as mp3 files.

2.1.3.4 Official Paper Collections

Post Acknowledgment Plan Amendments (PAPA), Periodic Review (PR), Farm/Forest, and the Ocean and Coastal Library (Bubba) are paper collections for which DLCD is either the official repository or primary custodian for the State of Oregon. Interested parties must travel to Salem to access these documents. A portion of the PAPA paper collection has been scanned into searchable portable document format (.pdf), but low resolution scanning limits reliable search on many of these digital files. Recent PAPA documents are stored on the J:\drive. Many older local and regional planning documents are available online through the Scholars' Bank, UO Libraries Digital Library Services. Preliminary assessments of the level of effort required to make the paper collections accessible online are underway. The Bubba collection could now be characterized as an historical depository since most

materials are arriving in digital format. The Farm/Forest document submittals from the counties are discarded after a few years because of the sheer volume of paper.

2.2 Application Architecture

Applications are automated programs people use to do their work. The application architecture provides the structure for developing electronic business applications that consume data, execute processes, and return results. Some of the observations captured here also apply to some of the data assets described above. State enterprise or other agency applications that we provide input on or enter data into are outside the scope of this plan. We will consider these at a high level to the extent that these systems affect DLCD architecture, processes, and choices.

2.2.1 Challenges

Significant challenges exist in DLCD's current application architecture. What we have is diverse and uneven. Diversity manifests in platforms, development environments (both part of technology architecture), user experience, maturity, and utility. Some GIS applications have been developed on the State's standard platform, but more extensive development has occurred on open GIS platforms. Since most of the applications arise from the better funded Coastal program, our most robust and mature resources benefit only a narrow ribbon of Oregon. Applications supporting the broader land use program are underdeveloped and not timely or adequately modified as new needs emerge. As a result, workarounds proliferate, leading to quality issues, inefficiency, and abandoned investments. Permission structures and reliability issues are chronic impediments.

Of equal significance are gaps in DLCD's application architecture. A basic, authoritative land use planning application and portal does not exist, let alone a comprehensive resource. Current data and applications are not capable of facilitating an evaluation of the land use planning program, nor are there any tools to support executive decision-making. Finally, DLCD lacks a framework to guide decisions about what applications should be selected for development.

2.2.2 Strategy

- Standardize application development and GIS platform
- Use services to build applications
- Standardize database engine
- Fill voids in basic application resources
- Leverage spatial capability in SharePoint and SQL
- Harmonize data, applications, portals and other offerings with our partners
- Establish application life cycle management practices
- Enhance capabilities through resource sharing
- As a general rule, serve our needs first

With SQL Server as the data store, it will be easier to develop and provide appropriate access to database-centric applications. Access can be used for the interface and reporting functions. The ESRI platform can be used for developing and serving map-centric applications and services by establishing our own capability, using sister agencies' capabilities and expertise, or a blend of both. We can leverage

spatial capabilities in SQL Server and in SharePoint to bridge these resource flows. For now, it may be expedient to accept that the Ocean and Coastal Services Division (OCSD) will continue to develop and serve applications and resources on open source platforms because that is the established environment for the ocean research and planning community. Over the five-year life of this plan, it will be prudent to work toward a less diverse application development and administration environment that conforms to the State's GIS standard while incorporating open source for application components not covered by the standard. This shift will conserve personnel time, streamline professional development, optimize capital investments, and enable more consistent quality outcomes.

Equally important is resolving duplicative and underutilized resources in a way that best makes sense. Collaborative efforts to harmonize existing and emerging applications and portals offered by us and by others are already underway. After shoring up our information foundation, focus will gradually shift to developing or adapting resources to assist local governments and on building executive tools to support land use planning program evaluation. As with data assets, improving and extending life cycle management practices will enhance the individual assets and the overall information architecture.

2.2.3 Description

DLCD's applications range from very old to still in development. Some applications are available internally only; some are specifically designed to support external parties and processes. Some applications are nicely geared to specific audiences--the general public, researchers, planners. DLCD also provides outstanding multi-channel, multi-organization information resources online, descriptions of which are included here, too.

Oregonocean.info (OOI), <http://www.oregonocean.info>, is an online information resource to support public participation in ocean and coastal planning processes. Originally funded by NOAA 306 grants, DLCD's Oregon Coastal Management Program (OCMP) developed this resource to serve as a portal for staff from different institutions involved in the various planning processes to contribute status information directly to a shared portal. Applications available within it primarily relate to communicating the status of public processes (Marine Reserve planning, Nearshore Research planning, Offshore Energy planning, and Seafloor Mapping planning). General information resources include a schedule and calendar of events, meeting preparation and results materials, and news articles. The Coastal Natural Resources Specialist is the long-term content administrator, but much of the content is provided by non-DLCD staff. OOI is hosted on a virtualized Windows server located in Portland, using Apache and MySQL technology for Web and database services, respectively. Joomla is used to manage content. OOI consumes data from Oregon Coastal Atlas and partner Web sites. The OSCD Web Applications Developer administers the Web content, and the Network Administrator manages the network and server aspects of OOI. The site is not mirrored, but content is backed up as part of routine agency IT practices.

Marine Map (OMM), <http://oregon.marinemap.org/>, is primarily a visualization tool for exploring data and engaging the public in current decision making within a Google Earth plug-in environment. A secondary application allows users to draw polygons and query the marine data to promote understanding of underlying marine resources. Initially funded by the Oregon Department Fish and

Wildlife and Oregon Wave Energy Trust, OMM is a local implementation of a tool developed in California by a consortium of institutions. Current funding is maintained by NOAA 309 grants. OCSD (the Web Applications Developer and the Natural Resources Specialist) is the long-term content administrator, with technical support by Ecotrust. OMM is hosted on a virtualized Linux server located in the Amazon cloud, using Apache and PostGreSQL for Web and database services, respectively. GeoDjango is used to manage content. Geospatial data is hosted in both static KML format and PostGIS spatial database format. Web services are not available. Over 150 KML layers are used in public meetings. These KML are handcrafted from the original geospatial data formats specifically for use in Oregon MarineMap display. We provide significant services to ODFW's Marine Division in KML production and other technical support. The Coastal Natural Resources Specialist administers the KML content, and Ecotrust manages the other content and server. Amazon manages the infrastructure. The site is not mirrored, but there is a development server that hosts a parallel instance of the site. Content is backed up as part of the Amazon hosting agreement.



Oregon Coastal Atlas (OCA),

<http://www.coastalatlant.net/> is a searchable archive of over 4,000 coastal and marine data sets for the Oregon coastal zone. Data is primarily in shapefile format, but there are also coverages, geodatabases, GRIDs, and GeoTiffs. Scale ranges from local to regional. Data discovered may be downloaded or (in some cases) streamed as services. Complementary applications showcase specific data sets to illustrate how coastal and marine data can be used to aid decision making, and informational articles discuss coastal topics and lead users to data that relate to those topics. Another

resource embedded in the atlas is the land use planning program training module (see below). OCA, initially funded by NOAA and the National Science Foundation, was developed by a partnership among the Oregon Coastal Management Program at DLCD, OSU's Geosciences Department, and Ecotrust, a nonprofit organization. Current funding is maintained by NOAA 306 grants. OCSD, through its Coastal Web Applications Developer, is the long-term steward of the site and its contents. OCA is hosted on a dedicated server located in Portland using Apache and MySQL technology for Web and database services, respectively. Joomla is used to manage content. Geospatial data is hosted in static downloadable ESRI formats and PostGIS format. Web services for frequently used cartographic base layers are available in OGC WMS format. The Coastal Web Applications Developer administers the Web content, and the Network Administrator manages the network and server. The site is not mirrored, but content is backed up as part of routine IT practices at DLCD.

Examples of simple Web map applications, commonly referred to as mashups, are the **Public Access in the Coastal Zone** locator and the **Beaches and Dunes** locator, both served through Oregon Coastal Atlas.

RiskPlan (Oregon's RiskMAP implementation) is a multi-dimensional, watershed-based online portal intended to support natural hazards planning statewide. When finished, RiskPlan will offer information, guidance, technical assistance, and financial resources to local governments. It is being developed by the Natural Hazards Program within the Planning Services Division using open source content management (Joomla), spatial data in shapefiles, KMLs and .pdf formats for download, and Excel spreadsheets for tabular data. It also links to other state and federal agencies and community GIS Web sites. The Floodplain/Natural Hazards Mapping Specialist is developing this resource with FEMA funds and according to FEMA requirements, but diminishing funding and other issues put this investment at risk. Further development, hosting and refinement will likely be a joint effort among GEO, INR, DOGAMI and DLCDC, along with others. The back end will be based in the enterprise platform recommended here.

The **Measure 37** database application was developed and administered by an external contractor for processing claims made by property owners seeking compensation for reduced market value due to land use regulations imposed after purchase. The passage of Measure 49 modified the outcomes under Measure 37 and affected how the claims are processed. The data and tools were migrated to the Measure 49 database. See below for a description of that database.

The **Measure 49** online database application was developed and administered by the same contractor as the M37 database. It accommodates changes to M37 claims processing, tracks new claims under M49, and tracks claims made between the two measures. This database maintains the history of M37 claims, having integrated the M37 data. The Department-wide Support Specialist enters information about new land use applications as they arrive and older information as time permits. The Planning Services Division (PSD) M49 Specialist performs database maintenance and quality checks and oversees enhancements. She uses the M37 data only when she needs to do research on a claim. The claim documents, the database, and the decision orders are each kept in separate digital containers; they are not connected or linked together. Currently, this system relies on humans to identify when certain legal thresholds and time periods are reached. A new module for tracking land use applications and development at the county level will be available online soon. The next enhancement will provide better reporting of M49 claims and M49 development, along with a demonstration of ways that M49 transfer of develop rights (TDRs) could be tracked. Longer term plans call for spatially enabling the database. A few people have access to this database, but levels of use are not known. Copies of the database tables and queries are copied to one of the network drives nightly. This application will be included in the planning activities identified in Section 5.

The public can access soil information relevant to M49 properties using the **M49 Viewer**, which was funded and shaped by DLCDC and published by the Institute for Natural Resources (INR) through Oregon Explorer. The spatial data was developed by DLCDC alone or with help from partners; it is frozen in 2009 due to statutory definitions. Even though the data is coarse, the viewer is frequently used by local governments and land use consultants. Parcel-level query is not supported. Note that DLCDC did not fund or shape the M37 Viewer, also available on Oregon Explorer.

The **M49 Map Analyzer**, an internal tool, incorporates tools for calculating percentages of high-value farmland and forestland within tax lots and is described as indispensable by DLCDC's Landowner

Compensation Specialist. Data layers include 2009 tax lots for about 20 counties matched to claims. The property IDs can be used to update the tax lot polygons.

In addition to these three M49 assets are the following spreadsheets which are being transferred to a database: litigation, vesting claims, and land use action tracking. Various Access databases manipulate data downloaded from the M49/37 online database described above.

A completely different information resource is the **Oregon Land Use Planning Program Training** available online at <http://www.coastalatlant.net/training>. This modular training resource is designed for local officials and the public to familiarize them with the history and major components of Oregon's land use program. This particular investment is a success story because it was originally conceived for the OCOMP alone but was broadened to incorporate the entire land use program.

2.3 Technology Architecture

The technology architecture describes our hardware and software infrastructure. It includes the desktop computers, portable computing devices, servers, routers, switches, gateways, wiring, and software products required to host and operate the applications, perform office automation functions, and communicate and conduct business electronically. DLCD's desktop and server hardware and software are identified in Appendix B. These are updated versions of tables contained in the most recent Information Resources Management Plan, which identifies whether and when replacement is scheduled. Appendix B also inventories GIS, database, content management and other software and development environments used by agency personnel.

2.3.1 Challenges

Overall, the technology architecture is in better shape than the other architectures because equipment and some software are being replaced or upgraded according to the life cycle schedule referenced in the IRM Plan and detailed in the Information Technology Asset Management (ITAM) report to DAS. This is due to DLCD's focus on desktop applications supporting the department as a whole. For example, DLCD is part of only 2.8% of state agencies that have migrated to Windows 7 (95% of the state remains on Windows XP). However, some database software has not been upgraded to later versions even though the cost of doing so is modest. Despite the advantages inherent in the Enterprise License Agreement with ESRI, significant software upgrades have been deferred by many users, some people are maintaining both versions, and some software has not been installed in a timely fashion. The latest version of ESRI software is being staged for installation in the immediate future. Although organizationally postured to manage the ELA, opportunities to make adjustments before the new iteration was negotiated fell through the cracks and DLCD did not respond in a timely fashion. This resulted in a 60-percent increase in its contribution to the annual ELA cost. To compound matters, numerous options and rapid change inherent in GIS software and deployment strategies make investment choices confusing and almost immediately obsolete. Even if sufficient funds are available for licensing, IT personnel to install, configure, administer and support the best technologies may not be available given other work priorities. Seeking exceptions to state standards has been sporadic and the triggers are not fully or widely understood.

Recently, DLCD acquired SharePoint Standard edition licensing--a significant investment for the agency. The predominant purpose was identified as record/document management for internal use. SharePoint offers a rich array of functionality that can be shaped to serve many internal needs. To get the best out of this investment and its vast potential will require consulting services all along the way. To achieve a successful implementation, there are no prudent ways of abbreviating careful planning, professional administration, and formal documentation. DLCD's current technology resources could be easily overwhelmed by implementing SharePoint without addressing these requirements satisfactorily.

To date, no overall strategy for harnessing cloud services has issued from DAS, although a Western States Contracting Alliance (WSCA) contract will soon be available for cloud-based GIS data storage and potentially more. DLCD has one information resource positioned in the cloud. It is not known whether any other cloud services are already programmed or being planned.

2.3.2 Strategy

- Strengthen and broaden life cycle planning
- Regularly review technology resources, opportunities, and planning in view of this Plan
- Add depth and breadth to IT support capabilities
- Manage the Esri Enterprise License Agreement strategically
- Implement a service-oriented architecture (SOA)
- Build on the current scalable and extensible architecture
- Exploit opportunities to outsource IT services to the State Data Center (SDC), other partners, and the cloud
- Implement aspects of Information Technology Infrastructure Library (ITIL)
- Leverage Internet experience to inform Intranet development

DLCD's overall technology architecture is good, and planned improvements are making it even better. Therefore, DLCD should continue the current path of adhering to the replacement schedule in the IRM Plan and continuing to improve the architecture opportunistically. Case in point: we have migrated 25 percent of servers from physical to virtual over the last two years. In the next two years we will likely decrease our physical servers by another ten percent via virtualization or migration of services. This process should continue and will contribute to streamlined server administration. Additionally, a holistic review of technology architecture components should occur in light of this plan when updating the IRM Plan. That review should include bandwidth, connectivity, performance, physical and logical location, consolidation, sourcing, redeployment and other relevant dimensions. Proposed changes to services delivery and resource sharing will be assessed on a case-by-case basis using best practices, such as business case, cost/benefit analysis, and risk analysis.

Currently, the IT staff of two does an exemplary job of responding to and resolving incidents and interruptions in service promptly and effectively. Increasing the frequency and scale of demand for information resources has the potential to reduce the service level. One additional FTE (ISS series) is required to increase the depth, range, and quality of IT support in the modernized information infrastructure envisioned by this Plan. To help manage this more demanding environment and incorporate continual service improvement, it is advisable to introduce aspects of the ITIL, or similar

model, scaled to fit DLCD's size, to assist with incident tracking and change management. A configuration library and knowledge base may also be justified.

Regular review of geospatial technologies and opportunities will be guided primarily by DLCD GIS experts and informed by GEO and other external partners. Future investments should be in keeping with the State's standard for GIS software and any other solutions should be sought only when there is no reasonable alternative. This approach is essential in order to take strategic advantage of the Enterprise License Agreement with ESRI, which also includes regular review of current and future needs with this Plan in mind. For instance, a recent inquiry indicates that potential uses for field mapping in the near term exist and that the need will increase, but DLCD has no mobile GIS solution now or plans for its acquisition. Finally, DLCD is currently collaborating with DAS by participating in a beta test of ArcGIS Online for Organizations led by GEO. Our experience will teach us more about viable cloud-based GIS services via "software as a service" (SAAS) model.

2.3.3 Description

A general description of the current technology architecture is provided here as a baseline for planning improvements to meet the future needs as IMMI is implemented. Appendix B depicts DLCD's network topology at a high level and provides additional detail on selected hardware and software.

Network: The LAN connections can be generally described as reliable. WAN performance and reliability varies depending on location. Connectivity to the state network is robust, with Salem experiencing the fastest speeds and overall performance. Personnel located in Portland or at Regional Solution Centers experience different levels of performance, especially when accessing data remotely. Chronic issues in Newport have been effectively addressed. Bandwidth is an issue when working with large datasets over the WAN.

Drive mapping is tailored; however, the following table identifies the content by topic without referring to specific network share designations:

Topic	Content
GIS	GIS (two different collections, locations and access profiles)
Database	Where PAPA and Farm Forest database files are stored
Human Resources	Restricted to Human Resources
Issues	Miscellaneous directories, ranging from Budget to Baileys Retirement and from Strategic Planning to Process Improvement; the information management documents are stored here; some overlap with S:\drive
Juris	Records and other documents with legal implications, including PAPA, Grants, and Enforcement, generally related to specific local jurisdictions
Measure37	Everything to do with tracking and processing Measure 37/49 claims
Managers	Directories with restricted access, including one for the Director
Users	Directories for each employee; access restricted to employee and IT
Share	Miscellaneous directories for sharing documents; some overlap with I:\drive

IT	IT install files and documentation
TGM	TGM program documents
Email	Email archives

Table 2.3 Network Drives

Storage Area Networks (SAN): DLCD has two SANs in Salem and one in Portland. The Portland SAN is beyond its useful life and is in the process of being decommissioned. These SANs are scalable and will provide a modest existing platform from which to enhance our technical architecture.

Hardware: DLCD is a PC-based organization. Hardware investments are made according to evolving needs and expected useful life set forth in the IRM Plan. Server consolidation is being done as the opportunity arises through normal lifecycle replacement and other means. Most personnel have desktop PCs, some have laptops, and a few have both.

Software: The majority of software licensed and used by DLCD are designed for a PC-based environment. There are over one hundred different software applications installed on PCs and servers in the department. Although less than 20 percent are Microsoft products, the core technology platform is Microsoft.

GIS software installations are distributed among the Coastal, Planning and Community Services Divisions, with the most intense use occurring in the Coastal Division. There are two primary platforms, ESRI (the State standard) and Open Source. (None of the open source usage has gone through the exception process.) Appendix C is a graphic depiction of the geospatial infrastructure. The Coastal GIS Coordinator maintains a library of shapefiles and a library of layer files on a server in Portland that will soon be repurposed. Most GIS data development and maintenance is performed using ESRI software. The two exceptions are production of KML versions and preparing layers for use on the Web. For instance, KML versions are created from ESRI formats for secondary distribution and visualization in MarineMap. The second exception happens primarily in the Oregon Coastal Atlas context. About 60 percent of the data is developed in ESRI format; the balance is provided by other sources, usually in tabular form, and does not need to be changed to make it visible on the Web. DLCD has an ArcGIS for Server license which enables the development of map and data services and concurrent editing with version control. ArcGIS for Server version 10 was recently installed but will soon be replaced with version 10.1, which delivers critical new functionality required to meet our emerging needs. The services we develop will be published by DAS/GEO as part of services paid for through the annual assessment.

Recently, DLCD purchased SharePoint Standard edition licensing to develop a document management system within an Intranet. Implementation is beginning with a home page design with limited content. If the result is encouraging and stable, all agency personnel will have access to it. Experience from this initial project will be used to inform an RFP for SharePoint implementation planning.

Coinciding with our SharePoint implementation is the State of Oregon’s transition from Teamsite to SharePoint for the State’s public Web pages. DLCD’s Internet presence is one of the largest among State agencies due to the many documents that are linked from it and the wide scope of our programs and

program goals. The training and experience gathered from that context has potential to inform DLCD with its Intranet, and the Intranet links will often connect to material or documents posted externally to avoid duplicative storage and maintenance.

DLCD does not currently have any equipment located at the SDC, nor are any IT services provided by the SDC beyond network connectivity and an email hub. According to the network administrator, SDC promised additional capabilities with the hub, SPAM filtering among them, but nothing materialized after over a year and DLCD had to purchase its own solution. A contractor provides off-site storage services to DLCD. Marine Map is hosted in the Amazon cloud. Risk MAP will likely be hosted by Oregon Explorer/INR with individual resources managed by various stewards.

Phone System: About six months ago, the DLCD phone system was attached to the new State VOIP network. There are no further upgrades scheduled. Should DLCD want to change its policy on maintaining the telephone extensions, the direct numbers assigned to each DLCD employee can be used without any additional programming or fiscal impact. The extensions will also work. Current policy preventing distribution of the direct numbers may have been formed without this understanding. A passive, gradual transition will not incur extra cost or cause disruption.

2.4 Security Architecture

Security architecture in this context protects the availability, integrity, accountability, confidentiality and assurance of our electronic information. It describes how security controls are positioned and how they relate to the overall information architecture. It encompasses internal and external threats, policies and procedures, and user awareness.

2.4.1 Challenges

Currently, all external-facing Web servers are positioned inside the agency's firewall, but other measures in place substantially reduce the likelihood of a security breach. Information resources with privacy or other restrictions exist. With the increasing move toward smart phones and pad technology, additional security considerations for implementation of these devices and revised policies are occurring through the State and its CIO Council. DLCD is participating in a CIO Council workgroup, established June 2012, focused on mobile device security.

2.4.2 Strategy

- Continue reducing exposure to threats
- Boost security profile and measures where practicable
- Self-auditing
- Increase capabilities for monitoring and assessing resource usage
- Review and modify relevant policies
- Harmonize with existing Information Security Plan
- Leverage Intranet for education and awareness
- Participate on CIO Council and other collaborative groups to increase knowledge, share resources, and provide mutual support

The primary strategy currently employed is reducing exposure to threats. Establishing a perimeter network (DMZ) will slightly enhance DLCD's security profile. We will address the concerns of information custodians by appropriately securing information assets with privacy or other restrictions. To take that further, we need to review the Information Security Plan to address any omissions and double-check that we are on track with implementation. Existing policies, user awareness level, and IT skills are deemed sufficient at this time but will need to be ramped up and punctuated as new resources and capabilities are made available. The Intranet will be leveraged to maintain and enhance user awareness of security concerns and specific threats. Performing a security audit may point to vulnerabilities that should be addressed. DLCD's continued, and perhaps augmented, participation in the CIO Council will help keep it abreast of emerging security issues.

2.4.3 Description

Overall, our security is good. Except for network connectivity, all information infrastructure equipment and accessories are positioned inside the firewall. Two new firewalls will soon be deployed, with the added benefit of using them to establish a perimeter network, or DMZ, for external-facing Web servers. External documents can be added to the system through flash drives, DVDs and CDs, and email attachments. Spam is managed by a hardware device running in the background which is monitored and managed by the Network Administrator. Controls are in place at the desktop level to further manage SPAM. These run without user interaction and generally require only a one-time setup without subsequent management. Anti-virus, spyware, web filtering, desktop monitoring, and wireless security solutions are in place. A wide variety of utilities are also employed when necessary. Internet usage reporting is available and used but is inadequate in key respects, such as requiring IT knowledge for interpretation. It is strongly recommended that a robust tool be considered, such as Spector360. Intrusion protection is mostly handled by the SDC through DLCD's external network connection. Other security aspects are covered under the agency's acceptable use policy and the Asset Classification policy; however, with the current reporting capabilities, it is difficult to determine the extent to which the acceptable use policy is followed.

2.5 Organization Architecture

The organization architecture is the human resource framework of the information infrastructure. To successfully leverage technology for business needs, DLCD requires additional skills and expertise in many of the following core competencies: external service provider management, desktop and customer support, Internet and Intranet administration and support, applications development, data stewardship, database administration, testing, research, enterprise architecture, information resource management, security, IT consultancy, policy and standards development, project management, strategic planning, and budget development.

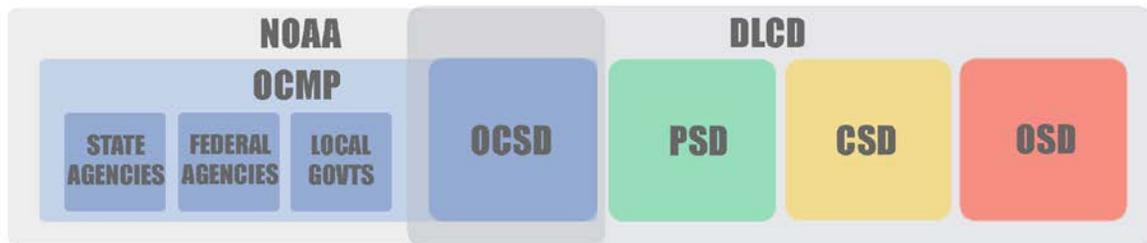
2.5.1 Challenge

DLCD has deficits in skills, positions, and organizational capacity that are needed to successfully deliver projects and services to achieve the goals of this plan. The department is divided between those programs receiving federal funding and those supported by State funding. Although the Coastal Program (now a part of OCSD) was incorporated into DLCD decades ago, in many respects it has operated independently, enabled by relatively abundant funding. Not surprisingly, then, OCSD has by far the most

sophisticated and best maintained information assets in the department and the staff that goes with them, including a GIS coordinator. These financial and capability imbalances have effects on morale, respect of jurisdictions and partners, and ability to carry out the agency’s mission effectively. Regardless of division or program, investments in information resources have been opportunistic and narrowly oriented rather than deliberate and within the framework of an overall strategy.

Another significant organizational challenge is the role of the OCSD as the anchor of a multi-organization effort, the Oregon Coastal Management Program (OCMP).

Figure 2.5 Relationship between DLCD and OCMP



The OCMP context and OCSD’s leadership role sometimes necessitates supporting decisions and making investments outside the enterprise environment of the agency. This plan and agency practice needs to support both roles--make the most of opportunities that arise from OCMP partners but also seek ways to leverage standard and existing platforms.

Missing skill sets hamper our ability to do better agency-wide. Except for the IMPC, a recent addition to the department, there is no history of or capacity for the level of project management needed to execute IMMI projects. Currently, IT is not managed by an IT professional. DLCD has allocated enterprise GIS services responsibilities to the Coastal GIS Coordinator. This arrangement will be relied on to deliver new capabilities involving Web services development and server management, so it will be important to make adjustments to the percent allocation or the scope of duties if workload exceeds .2 FTE. Internal data management has not been a priority. Minimal data entry and database maintenance is performed by people who have not been sufficiently trained and whose positions are not reflective of the important work they do and the contributions they could be making. Consistent and thorough database administration does not occur, although the network administrator performs occasional repair and support tasks. As a result, many information assets are depreciating too quickly or have been abandoned. Opportunities for shifting responsibility for administering enterprise services to SDC or other state providers have rarely been pursued for a variety of reasons. The same can be said for exploring IT resource-sharing opportunities.

2.5.2 Strategy

- Elevate importance of information infrastructure
- Balance emphasis of technology and content
- Infuse information with location intelligence
- Establish a portfolio approach for information resource investments

- Develop project management capacity
- Seek out opportunities to shift or minimize routine duties
- Develop existing personnel; adjust roles as best fits emerge

Given that nearly everything we do affects places and that the 19 planning goals touch every aspect of the natural and built environment, a more strategic and embracing approach to nurturing and managing our technology and information capabilities is advisable. An improved information future depends on developing smooth pathways to pursue arrangements for shared and distributed services, incorporating powerful spatial analysis and mapping capabilities, and bringing about a balance of operational imperatives with strategic thinking and anticipatory actions. This organizational architecture underpinning this effort provides a solid foundation for IMMI. The Deputy Director position (currently vacant) is the executive-level sponsor overseeing IMMI. (The Acting Director is fulfilling both positions at this time.) The IMPC, a new position, reports to the Deputy Director. The IMPC has extensive knowledge of information management, GIS, and is familiar with many aspects of traditional IT issues and operation. She is charged with carrying out this plan, which will include project management, consultant management, portfolio management, Framework leadership, and extensive internal/external coordination. To deliver the full array of GIS coordination activities, the policy and coordination aspects could become the responsibility of the IMPC, while the Coastal GIS Coordinator remains the lead on enterprise technical solutions and administration.

Whatever organizational changes may be made, shifts in the technology infrastructure will permit a remixing of responsibilities for existing IT personnel. Responsibilities that are likely to diminish are aspects of email administration, some security-related tasks, and server administration. There are likely to be fewer IT incidents as old equipment is replaced, legacy systems are migrated, and more enterprise systems replace DLCD's standalone solutions. New responsibilities will include SharePoint administration, database administration, systems integration, and data and application hosting services. There may also be a need for cloud services management. Initially, a database administration capability can be established by distributing roles and responsibilities among several employees trained to contribute complementary components. Our information future would benefit significantly from having a database administrator dedicated to higher order database administration tasks. People currently performing data entry tasks have significant potential for higher order tasks. Exploring the possibilities with them and providing near-term pathways for development is recommended. Including people positioned throughout DLCD to act as a Technical Advisory Committee to IMMI will extend the scope and range of information resource thinking.

Instituting a portfolio approach to information resource investments is highly recommended. This approach, involving the identification, description, and estimated cost of each proposed investment vetted by the Steering Committee, will yield the most cohesive and effective collection of investments with the highest overall return and benefit to DLCD. Existing resources, resources in development, and resources projects already committed form the initial portfolio. The goal is to get ahead of investment funding so that each can be approved as is or other appropriate disposition made prior to commitment. General project status would be tracked in the portfolio, and proposed projects would be reviewed periodically by the IMMI Steering Committee.

Once a project is in the portfolio management, professional-level project management is usually required to successfully deliver a project. DLCD has established the IMPC position as a first step in that direction. As IMMI gains momentum, more project management capacity will be required to meet the need. Additional PM training for existing personnel is highly recommended for the near term. Thereafter, newly trained project managers can take on small projects and then medium projects as they build experience. In the meantime, the IMPC will probably take on most of the project management needs of IMMI. Depending on a number of variables, it may be necessary to acquire additional PM capacity to manage larger projects.

2.5.3 Description

Agency Organization and Selected Facts: DLCD is an executive agency of the State of Oregon with an associated policy body, the Land Conservation and Development Commission (LCDC). The Commission sets policy and makes major decisions. The Director, appointed by the LCDC, oversees the department's divisions: Director's Office, Ocean and Coastal Services Division, the Community Services Division, the Planning Services Division, and the Administrative Services Division. The Coastal Division is funded by federal grants. The rest of the agency, except for three small programs--Natural Hazards, Transportation Growth Management (TGM), and Oregon Sustainable Transportation Initiative (OSTI)--is sustained by general funds and a minor revenue stream. The bulk of department funds are used for personnel or passed through DLCD as grants to local governments to support planning activities. Regional and tribal governments are eligible, too, but rarely apply.

IT Support: The current information infrastructure is primarily supported by one network administrator and one IT specialist, located in the Administrative Services Division in Salem. The Administrative Services Manager manages all administrative functions, carries the CIO title, and manages the IT staff. In addition to all the typical IT responsibilities, the two existing IT positions are responsible for supporting the telecommunications tools, maintaining aspects of the extensive public Web site, and arranging for office equipment repairs. The IT professionals serve all agency personnel regardless of location. They have the capability to log in remotely to support users, install software, and to manage, monitor, and troubleshoot servers and network assets. It is frequently the case that only one IT person is available to respond and address issues due to training, leave, work schedules or special assignments.

Information Workers: A number of program people maintain data, applications, and content on internal and external information assets. There are five "power" GIS users: three in OCSD, one in PSD and one in CSD, and a few others heavily rely on GIS to carry out their work. Recently, the Network Administrator and the Records Coordinator helped migrate the department's public Web site from Teamsite to SharePoint. Web editors designated throughout the agency are already empowered to provide and manage content. Activities are underway to implement an Intranet in SharePoint 2010, which includes a document management system. Responsibilities for content and maintenance will be distributed across the department. A few people are responsible for the lion's share of data entry and report generation tasks.

2.5.4 Policies, Standards and Guidelines

DLCD has a standard array of Oregon IT policies and does a good job of making sure the policies are understood and followed. Policies include an Asset Classification Plan, which identifies restrictions on

certain types of documents and information. Other than that, the department does not currently have sufficient policies, standards or guidelines for data sharing, management, quality, stewardship, or storage. DLCD has not established naming conventions beyond hardware assets. However, discussions are occurring on document naming conventions, key words, and similar topics related to planning a document management system. Addressing these policy gaps as we evolve will facilitate the gradual institutionalization of treating data and the information distilled from it as a strategic asset.

3. Information Management Modernization Initiative

3.1 IMMI Organization & Governance

3.1.1 Charter

A Charter is needed to formalize IMMI and set out basic information about the purpose, duration, governance structure, and roles and responsibilities of this initiative.

3.1.2 Executive Sponsor

The executive sponsor of the initiative will be the DLCD Director.

3.1.3 Steering Committee

A steering committee provides guidance and review for IMMI projects and activities, including budget requests, training planning, policy development, and identifying resources to carry out the work. They also act as IMMI champions. The steering committee consists of six members, the Deputy Director, the four division managers, and the Information Management Project Coordinator (IMPC). They meet on a regular basis and as needed, in person or virtually, all together or by email exchange. Decisions are made by consensus, with final decision-making residing in the Deputy Director on behalf of the Director.

3.1.4 Partner Advisory Committee

An advisory committee provides a forum for external partner input, project idea development, resource sharing arrangements, and other activities related to aspects of IMMI planning and development that impact local governments, state agencies, or other planning partners. The IMMI-PAC will consist of no more than eight members, including:

Director, Institute for Natural Resources	Executive Director, CR Gorge Commission
State Geospatial Information Officer, DAS	Director, Data Resource Center, Metro
County Development Services Manager (rural)	City Development Services Manager

and two additional participants appointed by their directors from among these state agencies: ODOT, OWEB, ODA, ODF, ODFW, DOGAMI. It is recommended that the PAC meet at least three times per year. The IMPC attends the IMMI-PAC meetings as a liaison. Recommendations will be reached by consensus and forwarded to the Steering Committee for consideration by the IMPC.

3.1.5 Technical Advisory Committee

A technical advisory committee will advise on technical trends and issues for the edification of the Steering Committee. The IMMI-TAC consists of DLCD employees representing the IT professionals, the GIS professionals, other information workers, such as the people performing data entry and working regularly with the existing applications and data. The existing DLCD GIS group might take on this role as its composition somewhat mirrors this recommendation and includes people with expertise outside of GIS. As with the IMMI-PAC, recommendations will be reached by consensus and forwarded to the Steering Committee for consideration.

3.1.6 Project Portfolio Management

Project portfolio management will be the responsibility of the Information Management Project Coordinator, informed and guided by the Steering Committee, project managers, the Partner Advisory Committee, and Technical Advisory Committee.

3.1.7 Project Teams

Areas of project implementation suggest different combinations of people in teams to carry out the tasks that can be performed internally and to inform projects done by contractors. These teams will be assembled according to the needs of each project and be structured to carry out project tasks using the basic principles, documents and controls of good project management practice. This approach relies on different people stepping up to serve as project manager to a degree sufficient to support the projects that need to be accomplished. It also depends on timely completion of project tasks assigned to team members.

3.2 Administrative Rules, Policies, and Standards

Administrative rules, policies and standards must be reviewed and updated to support new and enhanced capabilities and information resources. For instance, the rules regarding digital submittal of official documents will be revised to permit digital submissions in tandem with changes in our retention schedule which will need approval from the Secretary of State.

Existing DAS policies concerning data stewardship, architecture investments, leveraging established information assets and services, and compelling publication of spatial and other data should be employed and adapted as appropriate. It is time to review and potentially revise agency policies relating to IT and information management more broadly in light of this plan and emerging trends.

When conceiving and proposing a new information resource, solutions within State standards should be considered first. Alternatives should be pursued only if a thorough internal evaluation results in the determination that the State standard does not meet the requirements. On those rare occasions when the best solution is outside the State standards, we will pursue the applicable exception process. Our internal process will then provide the necessary justification for securing an exception from DAS.

Internal standards and guidance are needed to address data quality, data stewardship, naming conventions, key words, and database administration. Software license management is ripe for improved management through policy or guidance, including the download and use of freeware or open source software.

Policies mandated by executive or legislative branches of Oregon government will be developed in light of IMMI and dynamic agency information resources and practices.

4. Resource Estimates, Assumptions and Risks

4.1 Resource Estimates

Given the current scarcity of funding and the reduction in personnel throughout state government and specifically by DLCD, the amount of time needed to modernize information resources will be somewhat longer than under more typical circumstances. However, there is a small budget carved out for modernization projects, and people are willing to assist and contribute in varying degrees from time to time. The more we do in-house to save money, the longer it will take to bring the vision into everyday reality, resulting in a smaller and delayed return on investment.

4.1.1 Staffing Estimate

One FTE is dedicated to this effort already. In order to make progress, steady participation is required from the IT professionals, the division managers, and the five power GIS users. Sporadic and sometimes intense participation will be required of the assistants to the Director and Deputy Director and from the people who interact most with the current data and application assets. Regular input and feedback is needed from nearly everyone at DLCD. Input and feedback is also required from representatives of our current and future state and local partners. To attain our information management goals, at least one more IT position is needed to address database management needs and provide more IT depth overall. Additional project management capacity would improve execution and timeliness of the actions recommended in this plan.

4.1.2 Budget Estimate

A comprehensive estimate of monetary resources has not yet been assembled. However, a conservative rough estimate by budget cycle and phase is presented in the table below. A breakdown by category is presented in Section 5.4. If more funding becomes available, the pace can be accelerated and/or new projects can be blended in. Note that these estimates are considerably below what would typically be requested due to internal advice about what would be acceptable.

Phase	Amount	Budget	Description
1	\$110,000	11-13	Build modern data and application foundation; improve information technology infrastructure; complete planning for SharePoint Intranet implementation; pilot portal, tool and application solutions that deliver unique capabilities
2	\$250,000	13-15	Enhance data and applications portfolio; provide robust land use portal for planners; gradually develop Intranet capability; mature pilot projects to production as appropriate
3	\$450,000	15-17	Continue to build on core capabilities, adding enhancements and new resources supporting program implementation; develop and deploy tool for evaluating the land use program and modeling proposed program modifications.

Table 4.1 Budget Estimate by Phase

4.2 Assumptions

1. DLCD will continue to exist as a stand-alone agency for the five years of the plan.
2. Mechanisms exist to secure long-term relationships with partners to promote mutual benefit and interdependence.
3. New or existing budget resources will be allocated to the effort.
4. All important factors impacting this plan have been shared to and incorporated by the Information Management Project Coordinator.

4.3 Risks

Anticipated risks, an assessment (estimate of likelihood over level of impact), and mitigation strategies are set forth in Table 4.3, below:

Risk Assessment	Risk Description	Mitigation Strategies
Low-Medium/ High	No action or too little action, too late	Staying focused, with our champion breaking through snags, will help maintain momentum. The biggest risk here is that so little is accomplished that technology innovations render most of our plan irrelevant. Purchase focus (i.e., outsource) whenever monetary resources permit.
Low/ Medium	Executive commitment wanes or is inconsistent	Mitigation at this level primarily rests on early notification of changes in direction or priorities so that an orderly winding down or transition can be accomplished.
High/ High	Insufficient or poorly timed resources, monetary and human	Early notice; flexible planning; adjusted expectations
High/ Medium	Projects initiated before business plan in place	This risk naturally diminishes as this Plan approaches adoption, so the best mitigation is adoption without undue delay. Until then, monitor ongoing projects to avoid potential incompatibilities.
High/ Low-Medium	Talent to task mismatch or match not possible	In the course of five years, this is likely to occur and probably more than once. The best mitigation is making early adjustments in assignments to better match existing talents and acquire talents by contract. If acquisition is not an option, seek volunteer contributions. If all reasonable options fail, consider changing project requirements or do with less satisfying outcome.
Medium/ High	Key decisions and investments are not made or not made in a timely manner	Communicate the impacts to decision makers early and often. Focus on efforts that can continue if delays on certain projects are unavoidable. Facilitate decisive decision making as much as possible. Regroup and potentially revise plan and schedule.
Medium/ High	Resistance to change or other human factor overtakes positive contributions and cooperative intentions	DLCD Director and IMMI Steering Committee must be willing to lead through the inevitable resistance to change. The adoption curve (pioneers through laggards) predicts a range of adoption timing and can be tolerated, but key contributors must be early adopters. Persistent resistance must be met with consequences. Those consequences must be clear and well communicated from the start.
Low/ High	Important information relevant to IMMI and this plan are not discovered in a timely fashion.	A certain level of communication failures and knowledge gaps can be absorbed without significant adverse impact. Beyond that level will require the active engagement of the IMMI Steering Committee to bring salient information forward so that appropriate adjustments can be made.
High/ Medium	Completed IMMI projects reveal unanticipated opportunities and lead to adjustments in priorities	It is anticipated that exposure to data and information previously inaccessible to most potential users will stimulate many new project ideas, shift priorities and perhaps obviate the need for

Risk Assessment	Risk Description	Mitigation Strategies
High/ High	and projects. Available budget is insufficient to carry out needed and desired projects	some planned projects. Review and revise projects as indicated. Re-scope to funding constraints and recalibrate time line; accept and communicate that DLCD will not be able to achieve even moderate competence in information management as the pace of change will far outstrip its ability to modernize.

Table 4.3 Risk Management

5. Implementation Plan

5.1 Overview

Many implementation activities must be completed in order to transform our current situation into a modern information infrastructure. These activities will occur over the five years of this plan. Those projects and activities known to be needed now are scheduled mostly in the first three years. As we make progress and people begin working with the data and applications, entirely new ideas and projects can be blended into the remaining years of the plan or carried into successive plan renewals. Current priorities are based on several factors, alone or in combination, including being identified by prior planning consensus, by feasibility, by order of dependency, by prior investment decision, and by opportunity. It is worth noting that DLCD acts to plan, while the jurisdictions and most other organizations plan to act. This fundamental difference makes it less likely that applications for internal use will be applicable or useful externally. However, data can and will be re-used in many different tools and applications.

5.2 Projects and Activities

Table 5.2 sets out the projects and activities recommended for the modernization of DLCD's information infrastructure, along with priorities. Identifiers are combinations of categories and serial numbers. The categories are: Data (D), Applications (A), Technology (T), Organization (O), and Security (S). Priorities are coded 1-5 that roughly matches fiscal year: 1 (July 2012 to June 2013) through 5 (ending June 2017). References to previous plans are abbreviated as Roadmap (RM) and Gartrell Report (GR). Asterisked activities are in progress but may not be sufficiently resourced, fully planned or formally managed. Appendix D contains the same information organized by priority.

ID	Priority	Name	Description
T1	2	Technology Architecture Assessment & Maturation	Review technology architecture, Business Continuity Plan, and IRM plan; revise plan accordingly; implement as appropriate, including installation of SQL Server 2012.
T2	1	Review network drive structure and content	As an interim measure preparatory to a document management system (DMS), mature current network drive organization to better support DMS and data-intensive applications; sort out overlaps and optimize placement of storage on existing network topology
T3	1	Complete ArcGIS 10 upgrade*	Upgrade all GIS users to ESRI ArcGIS 10 and then to version 10.1 after Service Pack 1 is released
T4	1	Establish Web Services capability*	Install & configure ArcGIS for Server 10.1 to enable publication of Web services
T5	1	ArcGIS for SharePoint	Download and install ArcGIS for SharePoint; experiment with potential uses such as spatially enabling tabular data; deploy as assets become available within SharePoint
D1	0-1	Database Foundation Plan	Develop a plan describing the approach and steps to implementing comprehensive database needs, including design, functionality, migration, and life cycle management, with focus on legacy databases. (RM 2.1.1, GR)

ID	Priority	Name	Description
D2	1	Spatially enable PAPA*	Pilot approach and implement a geospatial component to the PAPA document collection and database, including stewardship (RM 2.1.4)
D3	1	PAPA database migration	Detailed planning and migration of the PAPA database from Paradox to SQL Server, including redesign (RM 2.1.2, D1 dependency)
D4	4	e-Acknowledgment Room Phase 2	Complete digital conversion and e-library of AR documents that is discoverable and accessible internally on DLCD Intranet (RM 4.1, A10 dependency). External access to be determined as IMMI moves forward as noted in A11.
D5	12	Zoning Framework, Ph 1	Gather local zoning data sets and publish as Web service in Administrative Boundaries FIT context; demonstrate integration approach using Metro's translator; apply to all contributed zoning data sets. (RM 2.3.2-3)
D6	21	Comp Plan Framework	Within the Administrative Boundaries FIT context, gather local comp plan map data and publish as Web service; pilot integration approach. (RM 2.3.4)
D7	2	Farm/Forest database migration	Detailed planning and migration of Farm/Forest database from FileMaker to SQL Server, including redesign and incorporation of soils queries from Rural Lands Database (RM 2, D1 dependency)
D8	3	Periodic Review database	Detailed planning and migration of periodic review database in FileMaker and Excel to SQL Server, including redesign or incorporation into PAPA database. (RM 2, D1 dependency)
D9	5	Measure 37 tables	Populate decision and development attributes of M37 database tables (now included within the M49 database)
D10	4	Measure 49 Spatial	Spatially enable the M49 database (tabular open source) and establish procedures for maintaining GIS database
D11	1	Floodplain Framework*	Within the Hazards FIT context, review and revise existing standard if indicated; publish standardized statewide floodplain data set as Framework (see O11)
D12	34	Farm/Forest and M49 database linkage	Establish linkage between Farm/Forest database and M49 database. KD says more utility if done earlier
D13	1	Land Use data matrix	Collaboratively complete a land use planning data matrix matching data needs with use cases to determine what data sets are necessary to support DLCD needs (RM 2.4.1)
D14	2	Estuary Plan Map Database*	Complete integration and update of city and county estuary plan map data into a geodatabase.
D15	1	Shoreline Framework Assessment*	With the Coastal Marine Network, develop report and recommendations for Shoreline Framework
D16	3	Shoreline Framework	Develop and publish Shoreline Framework with stewardship plan
D17	1	Land Use Data Library	Assemble, consume, and serve land use planning data based on matrix resulting from D13 (RM 2.4.2); deploy in SharePoint
A1	1	Intranet Home Page*	Plan and pilot an Intranet home page in SharePoint; make available agency-wide
A2	2	Document Management System, Phase 1	Implement a DMS in SharePoint based on work from O15 and O4 (RM 1); populate with high priority library (A7 dependency)
A3	2	PAPA Online Submission, Phase 1	Plan and prototype online capability for jurisdictions to submit plan amendment documents (RM 2.2.1)
A4	1	Land Use Toolkit, Phase 1*	Evaluate Metro land use planning toolkit for internal and jurisdiction purposes; conduct pilot as indicated

ID	Priority	Name	Description
A5	2	Land Use Indicators Feasibility	Evaluate potential of adapting smart growth indicators using data from comp plans; assess effort and resources required
A6	1	Planning Portal, Phase 1	Evaluate existing Oregon portals and design Hazards/Land Use Portal for planners as unique contribution with INR and OSU; leverage Land Use Library resulting from D17 (RM 2.4.2-3)
A7	1	SharePoint Implementation Plan	Engage SharePoint consulting services to guide and prepare a plan for SharePoint implementation (RM 1.3)
A8	2	PAPA Online Submission, Phase 2	Develop and deploy an online capability for jurisdictions to submit plan amendment documents and feed the PAPA database (RM 2.2.2-4, A3 dependency)
A9	1	Extranet/Internet Planning*	Survey local planners to solicit ideas and needs for online and other resources that DLCD could provide (RM 3.1.1)
A10	2	e-Acknowledgment Room, Phase 1	Based on preliminary assessments, plan to complete the digital plan library and design application enhancements to existing Scholars' Bank capabilities (RM 3.1.2-3; 4.1)
A11	3	Extranet/Internet Development	Augment Web resources supporting LCDC and jurisdictions (RM 3.1.4)
A12	2	Evaluate M49ex, M49in and Hazards map apps	Evaluate business need alignment and maturity paths for three map apps in partnership with Oregon Explorer (RM 3.2.2)
A13	3	M49 App enhancements	Modify and redeploy internal and external versions as Web Map Services; restore tax lot ID search capability to M49 Analyzer (RM 3.2.1)
A14	2-5	Canvas online DM support tools	At least annually, explore tools for models and adaptation potential (RM 3.2.3)
A15	2	Land Use Planning Toolkit, Phase 2	(Assuming Phase 1 is successful) Adapt Metro's toolkit (Context) for local uses and potentially for statewide LU program assessment
A16	4	Smart Growth Indicators, Phase 2	(Assuming Phase 1 supports proceeding) Develop Smart Growth Indicators for state and local uses
A17	2	Planning Portal, Phase 2	Implement plan to basic level (enhancements occur in later phases) (RM 2.4.2-3, A6 dependency)
A18	2-5	Data and Application Assessment	Identify emerging data and application development needs, assess existing capabilities in relation to need, and adjust this plan accordingly
A19	3	Land Use Planning Portal, Phase 3	Implement plan to intermediate level (RM 2.4.2-3, A17 dependency)
A20	4	Land Use Planning Portal, Phase 4	Implement plan to advanced level (RM 2.4.2-3, A19 dependency)
A21	3	Document Management System, Phase 2	Populate with at least one additional library
A22	4	Document Management System, Phase 3	Populate with at least one additional library
A23	5	Document Management System, Phase 4	Populate with at least one additional library; assess and plan for future library collections
A24	1	Grant Tracking Assessment	Examine existing solutions and practices for grant tracking; resolve issues and implement streamlined solutions.
A25	2	Farm/Forest Online Submission	Adapt PAPA online submission for Farm/Forest (D1 dependency)

ID	Priority	Name	Description
01	1	DBA capability	Develop and implement three-tier approach to database administration: Basic (data entry), Intermediate (QC, currency custom reports), Advanced (permissions, optimization, etc.)
02	2	Update OARs	Update Rules to provide for electronic submission of PAPA documents
03	2	SharePoint admin and user guidance	Develop SharePoint administration capability and user guidance to support Intranet and Document Management System
04	1	Document Inventory*	Plan and conduct an inventory of agency document holdings in preparation for implementing a document management system in SharePoint (bypass if File Plan done by contractor)
05	3	Data Sharing Agreement	In partnership with GEO, develop agreements for widest possible sharing of land use data (RM 2.4.4)
06	2	Records System Training & Support	Develop guidance for and train personnel in Documents Management System (RM 1.5)
07	3	Multi-agency GIS collaboration in SharePoint	Form partnership with ESRI, ODOT, et al., to leverage ArcGIS in SharePoint (RM 1.6)
08	4	Document Management System Extension	Plan and implement method for external stakeholders to access and use electronic document management system (RM 1.7)
09	1	UGB Stewardship	Document stewardship processes (RM 2.3.1)
010	3	Comp Plan and Zoning Stewardship	Establish formal stewardship charter and plan for life cycle management (RM 2.3.2)
011	2	Floodplain Stewardship	In collaboration with the Hazards FIT, formalize stewardship arrangements with charter, plan and related documents (see D11)
012	2	Policies, Standards & Guidelines	Initiate data and application-related policies, standards and guidelines, including data stewardship; align existing as appropriate
013	1	Harmonize applications and portals*	Collaboratively harmonize existing and future development and enhancement with external partners to avoid duplication and confusion
014	1	Portfolio Management	Establish portfolio management approach and process that includes all IT and information resource projects
015	1	Document Management Plan	Develop a document management plan for implementing a document management system in SharePoint (RM 1.4); include prioritization of document collections for library treatment (O4 dependency; could be included in A7)
016	2	Mature technology and information capability	increase current IT capacity, including requesting a policy package for one ISS 6 for DBA duties
017	1	Internet Stewardship	Establish permissions and develop guidelines and SOPs for maintaining the Internet Web site recently migrated to SharePoint
S1	0-1	Establish DMZ	Install two firewalls to create DMZ; reposition external-facing servers in DMZ (by June 1, 2012)
S2	1	Secure existing databases	Apply appropriate security measures to protect information assets with privacy or other restrictions.
S3	1	Security Audit	Perform self-assessment security audit or engage DAS/EISPD assistance.

Table 5.2 IMMI Projects by Architecture

5.3 Phasing and Milestones

Priority 1 projects are included in Phase 1 and at least initiated in this biennium. Priority 2 and 3 projects are scheduled and mostly completed during the next biennium, Phase 2. Priority 4 and 5 projects are part of Phase 3 occurring over the 2015-17 biennium.

Phase	Timing	Major Characteristics
1	Now to end of current biennium	Foundation and capacity building: data organization and integration, key data development, spatial enablement, data stewardship introduction, skill development, external partnerships forming, collaboration enabled by Intranet
2	2013-15 biennium	Program execution support building: Applications and tools tuned to audience, life cycle management/data stewardship institutionalized, resource sharing routine, partnerships solidified, Framework data accessible and used many times, DLCD reputation enhanced
3	2015-17 biennium, ending 6/30/2017	Executive and policy support building: Tools and applications for program evaluation and reporting, evaluation of proposed improvements to programs, multiple organizations contributing to common portals and applications, Framework data enhancements

Table 5.2 Phases and Phase Characteristics

5.4 Budget Plan

This bare-bones budget plan will require a lot of discipline and in-house contributions to achieve good results. Realistically, at least during Years 3 and 4, a project manager is needed to help manage the larger projects, while in-house people rotate in providing medium and small project management services. Add \$100,000 to each of Phase 2 and Phase 3 budgets for project management capacity.

Phase 1 ending June 30, 2013
Budgeted Amount = \$110,000

Project	Est. Cost	Type	Notes	ID
Spatially enable PAPA database	\$5,000	Contract	UO Library student workforce	D2
Planning portal pilot	\$15,000	Contract	w/INR in Oregon Explorer	A6
Comp Plan and Zoning Framework	\$7,000	Combo	Outreach by DLCD	D5
Database Foundation Plan	\$8,000		Contract for data integration pilot	
PAPA Database Migration	\$20,000	Contract	With significant input from IMPC & programs	D1
Land Use Toolkit Pilot	\$20,000	Combo	Contract for database migration; perform some tasks in-house	D3
SharePoint Implementation Plan	\$20,000	Contract	w/Metro and Union County	A4
Professional Development	\$15,000	Contract	Guided planning with consultant, emphasizing document management system	A7
	Training budget		DBA and other necessary training for selected personnel	O16
Total	\$110,000			

Phase 2 ending June 30, 2015

Budget Requested = \$250,000 – \$500,000 (current budget processes ongoing will determine amount)

Project	Est. Cost	Type	Notes	ID
e-Acknowledgment Room, Ph 1	\$10,000	Combo	Plan w/VO Libraries and application development consulting	A10
Adapt Metro tool	\$30,000	Contract	w/Metro, adapt tool(s) for DLCD use; expand pilot for jurisdiction use if indicated; includes some data tasks	A15
Establish Oregon Land Use Indicators	\$2,000-10,000	Contract	Guided evaluation, feasibility and, if indicated, planning	A5
PAPA Online Submission Ph 1 & 2	\$30,000	Contract In-house	Plan, plus application development, testing, training, deployment Workflow re-engineering	A3 A8
Planning Portal, Ph 2 & 3	\$30,000	Contract	w/INR and in collaboration with other partners	A17 A19
Farm/Forest Database Migration	\$15,000	Contract	Guided re-design and contractor implementation	D7
Acquire dba skills	100,000	Hire	One ISS 6 primarily for database administration, beginning Year 3	016
Document Management System Ph 1 & 2	\$20,000-30,000	Contract	Implement with consultant file plan – 45 days; Alt: Use document inventory in-house and move to Year 1	A2 A21
Internet/Extranet Development	\$5,000-15,000	Contract	Informed by program specialists, jurisdictions, LCDDC and partners	A11
M49 App Enhancements	?	Contract	Alt funding?	A13
Total		\$242,000 – 270,000		

Phase 3 ending June 30, 2017

Budget Requested = \$450,000

Project	Est. Cost	Type	Notes	ID
Periodic Review database	\$20,000	Contract	Informed by program specialists	D8
e-Acknowledgment Room, Ph 2	\$25,000	Contract	w/document conversion firm; to the extent of available budget	D4
Land Use Indicators, Ph 2	\$15,000	Contract	Includes data integration and derivation	A16
Land Use Planning Portal, Ph 4	\$30,000	Contract		A20
M49 Spatial	\$10,000	Contract	Alt funding?	D10
Document Management System, Ph 3	\$15,000	Contract		A22
Farm/Forest & M49 linkages	\$15,000	Contract		D12
DMS Extension	\$20,000	Contract		O8

DMS, Ph 4	\$30,000	Contract	Complete all libraries	A23
M37 Tables	\$10,000	Contract		D9
Contingency & yet to be identified projects	\$60,000			
DBA	\$200,000		Years 4 and 5	
Total		\$450,000		

5.5 Communications and Outreach

The most essential ingredient for any initiative is effective, consistent communications in all directions. Given the amount of change that implementation of this plan will bring, it is critical to organize and use multiple channels of communication on a regular basis, and increase the frequency of communications during peak periods of change.

One new communication channel will be our Intranet. Announcements and accomplishments can be posted on the home page. The calendar will let people know when meetings are set. The Director can use the area set aside for thoughts to include items about IMMI. Space could be devoted to refresh people’s minds on available tools and resources and ongoing projects. The project teams can use the Projects Web pages to share documents, ideas, issues, and progress. A page devoted to IMMI overall will feature status reports to IMMI Steering Committee, meeting agendas, the project portfolio and other relevant materials, along with Frequently Asked Questions. On the flipside, people can use the Intranet to post project ideas, share new efforts that relate or could be connected better, provide suggestions, pose questions, or alert us about upcoming opportunities or questions that we need to be able to answer. It can also be used to inform us all about what’s not working very well. Incentives can encourage participation, such as having lunch with the Director or getting credits for professional development.

We will also employ our public Internet site to provide information about our activities, announce improvements and new services, post answers to frequently asked questions, and perhaps create a visualization of IMMI progress similar to those used for fundraising drives.

Demonstrations and models, requirements gathering, beta testing, and new ideas will be gathered using a variety of methods and throughout the five years of plan implementation. In addition, we can incorporate newer media approaches into our communications strategy (if DLCD policies are adjusted), such as tweets to planner community followers and partners, RSS news feed, and convenient feedback mechanisms.

Communications is a major component of effective change management, and effective change management can make or break this initiative. A structured approach to change management, supplemented by informal communications, is highly recommended. For changes in the infrastructure itself, introduction of new information services, process re-engineering, and other activities that affect stakeholders getting their work done, it is good practice to set up a Change Advisory Board. The CAB previews changes, anticipates impacts, involves affected stakeholders, and guides deployment or

introduction of changes in our information infrastructure to users. A CAB might be beyond DLCD's capacity at this time, but essential aspects of the practice could be incorporated.

General communications and solicitation of feedback can occur during all-staff meetings, via our new Intranet, and at division or stakeholder meetings. Well-timed expressions of support and encouragement from the executive sponsor and Steering Committee members are critical to sustaining momentum and remind about common priorities and the value of working together. Another extremely important communication involves calibrating expectations to match reality.

To round out the communications strategies, plan for milestone celebrations (probably in conjunction with all-staff meetings), provide updates in between milestones at all- staff meetings, engage the management team as appropriate, and make presentations to the Land Conservation and Development Commission to inform and to solicit their guidance and ideas.

6. Measuring Progress and Incorporating Improvements

This section describes at a high level the measures, reports, evaluations, and methods of improving the IMMI program.

6.1 Measures

Measuring progress is an important aspect of IMMI. A careful selection of the most indicative measures will quickly reveal the strengths and weaknesses of the program. Too many measures or measures that are weak, will only add burden without sufficient benefit. The IMMI Steering Committee is well positioned to select the best measures. Following is a list of measures offered for consideration:

- ✓ Number of projects initiated
- ✓ Number of projects completed
- ✓ Increased traffic at selected Web pages
- ✓ Download/streaming traffic trends
- ✓ Number of existing assets migrated
- ✓ Number of tools or methods to discover information
- ✓ Number of long-standing partnerships/collaborations sustained
- ✓ Number of new partnerships/collaborations formed
- ✓ Number of shared or bartered resources
- ✓ Number of new or enhanced resources offered
- ✓ Number of challenged jurisdictions enabled by new or adapted resources
- ✓ Time needed to respond to inquiries (increase/decrease)
- ✓ Decisions made using new or improved resources
- ✓ Land Use Program changes made based on new or improved resources
- ✓ Number of department personnel receiving training within the IMMI context
- ✓ Number of department personnel applying upgraded skills frequently or routinely
- ✓ Number of Framework elements stewarded by DLCDC
- ✓ Decreased time spent researching and/or integrating data
- ✓ Number of information resources managed using life-cycle approach

6.2 Reporting

Various kinds of reporting will facilitate tracking and measuring progress. These reports inform IMMI evaluation. The primary methods suggested are:

- Project portfolio tracking and status quarterly, with more thorough report annually, including description of impacts, if any, caused by schedule or budget variances
- Internal feedback summary and response tracking and reporting
- External feedback summary and response tracking and reporting
- Project reports and lessons learned identification
- Periodic reports to LCDC
- GIS conference for internal information sharing (technology, applications, etc.)
- Benefit tracking and reporting, including tangible and intangible benefits accruing to DLCDC and to jurisdictions or partners.

6.3 Evaluation

Measures and reports will largely fuel IMMI evaluation and suggest improvements. Additional sources of information for evaluation include use cases illustrating the effect on planning outcomes, for instance. Steering Committee members and Commissioners can be interviewed to elicit their needs and perspective on the progress and results of IMMI. Another approach likely to yield fresh ideas is an annual retreat to exchange ideas, new technologies, and explore what we could be doing better. Reassessments of various aspects of IMMI are included in the implementation plan, and the results of those can also feed into evaluation and improvement.

6.4 Improvement

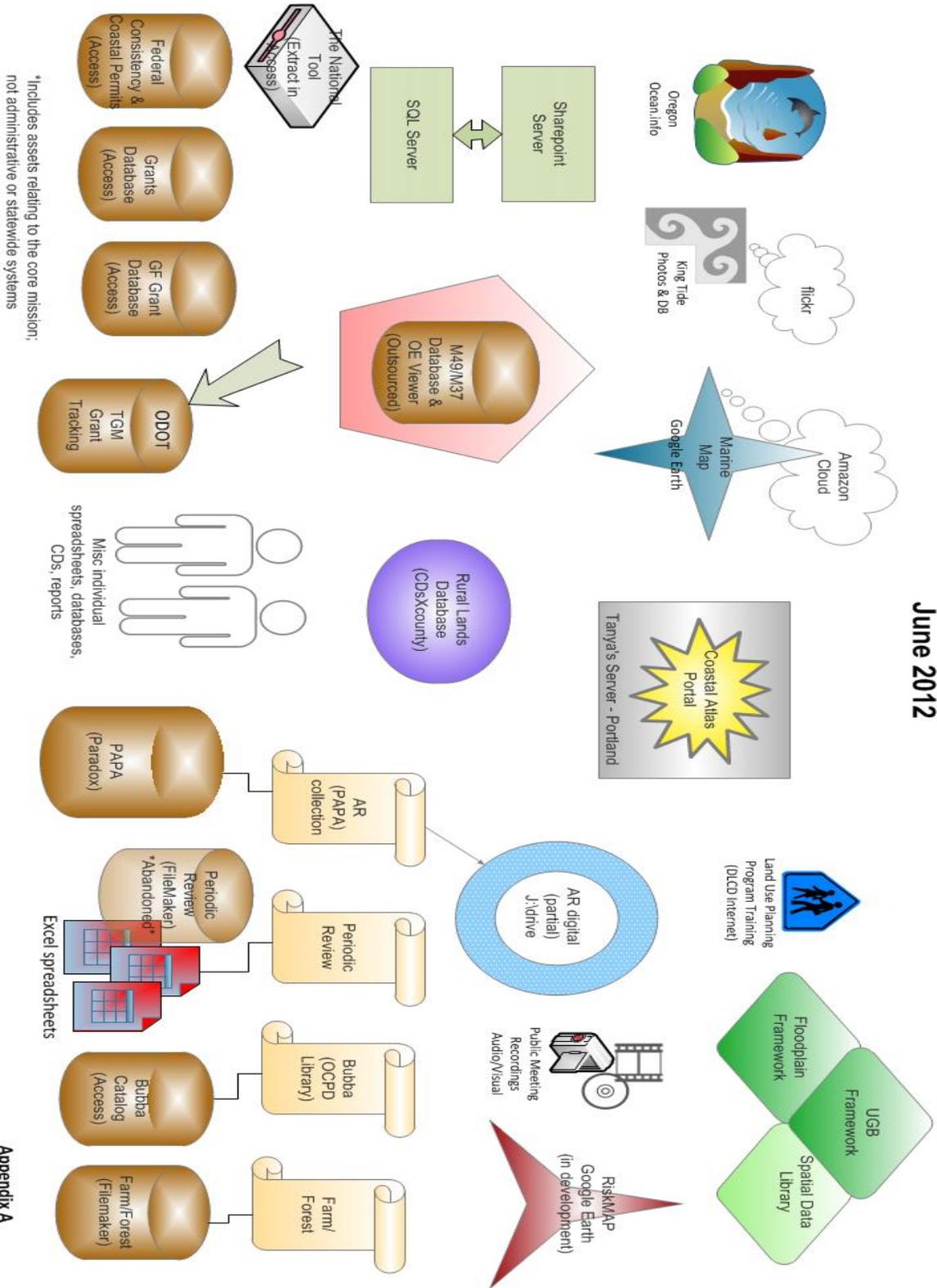
Incorporating feedback and new ideas frequently will help improve the plan and incorporate newer and emerging technologies and best practices, keeping the effort flexible and evolutionary. Coupled with continuous opportunity to provide feedback is an annual review of the IMMI Business Plan, with solicitation of comments, new needs, and ideas for how to do better. The annual review provides DLCD an opportunity to reaffirm its commitment to the effort and sustain momentum.

With new tools and integrated data, we will be able to dive deep into data in ways we have never been able to do before. Data mining will yield new insights and approaches that can be incorporated into the land use planning programs to improve effectiveness, consistency, and fairness. These new insights would shape and inform agency and program reporting.

Finally, an annual retreat or other sequestering event would provide an opportunity to examine the results to date, document lessons learned, and make adjustments as indicated. Part of the event should be devoted to planning for the next five-year cycle. This approach will permit continuity and, if carried out effectively, will obviate the need to start from scratch.

Appendix A - Information Assets

DLCD Information Assets* June 2012



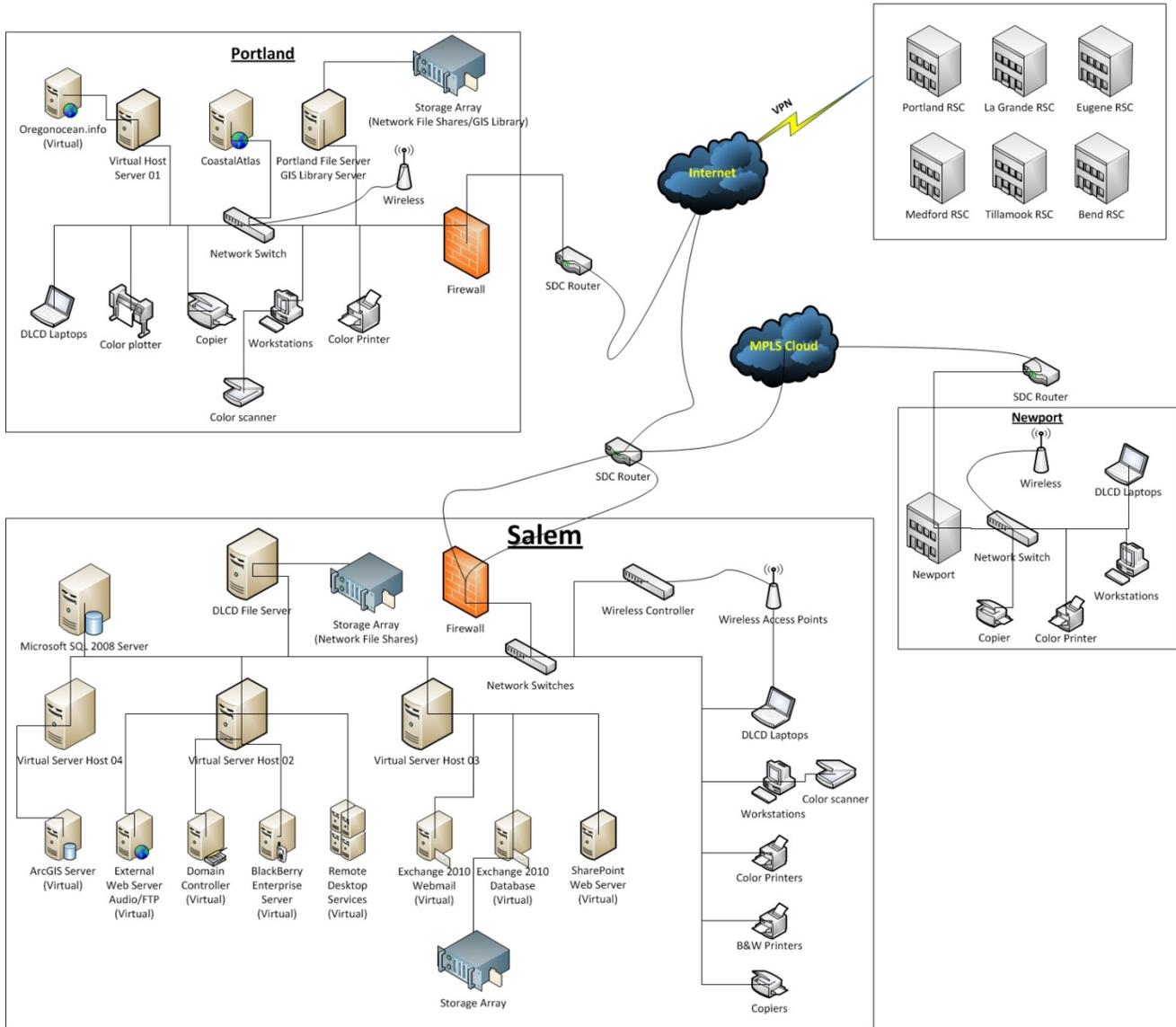
*Includes assets relating to the core mission; not administrative or statewide systems

Appendix A

Appendix B – Technology Architecture Detail

Current as of 04/06/2012

DLCD Technology Profile



Software

This section describes the current software deployments for data development, management, maintenance, sharing, and use.

Database

Software	Use
Paradox 5.0	PAPA
FileMaker Pro 5	Farm/Forest Periodic Review (abandoned)
Access 2003	Grants (Coastal) Bubba catalog (copy) Metadata catalog (existing production SMMS) Goal 18 inventory PAPA project information Oregon Coastal Public Access Inventory (2010) Oblique photo inventory (1988) numerous personal databases for undetermined uses
Access 2010	IT asset database used for internal tracking and generating reports to meet DAS requirements http://www.oregon.gov/DAS/EISPD/ITIP/docs/itam-submission-schedule-2011.pdf . It is only accessible to IT personnel.
Excel 2010?	Periodic Review (active)
SQL Server 2008	SharePoint Intranet (in early stages of development)
MySQL (OS)	Measures 37 and 49 (hosted by contractor; data maintained by DLCD) Websites: Oregon Ocean Information, RiskMap, Oregon Coastal Atlas, CAPIS, Oregon Coastal Marine Data Network blog (in development) Tabular: Nearshore Research Inventory, Atlas data re Oregon coast, NOAA tide predications for Oregon coast, USFWS Seabird Colony, Oregon DHS Beach Water Quality, Oregon Coastal Public Access inventory, Goal 18 Inventory (Web-enabled copy) Photo inventories: OCMP and ShoreZone Metadata catalog (prototype)
PostgreSQL (OS)	OCA Marine (~130 marine GIS data layers underlying MarineMap reports) Aerial Photo Library (Web-enabled copy) Oregon/Washington OpenStreetMap base map Metadata catalog database (prototype replacement)

GIS

ESRI: DLCD is slowly migrating to ArcGIS 10 environment, with license management from a server located in the Salem office. The concurrent licenses on that server are:

6	ArcView	2	3d Analyst	3	Visual Basic for Apps
1	ArcScan	3	Spatial Analyst		

DLCD still has ArcGIS 9.x licenses in use and deployed by a server in a closet at the Portland office. The concurrent licenses on that server are:

4	ArcINFO	2	3d Analyst
1	ArcScan	3	Spatial Analyst

In addition to the licensed products, ArcGIS Explorer Desktop and other free ESRI and ESRI-compatible viewers and utilities are installed on an as-requested basis.

Open Source: The Open Source capabilities are primarily based in the Coastal Division, with emerging capability in the Natural Hazards Program, both of which are federally funded.

Platforms: Google Earth, Virtual Earth 3D, NASA World Wind, Bing	MapWindow GIS – fully featured GIS
Open EV	Quantum GIS – fully featured GIS
OpenOceanMap – tools for integrating assessments for fishery policy and marine conservation	PostGIS – supports spatial objects in PostgreSQL

Other Spatial Data Software

Dassault Systemes SolidWorks eDrawings – 3D data manipulation and visualization	Intergraph erdas ER Mapper for advanced image processing, compression, analysis and visualization
MapViewer Desktop 2.03 RC (for FEMA DFIRMs)	Merkaartor for Windows – OpenStreetMap editor

Other geospatial tools include a plethora of plug-ins, models, and utilities.

Content Management

Microsoft SharePoint 2010: Content – for Intranet
 Joomla (open source) – for Oregonocean.info and RiskPlan
 CVSNT – open source version control system

Other software (not related to security or network)

Protégé (open source) – ontology modeling for knowledge bases
 Image Magick (open source) – image manipulation and format conversion
 IHMC CmapTools (open source) – Concept mapping

Development Environments & Scripting

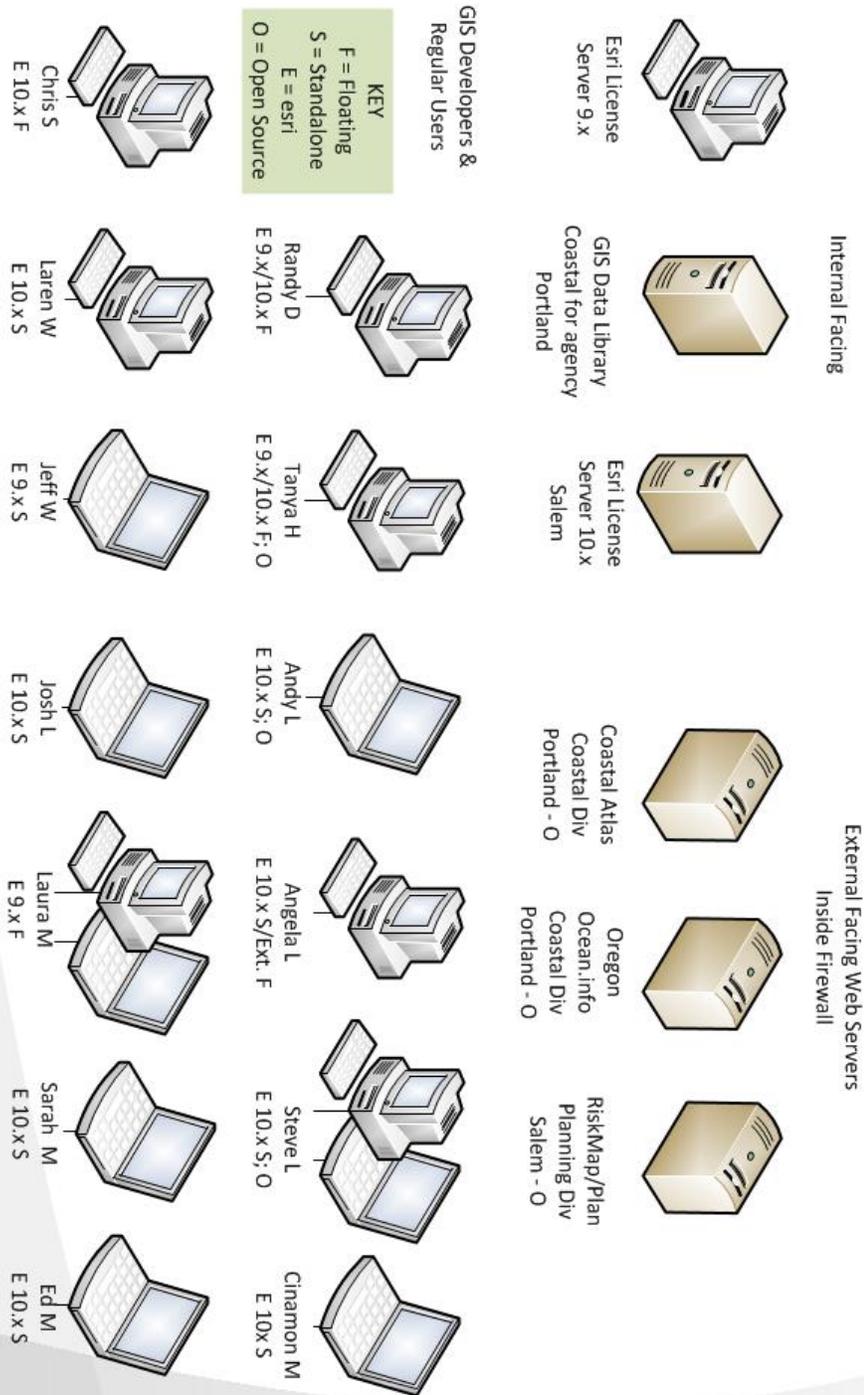
Python	Crystal Reports for ESRI
Open EV	Tinn-R (code editor)
Flash	Javascript

Server Software

Apache HTTP Web Server	Microsoft SharePoint 2010
Microsoft Exchange Server 2010	Microsoft Remote Desktop Services
Microsoft SQL Server 2008	ArcGIS Server 10 (to be replaced by v.10.1 in June)

Appendix C – Geospatial Technology Infrastructure

DLCD Current Geospatial Infrastructure June 2012 – Appendix C



Appendix D–Projects by Priority

[this table will be updated after all changes are made in the primary table]

ID	Priority	Name	Description
D1	0-1	Database Foundation Plan	Develop a plan describing the approach and steps to implementing comprehensive database needs, including design, functionality, migration, and life cycle management, with focus on legacy databases. (RM 2.1.1, GR)
S1	0-1	Establish DMZ	Install two firewalls to create DMZ; reposition external-facing servers in DMZ (by June 1, 2012)
A1	1	Intranet Home Page*	Plan and pilot an Intranet home page in SharePoint; make available agency-wide
A24	1	Grant Tracking Assessment	Examine existing solutions and practices for grant tracking; resolve issues and implement streamlined solutions.
A4	1	Land Use Toolkit, Phase 1*	Evaluate Metro land use planning toolkit for internal and jurisdiction purposes; conduct pilot as indicated
A6	1	Land Use Planning Portal, Phase 1	Evaluate existing Oregon portals and design Land Use Portal for planners as unique contribution; leverage Land Use Library resulting from D17 (RM 2.4.2-3)
A7	1	SharePoint Implementation Plan	Engage SharePoint consulting services to guide and prepare a plan for SharePoint implementation (RM 1.3)
A9	1	Extranet/Internet Planning*	Survey local planners to solicit ideas and needs for online and other resources that DLCD could provide (RM 3.1.1)
D11	1	Floodplain Framework*	Within the Hazards FIT context, review and revise existing standard if indicated; publish standardized statewide floodplain data set as Framework (see O11)
D13	1	Land Use data matrix	Collaboratively complete a land use planning data matrix matching data needs with use cases (RM 2.4.1)
D15	1	Shoreline Framework Assessment*	With the Coastal Marine Network, develop report and recommendations for Shoreline Framework
D17	1	Land Use Data Library	Assemble, consume, and serve land use planning data based on matrix resulting from D13 (RM 2.4.2); deploy in SharePoint
D2	1	Spatially enable PAPA*	Pilot approach and implement a geospatial component to the PAPA document collection and database, including stewardship (RM 2.1.4)
D3	1	PAPA database migration	Detailed planning and migration of the PAPA database from Paradox to SQL Server, including redesign (RM 2.1.2, D1 dependency)
D5	1	Zoning Framework, Phase 1	Gather local zoning datasets and publish as Web service in Administrative Boundaries FIT context; pilot integration approach. (RM 2.3.2-3)
O1	1	DBA capability	Develop and implement three-tier approach to database administration: Basic (data entry), Intermediate (QC, currency custom reports), Advanced (permissions, optimization, etc.)
O13	1	Harmonize applications and portals*	Collaboratively harmonize existing and orchestrate future development and enhancement accordingly
O14	1	Portfolio Management	Establish portfolio management approach and process that includes all IT and information resource projects

ID	Priority	Name	Description
O15	1	Document Management Plan	Develop a document management plan for implementing a document management system in SharePoint (RM 1.4); include prioritization of document collections for library treatment (O4 dependency; could be included in A7)
O17	1	Internet Stewardship	Establish permissions and develop guidelines and SOPs for maintaining the Internet Web site recently migrated to SharePoint
O4	1	Document Inventory*	Plan and conduct an inventory of agency document holdings in preparation for implementing a document management system in SharePoint (bypass if File Plan done by contractor)
O9	1	UGB Stewardship	Document stewardship processes (RM 2.3.1)
S2	1	Secure existing databases	Apply appropriate security measures to protect information assets with privacy or other restrictions.
S3	1	Security Audit	Perform self-assessment security audit or engage DAS/EISPD assistance.
T2	1	Review network drive content	As an interim measure preparatory to a document management system (DMS), mature current network drive organization to better support DMS and data-intensive applications; sort out overlaps and optimize placement of storage on existing network topology
T3	1	Complete ArcGIS 10 upgrade*	Upgrade all GIS users to ESRI ArcGIS 10 and then to version 10.1 after Service Pack 1 is released
T4	1	Establish Web Services capability*	Install & configure ArcGIS for Server to enable publication of Web services
T5	1	ArcGIS for SharePoint	Download and install ArcGIS for SharePoint; experiment with potential uses such as spatially enabling tabular data; deploy as assets become available within SharePoint
A10	2	e-Acknowledgment Room, Phase 1	Based on preliminary assessments, plan to complete the digital plan library and design application enhancements to existing Scholars' Bank capabilities (RM 3.1.2-3; 4.1)
A12	2	Evaluate M49ex, M49in and Hazards map apps	Evaluate business need alignment and maturity paths for three map apps in partnership with Oregon Explorer (RM 3.2.2)
A15	2	Land Use Planning Toolkit, Phase 2	(Assuming Phase 1 is successful) Adapt Metro's toolkit for state and local uses
A17	2	Land Use Planning Portal, Phase 2	Implement plan to basic level (enhancements occur in later phases) (RM 2.4.2-3, A6 dependency)
A2	2	Document Management System, Phase 1	Implement a DMS in SharePoint based on work from O15 and O4 (RM 1); populate with high priority library (A7 dependency)
A3	2	PAPA Online Submission, Phase 1	Plan and prototype online capability for jurisdictions to submit plan amendment documents (RM 2.2.1)
A5	2	Land Use Indicators Feasibility	Evaluate potential of adapting smart growth indicators using data from comp plans; assess effort and resources required
A8	2	PAPA Online Submission, Phase 2	Develop and deploy an online capability for jurisdictions to submit plan amendment documents and feed the PAPA database (RM 2.2.2-4, A3 dependency)
D14	2	Estuary Plan Map Database*	Complete integration and update of city and county estuary plan map data into a geodatabase.
D6	2	Comp Plan Framework	Within the Administrative Boundaries FIT context, gather local comp plan map data and publish as Web service; pilot integration approach. (RM 2.3.4)

ID	Priority	Name	Description
D7	2	Farm/Forest database migration	Detailed planning and migration of Farm/Forest database from FileMaker to SQL Server, including redesign (RM 2, D1 dependency)
O11	2	Floodplain Stewardship	In collaboration with the Hazards FIT, formalize stewardship arrangements with charter, plan and related documents (see D11)
O12	2	Policies, Standards & Guidelines	Initiate data and application-related policies, standards and guidelines, including data stewardship; align existing as appropriate
O16	2	Mature technology and information capability	Plan and implement organizational changes to the existing IT and information-centric capability, including one ISS 6 for DBA duties
O2	2	Update OARs	Update Rules to provide for electronic submission of PAPA documents
O3	2	SharePoint administration & user guidance	Develop SharePoint administration capability and user guidance to support Intranet and Document Management System
O6	2	Records System Training & Support	Develop guidance for and train personnel in Documents Management System (RM 1.5)
T1	2	Technology Architecture Assessment & Maturation	Review technology architecture and IRM plan; revise plan accordingly; implement as appropriate
A14	2-5	Canvas online DM support tools	At least annually, explore tools for models and adaptation potential (RM 3.2.3)
A18	2-5	Data and Application Assessment	Identify emerging data and application development needs, assess existing capabilities in relation to need, and adjust this plan accordingly
A11	3	Extranet/Internet Development	Augment Web resources supporting LCDC and jurisdictions (RM 3.1.4)
A13	3	M49 App enhancements	Modify and redeploy internal and external versions as Web Map Services; restore tax lot ID search capability to M49 Analyzer (RM 3.2.1)
A19	3	Land Use Planning Portal, Phase 3	Implement plan to intermediate level (RM 2.4.2-3, A17 dependency)
A21	3	Document Management System, Phase 2	Populate with at least one additional library
D16	3	Shoreline Framework	Develop and publish Shoreline Framework with stewardship plan
D8	3	Periodic Review database	Design, develop and maintain a periodic review database in SQL Server from Excel spreadsheets and past database efforts. (RM 2, D1 dependency)
O10	3	Zoning Stewardship	Establish formal stewardship charter and plan for life cycle management (RM 2.3.2)
O5	3	Data Sharing Agreement	In partnership with GEO, develop agreements for widest possible sharing of land use data (RM 2.4.4)
O7	3	Multi-agency GIS collaboration in SharePoint	Form partnership with ESRI, ODOT, et al., to leverage ArcGIS in SharePoint (RM 1.6)
A16	4	Smart Growth Indicators, Phase 2	(Assuming Phase 1 supports proceeding) Develop Smart Growth Indicators for state and local uses
A20	4	Land Use Planning Portal, Phase 4	Implement plan to advanced level (RM 2.4.2-3, A19 dependency)

ID	Priority	Name	Description
A22	4	Document Management System, Phase 3	Populate with at least one additional library
D10	4	Measure 49 Spatial	Spatially enable the M49 database (tabular open source) and establish procedures for maintaining GIS database
D12	4	Farm/Forest and M49 database linkage	Establish linkage between Farm/Forest database and M49 database.
D4	4	e-Acknowledgment Room Phase 2	Complete digital conversion and e-library of AR documents that is discoverable and accessible on DLCD Intranet (RM 4.1, A10 dependency)
O8	4	Document Management System Extension	Plan and implement method for external stakeholders to access and use electronic document management system (RM 1.7)
A23	5	Document Management System, Phase 4	Populate with at least one additional library; assess and plan for future library collections
D9	5	Measure 37 tables	Populate decision and development attributes of M37 database tables (now included within the M49 database)

Appendix E–Glossary

[add terms and acronyms to list and I'll add a definition if you don't have time]

Terms

Framework

[ITIL](#)

navigatOR

Oregon Explorer

Open Source Software: The official Open Source Initiative definition is too lengthy to include here. Find it at <http://opensource.org/docs/osd>. Essentially, this is a development methodology. It is “free” in the sense of free speech (as opposed to free pizza).

Web Services: the term *Web Services* refers to the technologies that allow for making connections. *Services* are what you connect together using Web Services. A service is the endpoint of a connection. Also, a service has some type of underlying computer system that supports the connection offered. The combination of services--internal and external to an organization--make up a *service-oriented architecture*. Berry, Douglas K., http://www.service-architecture.com/web-services/articles/web_services_definition.html.

Acronyms

GEO

INR

ESRI

FGDC

OCSO, OCMP, ASD, CSD, PSD

Service-Oriented Architecture (SOA): A service-oriented architecture (SOA) is the underlying structure supporting communications between services. SOA defines how two computing entities, such as programs, interact in such a way as to enable one entity to perform a unit of work on behalf of another entity. Service interactions are defined using a description language. Each interaction is self-contained and loosely coupled, so that each interaction is independent of any other interaction.

<http://searchsoa.techtarget.com/definition/service-oriented-architecture>

Storage Area Network (SAN): According to PC Magazine Encyclopedia: [SAN is] a network of storage disks. In large enterprises, a SAN connects multiple servers to a centralized pool of disk storage.

Compared to managing hundreds of servers, each with their own disks, SANs improve system administration. By treating all the company's storage as a single resource, disk maintenance and routine backups are easier to schedule and control. In some SANs, the disks themselves can copy data to other disks for backup without any processing overhead at the host computers.