**Information Technology (IT) Report
April and May 2015**

Prepared for the June 23, 2015 Commission meeting
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This report represents accomplishments of IT staff: Stacy Bruhn - GIS Web Developer,
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Goal One—Content

1. MSL acquires and manages relevant quality content that meets the needs of Montana
Library users.

IT Staff plan, implement, and support the file server and database environment where MSL
digital content resides.

1.1. File Server Updates

Library programs continue to need increasing amounts of file storage space for their growing
collections. Last year we added just over 10TB to the MSL Storage Area Network (SAN)
environment. In the coming weeks we will be expanding the SAN to add an additional 20TB of
storage capacity. This will maximize the existing capacity of our SAN. While we should have
sufficient storage space to handle existing program storage needs and anticipated requests for
a few years, the library will need to develop a plan for addressing future storage needs. A
holistic review of the MSL storage environment needs to be undertaken which will consider
both the types of data storage available (existing data storage as well as options such as those
available from the State Information Technology Services Division (SITSD) or cloud based
offerings) as well as the existing demands on MSL data storage resources including space
needed for the storage of raw data, production and publication datasets, records
management, archiving, and backup and disaster recovery.
(Originally reported April 2015) Our plan is to extend the warranty of our existing SANs to
October 2016 and evaluate our options for file storage over the coming year. While we won't
be adding capacity to the existing SAN environment, we are exploring alternatives for making
Imagery data available. If we were able to move the statewide imagery datasets off the SAN
that would free up 10TB for other uses.

(Update: June 2015) We have extended the warranty of our existing SANs to October 2016 and evaluate our options for file storage over the coming year. I have requested a meeting with SITSD to better understand their storage pricing model because an analysis of their existing rates indicates data storage on SITSD servers at the State of Montana Data Center (SMDC) cost five times more than in house hosting. Cloud storage could offer a more cost effective alternative. We have an Imagery working group meeting scheduled for mid-June to understand the ongoing value of the statewide imagery datasets we currently host on our SAN (10TB). We are also in the process of evaluating a cloud based Managed Web Map Service environment offered by ESRI to determine if this is a possible alternative to local hosting of web map services as well as a feasible alternative storage option for imagery data storage.

1.2. Database environment overhaul

We plan to complete the overhaul of the MSL database environment this year. During the 2014 Fiscal Year (FY14) we began the redesign of the database architecture, coupled with a move to virtual servers and an upgrade to current database server software. The goal of this project is to provide the library with a more robust platform designed to support all of the agency's database server needs in a manner that is much more efficient to manage.

In the last year we were able to stand up a virtual database environment that consists of a development, production, and publication servers. During FY15 we will migrate remaining databases off of our older, physical server based architecture and into this new virtual environment. This will allow us to retire or repurpose several physical servers. This project was more complex than originally anticipated due to the number of databases we host for internal and external partners including the Montana Natural Heritage Program, Fish Wildlife and Parks, the Department of Natural Resources and Conservation, and the Department of Environmental Quality. We have been working with these stakeholders to minimize the impact of these changes and we are confident that this project can be completed by the end of the calendar year.

(Originally reported April 2015) Some of our legacy database servers are currently running on Windows Server 2003. This operating system will no longer be supported by Microsoft after July 14, 2015. While we will have many of our datasets migrated to the new environment by that time, it is unlikely we will be prepared to take the legacy databases off line. We will do that if possible, but we are putting together an exemption request, which must be approved by the State Information Technology Services Division, that will allow us to keep these servers on line until the end of 2015 as a contingency plan.

(Update: June 2015) Our Database Administrator has been aggressively working to clean databases off of legacy systems. We are in a good position to have at least two of our legacy database servers cleaned off prior to June 30. The other server is more challenging due to the number of datasets and the number of applications depending on those datasets, but we still hope to be able to clean it off by the end of the fiscal year as well. We will submit an

exemption request to SITSD to allow the final server to remain up as a contingency in case it is still needed after June 30.

Goal Two—Access

2. MSL provides libraries, agencies, and its partners and patrons with convenient, high quality, and cost-effective access to library content and services.

With more and more library content being made available digitally, the primary point of access for this information is becoming the library web site and web based applications made available through the website.

2.1. MSL Web Updates

With the MSL program pages migrated to the DNN Content Management System (CMS) the next step in the update to the MSL web site is to review and update the overall design of msl.mt.gov and the top level program pages. While much of this work will be implemented through the MSL Web Manager and other IT staff, it is really a larger, library-wide project that will be addressed in more detail in the MSL work plan.
(Originally reported April 2015) A small contract is being pursued with a local marketing firm to provide design recommendations for the MSL home page and program home pages as well as navigation recommendations that we could apply site-wide.

(Update: June 2015) The contract has been signed with an expected completion before the end of June.

2.2. Application Updates

In addition to program web content, MSL supports a number of web based applications to assist with data discovery and data access. The GIS Web Developer continues to update library web applications that reside on outdated technology. The goal for this year is to convert the remaining large applications (the Digital Atlas, TopoFinder, and the Library Directory) developed in classic ASP to ASP.Net.

The Montana Digital Atlas update is currently in the scoping process (under the lead of the Geographic Information program), with the target for a replacement set at the end of the calendar year. The TopoFinder may be addressed within the new Digital Atlas, but if not, it will be updated shortly after the new Digital Atlas goes into production.

The planning phase for third major application needing an update, the Library Directory, will begin this fall. Updating the Library Directory will demand a high level of collaboration between IT and the Statewide Library Resources (SLR) program, with SLR taking the lead and the GIS Web Developer doing the majority of the programming work.

There are also a number of smaller applications, web sites, and other utilities written in classic ASP. We will continue to migrate these remaining pages and applications from classic ASP to ASP.Net (or another appropriate, current development platform) during this fiscal year. **(Originally reported April 2015)** The Digital Atlas project kickoff meeting was originally scheduled to occur March 24 but we decided to push it back to April 20 because many team members will be out of the office over the next three weeks. Because the Agile project management approach being used for this project is based on a model of planning sessions followed up very quickly by a highly productive development process we felt it would be counterproductive to initiate the project at a time when team members would not be available to complete the tasks identified in the planning meeting. Though we would have liked to get this project started sooner, after talking through the decision to move the kickoff meeting back we feel confident that this was the right decision.

(Update: June 2015) The Digital Atlas project started in late April. Two Agile work sessions, or "Sprints" have already been completed and the basic programming structure is beginning to take place. We are working towards a general target of mid fall for getting a new Digital Atlas into production and we hope to tighten up that date as the initial programming progresses.

After an evaluation of the existing Digital Atlas the GeoInfo and IT groups decided it was not necessary to keep this tool up until the new application was complete and we have notified users that the existing Digital Atlas will be taken off line at the end of May. While we still have some dedicated users of this application, the data provided has not been actively managed in more than a year (as users are made aware of through a splash screen). The resources being expended to keep an outdated application running on unsupported hardware and software to provide users with out of date data is increasingly difficult to justify. GeoInfo will re-focus staff time towards assisting current Digital Atlas users with alternative solutions to meet their needs.

The Topofinder is also under evaluation to determine if it can also be decommissioned before the end of FY15.

Finally, our developer is also working with SLR and Central Services to determine if a number of reports currently created using complex databases and served out as PDF files and web sites can be migrated to DNN for easier management.

2.3. ArcGIS Server service migration

Also supporting the MSL data access efforts is the MSL ArcGIS Server environment. ArcGIS server is a software tool for creating web mapping services. Many different types of web mapping service can be created with ArcGIS Server. The most common are basic map services that are used to support MSL web applications. In FY14, the GIS Server Manager set up an ArcGIS Server 10.2.2 environment. In the coming year he will migrate remaining web

services to the 10.2.2 environment. This will allow us to repurpose one physical server that supports older ArcGIS Server services and shutdown three virtual servers currently used to support ArcIMS (web map server technology that preceded ArcGIS Server) services.

(Update: June 2015) We continue to make progress in cleaning web map services off of the legacy ArcGIS Server. Almost all of the remaining services are already targeted to either be decommissioned, moved to the 10.2.2 environment, or moved to SITSD ArcGIS Servers.

We believe the majority of the remaining use of the ArcIMS environment is focused on just two services. By making the 2005 NAIP Imagery available through our existing Imagery Service at SITSD we can offer the majority of our users a more current and robust alternative to ArcIMS. The remaining service is a special service operated by MTNHP for MDT. We will work with the heritage program to determine the future of this service once the imagery service is decommissioned.

2.4. IT Security Planning

With much of our data intended for public access, from a security perspective our primary concern is not limiting user access to our resources. Even so, it is important to properly secure our IT systems to ensure data that needs to be secured is, and to remain in compliance with SITSD standards so that we can continue to leverage the resources of the state network to provide patrons with the best available access to our collections.

In the last year SITSD has released an exhaustive set of Baseline Security Controls for state agencies to follow to ensure the security of the state network. MSL IT staff will review this document to identify which, if any controls we are not in compliance with. Once this review is complete, we will make recommendations to library management for correcting or improving the security of our IT environment.

In addition to recommendations that come out of the review of baseline security controls, we have already identified a number of specific security related tasks for the coming year. With updates to program file server environment we will continue to clean up the security groups that we use to control access to data on the file servers. We are also researching systems for managing administrative accounts in an organizational setting and plan to develop and implement a new administrative login policy in the coming months. Finally, we are in the process of restructuring our web application environment and we will soon begin implementing the use of the SITSD supported WebDefend tool to help us better secure our public facing resources.

(Originally reported April 2015) More advanced filtering options have been applied to our WebDefend implementation to provide more security for our locally hosted applications.

(Update: June 2015) We had an initial meeting with the state's new Enterprise Security Manager and his team in early May. We let this group know that one of our goals is to get an

Agency Security and Continuity Strategy in place in the coming year and that any resources they can make available to assist with this goal would be welcome. We don't currently have a follow-up meeting scheduled but we hope to meet with them at least once before the end of FY15.

Goal Six—Sustainable Success

6. MSL is efficient and effective (measured against partner and patron outcomes) and is engaged in fulfilling its mission.

6.1. Systems and Hardware Updates

Data Center Virtualization

We have acquired the hardware needed to complete the process of virtualizing the MSL data center in the coming year. It has taken several years, but we are very close to completing this transition. Most of the remaining physical servers already have virtual server replacements up and running and we just need to migrate the remaining data or services to the new servers. This is the case for Blade08, Blade09, AGS01, and AGS02 (database and ArcGIS Server machines). We also just purchased a host server to house the virtual server that will replace the physical server currently running the Keystone Automated Library System (KLAS) for the Montana Talking Book Library (TBL).

(Originally reported April 2015) KLAS has been successfully moved to production on the new Virtual Server. With the end of the fiscal year approaching we are exploring replacing one of our pools of virtual server hosts with a new server that would be part of our primary host pool. In addition to consolidating our physical servers (moving from three hosts to one), by bringing this into our primary host pool it adds greater administrative flexibility to our virtual server environment.

(Update: June 2015) We have received conditional approval from SITSD to purchase an additional host server for our virtual server environment as long as we move that server to SITSD during FY16. We just received this notice and are exploring whether this is a realistic and reasonable approach to the management of our server resources.

Windows Server 2003 - The completion of the virtualization process will also be an opportunity to retire some of our servers still running Windows Server 2003 and replace them with servers running a more current operating system. In all we have eight servers still running Windows Server 2003. Three of these will be updated through virtualization, two will be decommissioned after the applications they host are updated, two more can be decommission in the near future as the tools they host will no longer be needed. There are no plans in place for upgrading the final Windows Server 2003 machine yet.

IT Back-up and Disaster Recovery - With the completion of the virtualization process, updates to our file server environment and our web applications nearing completion, this is a good time to evaluate our IT Back-up and Disaster Recovery systems. Our current backup and disaster recovery model is more of an ad-hoc approach that has been developed over time to address needs as they arose. A model that looks at overall agency needs and the resources available should provide more consistent and efficient support for the library. This project should be part of the larger review of the MSL storage environment.

Planning a move to the State Data Center - Another opportunity that we are in a position to pursue now that our servers environment have been virtualized is the migration of some (or all) of our servers to the State of Montana Data Center (SMDC) or other third party server hosting environment. We are currently at capacity in the MSL Data Center (MSLDC) for both network connections and backup power. Moving some of our servers to an alternative data center would free up both power supplies and network ports. Moving our public web resources - primarily MSL web sites, application servers, and FTP servers – out of the MSLDC will also reduce the amount of external traffic on the library network, freeing up those resources for internal needs. Finally, the SMDC has a level of monitoring and support that we are unable to provide at the MSLDC (it is unclear what other third party hosting options would be able to provide related to this). While this is important for all of our IT resources, it is especially important for the web resources that we want to make available to patrons on a 24x7 basis.

(Originally reported April 2015) MSL had requested funding in our IT budget to purchase rack space and network access for a subset of our virtual host servers to be moved to the SMDC.   Unfortunately this funding was cut from our IT budget by the house subcommittee that reviewed the MSL budget. We are waiting to see how the final budget turns out, but if there is no change we will look for opportunities to test alternatives to local hosting that we might be able to implement using existing funding.

(Update: June 2015) We are waiting for updated rate sheets from SITSD. We have heard that rates have been adjusted to allow us to fund our full IT request with the reduced budget made available by the legislature. If this is the case we should still have the option of moving some of our hardware to the SMDC.

Microsoft Licensing

MSL recently entered into a school agreement that entitles us to academic pricing and other benefits when purchasing Microsoft software. This agreement covers the operating systems and office software for staff workstations. We will be reviewing the licensing of server software to determine if there are opportunities to expand this agreement and gain more benefits on the server side.

(Update: June 2015) No significant changes to our Microsoft license are planned for the coming year. We will be going through our first true-up in the coming month and beginning our second year of the school agreement in July. This agreement provided MSL with the same

software and licensing previously purchased through SITSD enterprise license but for $12,500 less that we previously paid ($7,500 per year vs. $20,000 per year)

6.2. MSL Web Updates

Staff and Program Development

IT Asset Management

With input from IT and other library staff, the GIS Web Developer has begun working on and IT Asset Management System. This vision for this is a web based tool available to all MSL staff through the library intranet site which will serve as an inventory and tracking tool for hardware, software, applications, web services, and possibly raw data as well as published data products. A map inventory tool has already been implemented for Geographic Information staff, and the next step in this process is to integrate data about desktop and server machines as well as database and application servers from a variety of existing databases currently being used by IT staff. This tool may continue to evolve for many years, but we hope to have the core functionality in place by the end of this year.
(Originally reported April 2015) The data model for our asset management system is becoming more stable and we have begun migrating data from existing, disparate (IT) administrative databases into a single system. Initial data being targeted includes IT user information (Internal staff as well as "headless" user accounts created for IT admin tasks) and server hardware. The IT group is reviewing and prioritizing all of the fields identified for inclusion in the system to determine which to population next.

(Update: June 2015) Our web developer and database administrator have been working to get the core of the IT Asset Management System up and running.

IT Policies

In an effort to improve communication between IT staff and library programs we will be reviewing and documenting several agency IT policies in the coming year.

On-Call - One of these will be the agency on-call policy which was developed to ensure that MSL IT systems were monitored over the weekends. While the existing policy has been effective for several years, it was developed prior to the creation of the MSL IT program. With the reorganization that has occurred in the library over the last couple of years and updates to our IT systems it is important that the on-call policy be reviewed and updated so that it continues to meet the library's needs.

IT Change Management - Another policy that needs to be developed is an IT change management policy. While IT staff have always done their best to ensure program staff are notified of planned changes to IT systems, this approach has never been documented and

formalized. With library staff growing more dependent on IT systems, and with the increased interdependencies among those systems, we need to have more formal guidelines in place for proposing, evaluating, communicating, and otherwise managing the change process for IT systems.

(Update: June 2015) While some initial thought has been given to both of these policies, neither has been addressed in a structured manner in the current fiscal year. Both should be addressed as soon as possible in the next fiscal year.