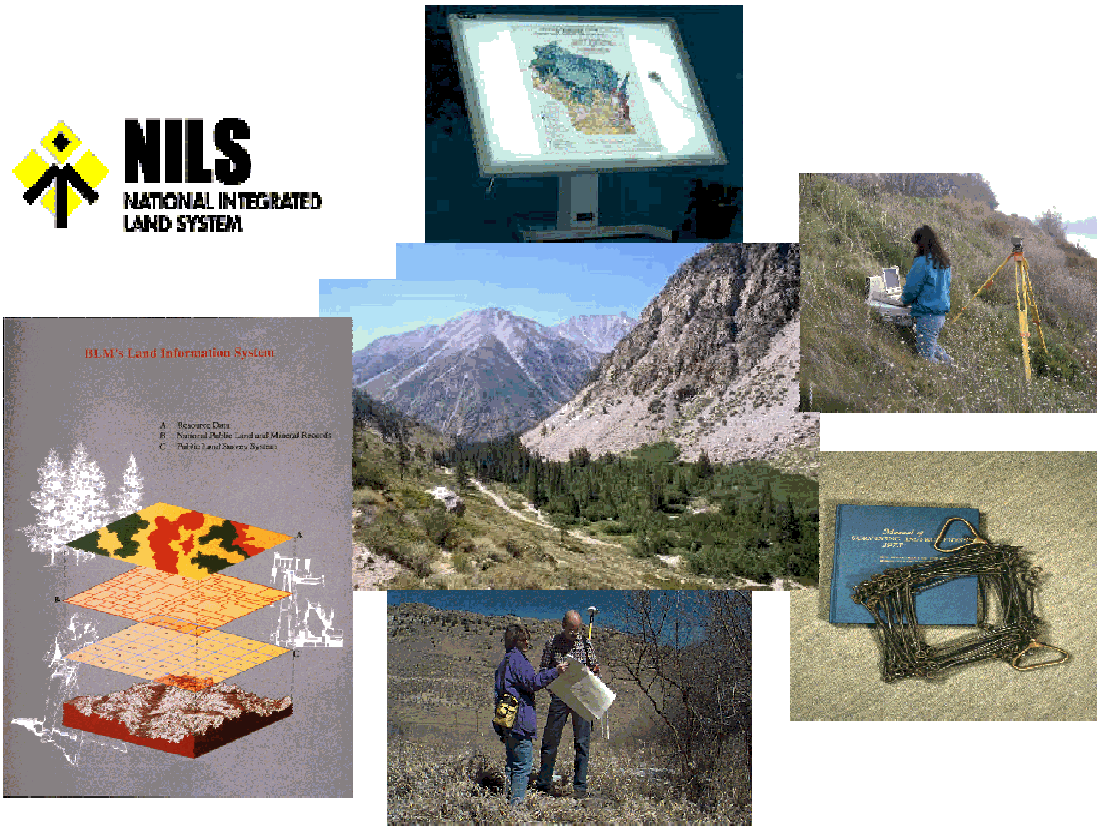
The NILS Project
Alternatives for the National Integrated Land System



1. Overview

1.1 National Integrated Land System (NILS) Scope

The National Integrated Land System (NILS) is a joint project between the BLM and the USDA Forest Service (USFS). NILS will provide a business solution to land managers who face an increasingly complex environment of complicated transactions, legal challenges, and deteriorating and difficult-to-access records.

The BLM and USFS are working in partnership with states, counties, and private industry to develop a common data model and software tools for the collection, management, and sharing of survey data, cadastral data, and land records information. Using geographic information system (GIS) technology, NILS will greatly facilitate cooperative land management and better decision making among all land managers.

The vision for NILS is to provide a solution that unifies the worlds of surveying and GIS while maintaining land information spatially versus alphanumerically. Implementing this vision will require a common data model, in-field computing tools, a measurement management engine to analyze survey data, and parcel creation and maintenance tools. This integration of surveying and GIS will provide land managers with a complete field-to-fabric technology solution.

To be successful, NILS must meet a diverse set of requirements. It must work in PLSS as well as metes and bounds states. It must work in both urban and rural environments. It must support survey control, yet allow databases to be created based on map control when more precise survey data are not available. It needs to support digitized data, scanned data, GPS data, legal descriptions, orthophotography, documents, and others. Users must be able to customize NILS to accommodate their established workflow and business practices.

Commercial off-the-shelf (COTS) GIS technology will form the foundation of NILS. Based on industry standards, including the Common Object Model (COM) and object-oriented (OO) technology, the software will provide a modern development platform for NILS. Object-oriented software engineering techniques will be used to extend the COTS to meet the specific needs of NILS users.

The NILS project has four major components:

Survey Management: An integrated set of automation objects that will be embedded into compatible survey data collection software packages. This will support the capture of measurement features and metadata directly into a GIS database format. The goal is to minimize the need for data conversion and re-construction as measured features are incorporated into the land records management system.

Measurement Management: Will allow users to produce a new feature coordinate solution by performing a weighted planimetric-geodetic adjustment according to the qualitative

characteristics for individual feature elements in the working set. This will enable users to create a higher-quality control network database for both PLSS and metes and bounds land environments.

Parcel management: Will provide process for managing land records and cadastral feature data stored in the database model. It will provide custom feature classes, tools, and procedures for editing land records in a transactional, history-tracking environment. Support will be provided to allow users to construct and edit legal description fabrics and to create required parcel fabrics from them. Parcel fabrics may include ownership, land use rights, tax assessment, and others.

GeoCommunicator: A proactive Internet subscription (no fee) web site for sharing information about data and activities of interest to land managers. Map navigation and content filters will allow users to discover information that meets their needs – such as available parcel data, planned surveys, and potential cost-sharing partners. The goal of the GeoCommunicator is to facilitate data sharing and collaborative efforts among land managers.

NILS will be designed, developed, and released using an incremental implementation lifecycle methodology. Functionality will be prioritized and delivered to users in successive stages, rather than waiting until the entire system is developed.

2. Implementation Alternatives

2.1 Alternative 1 - Each System with "Stand-Alone Spatial"

- Existing alphanumeric BLM systems stay the same
- Spatial access is incorporated into any BLM system
- No integration at any level

This alternative involves leaving existing BLM systems status quo and incorporating a GIS interface to any system. The land data stays the same in each system.

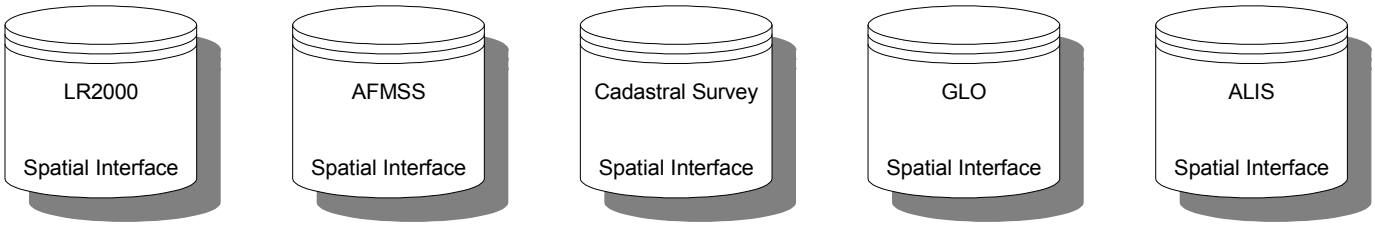


Figure 1. Alternative 1 - Each System with "Stand-Alone Spatial"

Pros:

- BLM systems unchanged; applications, data remain as they are now
- Limited user retraining required for spatial

Cons:

- No integration
- Current land problems stay in data, no data clean up
- Multiple GIS Interfaces
- Maintenance of separate land systems

2.2 Alternative 2 - NILS Integrated Land, One GIS

- Existing BLM Systems' land data converts to NILS
- Seamless spatial access to NILS from BLM Systems

This alternative involves ***converting*** the land data from BLM's automated systems to NILS as a single effort. This alternative will result in seamless spatial access to land data in NILS from the BLM automated systems. The BLM automated systems will require alteration to access land information from NILS. Non-land data remains in the original BLM Systems.

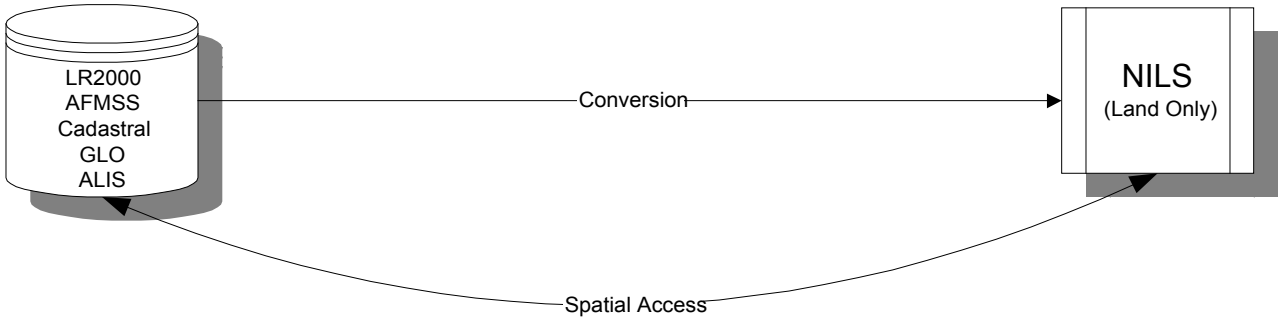


Figure 2. Alternative 2 - NILS Integrated Land, One GIS

Pros:

- BLM systems gain spatial access to land data
- Conversion of land data to NILS
- Utilizes national standard (FGDC)
- BLM land data cleaned up
- Single source for maintaining land data

Cons:

- Maintenance of separate systems for land and non-land data
- Changes required to existing BLM systems
- Some user re-training required

2.3 Alternative 3 - Phased Approach to NILS Integrated Land, One GIS

Phase 1. Land data converted to BLM Common Land Model

- Alphanumeric access to integrated land data in the BLM Common Land Model

Phase 2. Land converted from BLM Common Land Model to NILS

- Spatial access to land data in NILS from BLM
- BLM Common Land Model is phased out

This phased approach ***will integrate the land data*** that exists in the BLM systems into a BLM Common Land Model. The BLM Common Land Model will be used to derive an integrated land data structure for existing BLM systems. This approach will address known inconsistencies and anomalies that have been identified and documented in the existing BLM systems. The interim step provides an opportunity for the BLM to resolve some of the currently recurring structure-related problems. Most of the current systems are either legacy systems utilizing older technology or re-hosted from legacy systems. The integrated BLM Common Land Model will facilitate the clean up of land data in preparation for migration to NILS when it becomes available.

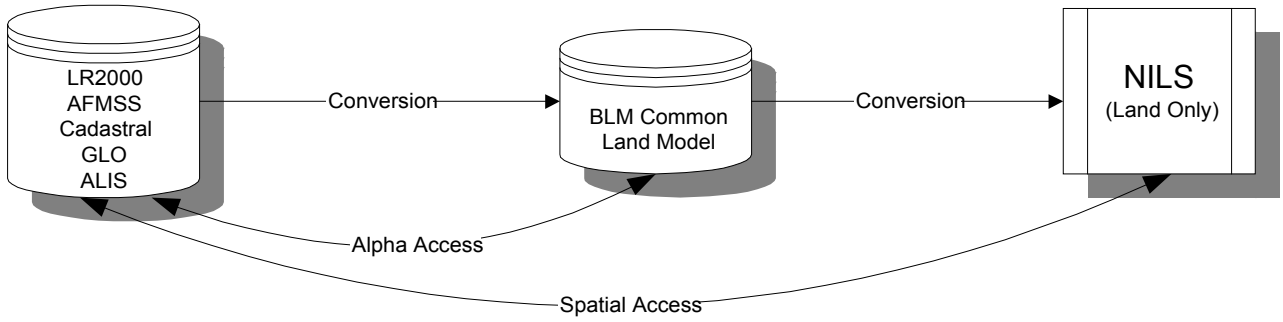


Figure 3. Alternative 3 - Phased Approach to NILS Integrated Land, One GIS

Pros:

- Spatial access to land data
- Utilizes national standard (FGDC)
- BLM land data cleaned up
- Delivers interim business benefit until NILS is available

Cons:

- Changes required to BLM Systems to use Common Land Model
- Changes required to BLM Systems to use NILS
- Two conversions required
- Some user re-training required
- Maintenance of separate systems

3. Assumptions

This analysis is based on the following assumptions:

- Hourly rates for FY2000 are based on the Office of Personnel Management, FY2000 General Pay schedule, overhead factors are based upon Circular A76, Supplemental Handbook Part II, total fringe benefits factor for permanent employees is 32.45%, indirect benefits = (Salary x 32.45%) x 12%
- Hourly rates for FY2001 - FY2005 were increased by 3% a year to compensate for Cost of Living raises
- NILS will use the BLM standard GIS suite of software produced by ESRI, including the new release of ArcInfo 8.x, which features the Object Oriented technology
- NILS will use the BLM standard EMAIL package, Lotus Notes and its components, produced by IBM to accomplish some of its functionality
- GCDB data prep cost is based on current FY2000 budget cost for this process
- NILS will utilize existing NT workstations deployed for LR2000
- NT Maintenance and operations costs are $8000/machine/year
- Arc/Info cost was determined using this formula: yearly maintenance ($284,865.24)/Total Number of seats (2448) = $116.37 per Arc View seat.
- NILS will use existing BLM systems such as LR2000 to obtain tabular data returned from spatial queries.
- Costs associated with data conversion will be funded separately and are reflected in the Data Integration Analysis (DIA) Costs row of the Alternatives Cost Table
- NILS will use contract support to develop/customize COTS software
- NILS will use BLM personnel to test system components
- NILS will provide data via the Internet
- NILS will serve map data over the Internet using ESRI's ArcIMS and ArcSDE
- Alternative comparison is of the System life costs for all 3 alternatives expanded 8 years to match the summary ROI spreadsheet
- The System Life Costs used for the alternatives comparison consists of data from the Shared Costs and Costs worksheets of the NILS ROI.
- An identical time period to the NILS start through deployment was used for ease in comparison
- Alternative 1, shared costs, for everything but new servers, were multiplied by 5 to compare costs of adding stand-alone spatial to LR2000, AFMSS, Cadastral Survey, GLO and the ALIS systems.
- Alternative 1, hardware costs for 16 New application and 15 new data servers was used based on AFMSS being distributed (12 servers) + 1 for each central system, except the LR2000 which we estimate, has capacity on its existing data server).
- Alternative 1, COTS software for 16 New application and 15 new data servers was used based on AFMSS being distributed (12 servers) + 1 license for each central system, except for the LR2000 system, which we estimate, has capacity). LR2000 would use its existing COTs licenses.

4. Summary

The availability of spatial technology to the BLM and its benefits has been eagerly anticipated. The ability to select an area of interest and visualize the land and related features will greatly assist BLM's business users and the public.

The various alternatives presented provide alternative methods for supporting the NILS vision of a common data model and toolset to facilitate the collection, management and sharing of survey and land info across all levels of government and private industry. The alternatives range from:

incorporating a "stand alone spatial" interface for each BLM system to
converting BLM land information to NILS resulting in a seamless spatial view of land data

The transition to using NILS for spatial capability can be approached in a variety of ways. The alternatives are not mutually exclusive; as NILS matures the level of transition, migration and integration between NILS and the individual BLM systems can expand. Management has the option to initially apply a "stand-alone spatial" interface to each system (Alternative 1), then decide later to use NILS actively and interface directly to it (Alternative 2). Another alternative approach presented is to integrate the land data into a BLM Common Land Model as an interim deliverable while NILS is being developed. This alternative can be used to derive structures for existing systems that resolve some of the currently recurring structure-related problems. Most of the current systems are either legacy systems utilizing older technology or re-hosted from legacy systems. These new structures can assist BLM users in the clean up of land data now, which will greatly facilitate the migration to NILS when it becomes available (Alternative 3).

All of the alternatives presented will support the NILS objective for establishing a common foundation to collect, manage and access land information to meet the common business needs for land title and land resource management by government organizations, the private sector and the public.