National Integrated Land System
Project Planning Document

NILS Staff
Department of the Interior
Bureau of Land Management
Denver Federal Center
Building 50, WO-510
P.O. Box 25047
Denver, CO 80225-0047

January 5, 2001

Table Of Contents

1.0 Project Overview

1.1 Project Description

Name of Project	National Integrated Land System
Sponsor (Name, Title, Program/office)	Jack Arthur, Director, IRM and Jack Craven, Director, Lands, for the Forest Service. Hord Tipton, Assistant Director, IRM and Pete Culp, Assistant Director, Minerals, Realty & Resource Protection, for the Bureau of Land Management.
Direct Beneficiaries	Cadastral Surveyors and Land Management Specialists
Products	A common land data model and a set of land management, GIS-based tools.
Justification	The mission of the Bureau of Land Management (BLM) is "to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations." The BLM maintains land and mineral records for the Nation's public and Indian lands, including over one billion documents such as land surveys, surveyor notes, tract books, Master Title Plats (MTP), Historical Indices land patents, mining claims, oil and gas leases, and land and mineral case files. Many of these paper documents are deteriorating and some are becoming illegible. Most of the original records and plats are manually maintained and stored in a number of locations throughout the western United States and several locations in the East. Some of the information contained in these documents has been entered into various databases beginning in the 1970s. When the energy boom began in the early 1980s, BLM found it could not handle the paper workload demand and recognized the need to become more efficient and cost effective by automating many of its public land tenure records. Looking to the future, the examples of non-automated, non-standardized record keeping cited above, are indicative of what is to be expected as requirements increase in number and complexity. The workload, inefficiency and low customer satisfaction associated with manual land management record keeping will be the foremost obstacles to the BLM's mission accomplishment. Cadastral data, land management business processes and land record maintenance must be automated . The NILS project is an initiative to create standardized data models for the storage and maintenance of land records, to automate land business processes in a field-to-fabric implementation and to provide common tools for land management specialists. NILS will provide a business process method to collect, maintain, and store parcel-based information that meets the needs of the BLM and the widest possible spectrum of land title and resource information providers and customers. Common, standardized models and processes will eliminate the uncertainties, redundancies and inefficiencies associated with the many existing systems.

Return on Investment (ROI) ratio.	2.4

The National Integrated Land System is a service-first initiative of the Bureau of Land Management (BLM) and the U.S. Forest Service (FS). The Project Charter was signed in March 1999 by the four Project Sponsors, Jack Arthur, Director, IRM and Jack Craven, Director, Lands, for the Forest Service and Gayle Gordon, Assistant Director, IRM and Pete Culp, Assistant Director, Minerals, Realty & Resource Protection, for the Bureau of Land Management.

The NILS Project would be directed and managed by the BLM and FS in partnership with a consortium of other federal, state and local governments, and other interested parties active in the fields of surveying and parcel management. The BLM, FS, and Consortium, in cooperation with Environmental Systems Research Institute (ESRI) would develop a common data model (based on Federal Geographic Data Committee (FGDC) standards) and a toolset for managing land records in a Geographic Information System (GIS) environment. The data model and toolset would fulfill BLM and FS core business requirements critical to meeting the common mission objectives of both agencies

Deployed as a national system, NILS would facilitate the collection, management and sharing of survey and title record information across all levels of government and the private sector while protecting and enhancing current investments in cadastral data.

1.2 Project Purpose

1.2.1 Project Objectives

- Develop a database model that unifies the worlds of surveying and GIS and would serve as the basis for a cadastral (land) database store.

- Develop a GIS-based set of software tools for land management specialists which would encompass all land management tasks from data capture to final parcel products.

- Develop an Internet-based, data sharing environment which would provide land management specialists with the capability of searching for data, providing data and communicating with other professionals.

1.2.2 Compliance with Laws

1.2.2.1 Clinger-Cohen Act.

- Land management business practices and requirements specific to the above-mentioned offices are currently, but not totally and concisely implemented in software. This eliminates

the use of Commercial, Over-the-Counter Software (COTS). NILS would cooperate with a prominent GIS software development contractor to take advantage of existing functionality and to develop additional functionality to create a state-of-the-art land management system.

- The NILS Project supports the BLM goal of developing a common solution for BLM, the Forest Service and their partners for the business processes involved with the management of cadastral land records.

1.2.2.2 Government Performance and Results Act (GPRA)

- The NILS efforts are aligned with the BLM Performance Plan:

- The implementation of NILS would improve land data accuracy thus reducing technical and legal risks and would develop a higher level of customer confidence.

- NILS conforms to the BLM mission statement by providing the best practices of managing the public lands.

- NILS has been initiated and would be tracked to completion using state of the art management practices.

- Results would be measurable - consistency of data, efficiency, paperwork reduction, customer satisfaction.

1.2.2.3 Paperwork Reduction Act (PRA)

- By digital automation of land management business practices from data capture to final product, paper records and maps would be minimized and/or eliminated.

- Automated sharing of land data would become digital vs. the now prominent duplication of information using copies. Data retrieval and analysis would be performed in a GIS environment.

- Communication of task plans, needs and specifications would be carried out via electronic methods.

1.2.2.4 Rehabliltation Act of 1973.

See section 3.8.

1.3 Summary of Project Management Information

1.2.3 Project Management

The Project Manager is Leslie Cone with the Bureau of Land Management, located in the Denver

Federal Center, Building 50, WO-510 80225-0047, Denver, CO. The Project Manager may be reached at [303-236-0815] or by e-mail at Leslie_Cone@blm.gov. This project is documented on the World Wide Web at www.blm.gov/nils.

An object-oriented analysis and design (OOAD) method was used to capture the essential business process requirements that would be supported by the NILS software application. Analysis, data modeling, build and review phases of NILS would also follow OOAD principles. Project management of NILS is based upon the concepts of Managed Evolutionary Development (MED) and would follow these concepts throughout the life of the project. Resources and scheduling would be tracked throughout the life of the project using a Work Breakdown Structure (WBS) and a Gantt chart. Other project management techniques applied to the project would include forms of Life Cycle management and Uniform Modeling Language (UML).

The NILS data architecture must comply with the Federal Geographic Data Committee's (FGDC) Cadastral Data Content Standard. It is expected that the NILS data architecture would extend the FGDC Cadastral Data Content Standard.

1.2.4 Project Schedule Overview

The Design and Requirements phase of the NILS project was completed in March 2000. In this phase, the business rules, business requirements and functionality was determined and documented. See the NILS Concept of Operations and User Requirements (COURS) document. The Analysis phase, currently in progress, will include, detailed refinement of the high-level user requirements form the COURS document and gap analyses with existing Commercial Over-The-Counter (COTS) software. NILS functionalities and software will be developed in modules (extensions) with the aid of Environmental Systems Research Institute (ESRI), contractor for the project. The modules are: Survey management (SM), Measurement Management (MM), Parcel Management (PM) and GeoCommunicator (GC)

A basic requirement of the NILS development is to ensure that the functional requirements for the extensions are compatible with ESRI's latest version of their COTS. The Analysis phase and the gap analyses will define the NILS requirements which would be contained in COTS and which requirements must be built as custom software. The extensions are being developed in parallel with ArcInfo's Modules: GeoCommunicator is scheduled for completion in FYQtr. 2 of 2001; SM and MM are scheduled for completion in FYQtr. 4, 2001; PM is scheduled for completion in Qtr. 1 of 2003.

The Transition and Deployment phase will include site installations, COTS installations, site testing, readiness review and deployment. This is scheduled for completion in Qtr 1 of 2003.

The Operations and Maintenance Phase will consist of BLM staff dedicated to the support of NILS and its extension.

A high level Gantt chart of the NILS schedule is in Section 6.1.2.1 of this document.

The NILS milestones are listed in the following table:

Phase	Milestones	Date
Initiation	Partnership Agreement	6/11/98
Design	Completion of Requirements Document	3/00
Analysis/Build/Review	Completion of Analysis (Data Modeling Document)	GC - 6/20/00 MM/SM – 1/31/01 PM - 2/1/02
	Completion of Development Plans	GC - 6/20/00 MM/SM – 6/1/01 PM - 2/1/02
	Measure Mgmt./Survey Mgmt. close-out.	11/2/01
	Parcel Management close-out.	3/28/03
	GeoCommunicator close-out	2/1/01
Transition/ Deployment	NILS roll-out	3/28/03
Operations/ Maintenance	Project Close-out	3/28/03

1.2.5 NILS (PO-504) Project Budget/Resources Overview

In addition to the Project Manager and an Asst. Project Manager, NILS WO-330D staffing needs are six Computer Specialists and one Administrative Assistant.

See external budget document.

1.3 Project Documentation Plan

Document Name	Date completed/Updated
Partnership Agreement	June 11, 1998
Project Charter	March 9, 1999

Vision Document	September 22, 1999
Project Plan	September 22, 1999
Managed Evolutionary Development	January 5, 2001
Project Gantt Chart	January 5, 2001
Work Breakdown Structure	January 5, 2001

2.0 System Boundaries

2.1 Scope of Project

The NILS Project incorporates tasks and concepts originally planned for separate, independent development in the Forest Service's ALP Project and in BLM's ALMRS Release 2 Project and in the Cadastral programs into an integrated, collaborative effort. The criteria for determining the areas of overlap are based on the common business requirements of both agencies and the Consortium in the areas of realty and records and are identified as priorities for development in the Project Plan and supporting narratives. NILS would be tightly focused on development of parcel level interagency spatial land applications to integrate ALP and ALMRS Release 2 capability and meet basic user needs. The Project Team would actively seek input and validation from external customers and partners; however, the focus would be on business functions defined by ALP and ALMRS. Concepts for inclusion into NILS are:

- Essential data stores and data relationships of a parcel level cadastral database
- Streamlined software processes directed by flexible agency business rules
- Intelligent user interfaces populated with appropriate input/output tools for users in both agencies

The other components of an integrated land information system, technology (i.e., the computers, operating systems, networks, and communications), must accommodate and facilitate the development components and must be developed in partnership with this Project. As a major customer of each agency, NILS would be a factor in agency decisions concerning each agency's IT investments. The project would define technology requirements, network performance, disk space, etc to implement tools and applications. NILS also would need to evaluate and test new technology to support its own development needs and would present proposed solutions to each agency's IT Staffs. The project incorporates development originally planned for ALP and ALMRS Release 2; this project integrates the development and overlaps both independent projects as well as maintenance requirements.

2.1.1 Targeted Business Processes

2.1.1.1 Survey Management

- Research project area history, access records, plats, monument rubbings, aerial photos, survey notes, etc. before going to the field.
- Setup project on data collector or in fieldbooks based on the type of survey being conducted.
- Set up survey instrument and data collector if applicable in field.
- Capture/modify field survey observations directly in the field
- Calculate point coordinate position and lines.

2.1.1.2 Measurement Management

- Survey reduction and calculation of survey geometry.
- Provide logical connection between parcel geometry and parcel attributes; data validation; determine more exact location of property boundarues.
- Find and correct errors; create aliquot parts.

2.1.1.3 Parcel Management

- Select and verify land required for action; data input.
- Create a new legal description for a parcel by combining relevant geometry and attributes; associate an existing description with a geometry.
- Change or create parcels; fit parcel geometry to the existing land base.
- Obtain ancillary control and use to adjust existing parcel data.
- Change parcel geometry and attributes as required.
- Apply appropriate lables and information to parcel drawing.

2.1.1.4 GeoCommunicator

- Manually find information, references and existing data for an assigned task.
- Review and study located information.

- ❖ Communicate with interested parties and co-workers concerning tasks and problems; request information from the same

- ❖ Share data with interested persons via various media and in various formats.

- ❖ Store and maintain business data on paper, in data bases and in various record keeping systems.

- ❖ Communicate with interested parties concerning data and tasks.

- ❖ Maintenance of communications by individual; group communications.

2.1.2 Function:
Provide a common, standardized cadastral data management system to be used and shared by all levels of government and private concerns.

2.1.3 Intended Customers/Users :
Federal, state, county, local government land and resource management departments; professionals with requirements for public land data.

2.1.4 Geography:
The NILS vision proposes a seamless, coast-to-coast fabric of parcel data. The extent and complexity will depend upon the level of non-BLM participation

2.1.5 Business Sites:
Federal, state, county, local government land and resource management offices.

2.1.6 Interfaces with other Systems/Processes:
GCDB, LR2000, ALP, LOS.

2.1.7 Other Existing or Similar Systems:
Gap analysis was performed on existing software. Automated Land Project (ALP), Cadastral Electronic Field Book (CEFB), Cadastral Measurement Management (CMM), Geographic Coordinate Data Base Measurement Management (GMM),

2.1.8 Other components where any potential ambiguity may introduce scope creep:

2.1.9 Risk Management

Overall risks to the Project have been identified. See the table in this sub-paragraph. These risks apply equally to NILS and all of its extensions. Risks are identified as part of each contractor/subcontractor's tasks. New risks (and the corresponding mitigation) are identified by them and the BLM as the project progresses through the phases defined in the Work Breakdown

Structure. Mitigation plans are developed as new risks arise.

Improvements to targeted business practices will depend largely on partner involvement. NILS recognizes the importance of creating a truly common land data base and widely useful tools. Risks will be mitigated through participation of technical field users and domain experts from around the country.

Inexperience with OOAD modeling methodology would be mitigated through a contracted training workshop for Consortium subject matter experts prior to the Requirements Analysis tasks

Overall Risks:

RISK	MITIGATION
1. Dedicated technology lead from BLM is required	BLM person assigned
2. Decentralized data conversion effort	QA analysis program; data content standard; GCDB; subsequent enforcement
3. Missing fundamental user requirements	OOAD process to guide design; user validation
4. Late, infrequent deliverables to illustrate progress	Project web site, iterative prototyping; communications plan
5. Lack of support and/or acceptance because of perceived insufficient input from multiple levels of users	Publicity and support drive, communication plan
6. Tools do not enforce data model standard and business rules effectively	Methods and behavior inherent in Arc 8 geo object data model, Iterative Prototyping
7. System not capable of aggregating and splitting land units properly	Design of Use Case functionality for 'Integrate Non-Survey Data', 'Parcel Construction', etc.
8. Newly legislated business requirements	Easily versioned software to accommodate new functonalities and business rules.
9. Changes in Freedom of Information Act (FOIA) requirements.	Same.
10. Changes in the nature of confidential BLM data and information.	Same.

2.2 Project Completion Criteria

Phase	Milestones	Date
Initiation	Partnership Agreement	6/11/98

Phase	Milestones	Date
Design	Completion of Requirements Document	3/00
Analysis/Build/Review	Completion of Analysis (Data Modeling Document)	GC - 6/20/00 MM/SM – 1/31/01 PM - 2/1/02
	Completion of Development Plans	GC - 6/20/00 MM/SM – 6/1/01 PM - 2/1/02
	Measure Mgmt./Survey Mgmt. close-out.	11/2/01
	Parcel Management close-out.	3/28/03
	GeoCommunicator close-out	2/1/01
Transition/ Deployment	NILS roll-out	3/28/03
Operations/ Maintenance	Project Close-out	3/28/03

2.3 System Boundary Changes

Changes since first version of MED document	Approved By	Date of Approval
ESRI introduced an Internet based data sharing COTS which contained most of the GeoCommunicator requirements. The remaining GeoCommunicator requirements were developed as link from GeographyNetwork.	Project Manager	7/00

3.0 Target Business Processes

3.1 Supporting Documents

Documents containing detailed material about the existing and re-engineered business processes:

Document Citation	Date	Information Content	On Web Site?
Geographic Measurement Management User's Manual and other documentation.	2/28/00	Geographic Coordinate Database and cadastral survey spatial information processes.	http://www.spatial.maine.edu/~kwurm/
BLM land management business process procedures.		Business rules and functional requirements for land management.	No
NILS Concept of Operations and User Requirements document.	3/00	Project requirements which would drive analysis/build /review phase.	http://www.blm.gov/nils
BLM IT Architecture vs. NILS Essential Elements Cross-walk.	3/14/00	Comparison of BLM IT Architecture and NILS proposal	No.
Draft Business Process to Strategic Plan Comparison	3/10/00	Comparison of NILS business processes with BLM business processes	No.
Manual of Surveying Instructions	1973	BLM surveying business rules	No
Detailed Feature/Function Specifications	9/00	Expanded Use Case Requirements	No
BLM Information Technology Architecture Technical Reference Model (TRM) Vol. 1, Management Overview	7/31/00	Direction for design, construction, purchase, deployment and management of Information Technology	http://web.wo.blm.gov/blma/
Content Standard for Geospatial Metadata, FGDC STD 001-1998	1998	Metadata standards.	http://www.fgdc.gov
FGDC Cadastral Data Content Standard for the National Spatial Data Infrastructure.	1999	Standard for cadastral data model.	http://www.fgdc.gov
Draft SM/MM Use Case Analysis	2/01	Refined and Expanded Use Cases	No.

3.2 Target Business Processes:

Business Areas:

- Survey Management (SM): Land-data collection, maintenance and management; the capture and processing of raw survey measurement data. The data collected from the field survey is used as the basis for parcel geometry.

- Measurement Management (MM): Adjustment of survey data; error detection; subdivision of parcels based on business rules. Creation of parcel geometry intermediate to the raw data input/processing (as done in FS) and the final data representation; includes user intervention and, possibly, GIS facilities, for data editing.

- Parcel Management (PM): The creation of parcels by combining parcel geometry and parcel attributes into a single entity which graphically represents the parcel on the earth and provides information about it; creation of information for land management operations, publication, and decision support.

- Data Sharing: Distribution of raw data and finished cadastral products to other offices; collecting required data for current issues. Currently this function is not based on standards and thus data is in many incompatible formats; it doesnot take advantage of web-based functionalities. Data sharing is also a means of providing coordination and communication among users (customers).

- Common Cadastral Data Model: A standard does not exist.

Target Business Processes for each Business Area:

Survey Management Business Area					
Description of Current Process	**Proposed Change**	**New Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Proposed Benefits**
Research project area history, access records, plats, monument rubbings, aerial photos, survey notes, etc. before going to the field.	Locate, view and evaluate all relevant digital database and non-digital records for the research scope. Sources may include hardcopy records, plats, monument rubbings, aerial photos, survey notes, etc.	Survey Research	Federal, state, county and local government land management specialists; private concerns	Most Critical	Automated, shared source of survey data A common land net and common display of land data will lead to quality decision making. GIS environment for locating/using data.
Setup project on data collector or in fieldbooks based on the type of survey being conducted.	Process to create a field survey setup file to manage the collection of readings, observations, and measurements.	Pre Field Survey Setup	(same)	(same)	Automated , shared, pre-defined source of data to preconfigure surveys. GIS environment for locating/using data.

Survey Management Business Area					
Description of Current Process	**Proposed Change**	**New Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Proposed Benefits**
Set up survey instrument	This is the in-field process to configure a data collection device and/or a computation device by selecting and applying a field survey setup file. (An example data collection device is a palmtop configured with NILS field survey software. An example computation device is a laptop configured with NILS field survey software. Data collection devices and/or computation devices are distinguished from a measuring device such as a total station.)	In Field Survey Setup	(same)	(same)	Automated setup and configuration of data collection device.
Capture/modify field survey observations directly in the field Construct a “true line” from a set of line measurements.	Actor performs field data collection by recording readings using a data collection device. Readings are computed with a computation device to derive observations and measurements.	Collect Field Data Observations	(same)	(same)	Shared collection and maintenance of land survey data reduces direct non-labor costs.

Survey Management Business Area					
Description of Current Process	**Proposed Change**	**New Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Proposed Benefits**
Calculate point coordinate position	Process to use coordinate geometry (COGO) tools to calculate coordinate positions. Includes planar and geodetic calculations. May be used to perform layout or to search for point locations. May be used in conjunction with building a measurement network, a legal description fabric, or a parcel fabric.	Perform COGO and Layout	(same)	(same)	Consistent topology is maintained with the use of standard adjustment tools; GIS environment for data calculations and evaluation..

All land management related processes are performed as daily, on-going tasks during the normal business cycle.

Measurement Management Business Area					
Description of Current Process	**Proposed Change**	**Nerw Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Proposed Benefits**
Survey reduction	Measured features are constructed from component elements in a measurement network by applying construction and computation methods. Measured features have topological associations to their component elements (i.e. Component features and/or survey points.) This use case may be used in conjunction with building a measurement network, a legal description fabric, or a parcel fabric.	MM01. Construct Measured Feature	Federal, state, county and local government land management specialists; private concerns	Most Critical	▪ Automated, consistent methods for creating survey geometry. ▪ Resolve cartographic and coordinate representation of non-survey features relative to surveyed features. ▪ Create GIS environment for manipulation of data. ▪ Integration of parcel attributes and features with parcel geometry

Measurement Management Business Area					
Description of Current Process	**Proposed Change**	**Nerw Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Proposed Benefits**
Provide logical connection between parcel geometry and parcel attributes Data Validation Determine more exact location of property boundarues	Perform an iterative parametric least squares adjustment on a measurement network to analyze and adjust coordinate values for points. Generate statistics on measurement and coordinate reliability. May be used in resolving the cartographic and/or coordinate representation (relationship) of non-survey features (map control, legal descriptions, digitized, scanned/vectorized) relative to surveyed features. May be used to resolve the representation of non-surveyed features without reference to surveyed features. NOTE: A measurement network may be composed of legal descriptions as well as measurements.	MM02. Edit Measurement Data	(same)	(same)	Error detection and correction. Provides for adjustment and correction of survey boundaries in automated, gis environment.

Measurement Management Business Area					
Description of Current Process	**Proposed Change**	**Nerw Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Proposed Benefits**
Find and correct errors Create aliquot parts	Manual entry/edit of measurement data values. Includes types of anomaly detection and anomaly correction as part of edit validation.	MM03. Adjust and Anayyze Measurement Network	(same)	(same)	Eliminates survey errors. Error detection and correction software allows for user intervention when validating survey data. Automated, gis environment Polygon creation and subdivision. Survey adjustment

All land management related processes are performed as daily, on-going tasks during the normal business cycle.

Parcel Management Business Area					
Description of Current Process	**Proposed Change**	**New Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Expected Benefits**
Verify land required for action. Data input	To identify and verify parcels affected by an initiating event and to determine the appropriate maintenance actions needed to process the parcel(s) or event.	PM01. Verify Parcel	Federal, state, county and local government land management specialists; private concerns	(same)	▪ Automation and readily available data. ▪ Relate information to a specific parcel on the landscape.
Create a new legal description for a parcel by combining relevant geometry and attributes; associate an existing description with a geometry.	Process to create the basic legal description components—geometry and attributes (text, ID, source ID, etc.). Legal descriptions may have topological association to features (e.g., parcels), to component features and/or to measurements. Legal descriptions may be saved into a collection of unadjusted legal descriptions (includes historic legal descriptions).	PM02. Construct Legal Description	(same)	(same)	Integrate positional and descriptive parcel-based land information for all boundary information. Gis environment Readily available, consistent methods. Create new parcel records and/or edit legal description data. Automated ubdivision of parcels based on business rules.

Parcel Management Business Area					
Description of Current Process	**Proposed Change**	**New Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Expected Benefits**
Change or create parcels. Fit parcel geometry to the existing land base.	Process to edit the legal description fabric. Insert new legal description components and/or edit existing components. Fit, assemble, and resolve legal description components within the legal description fabric.	PM03. Edit Legal Description Fabric	(same)	(same)	Resolves problems with associating or aggregating legal descriptions from the legal description fabric Gis environment Readily available, consistent methods.
Obtain ancillary control and use to adjust existing parcel data.	Process for adjusting the coordinates of an existing feature fabric (e.g., legal description fabric, parcel fabric) to enhance (cartographic) alignment with a reference source that has desired control features (also known as map control).	PM04. Re-adjust Fabric	(same)	(same)	Resolve problems with associating or aggregating legal descriptions from the legal description fabric. Edit/move parcel geometry. Gis environment

Parcel Management Business Area					
Description of Current Process	**Proposed Change**	**New Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Expected Benefits**
Change parcel geometry and attributes as required.	Process to define parcels within the parcel fabric by associating or aggregating legal description(s) from the legal description fabric. Process to create new parcel records and/or to edit parcel attribute values.	PM05. Edit Parcel Fabric	(same)	(same)	Consistent methods of creating and editing parcels. Gis environment
Apply appropriate lables and information to parcel drawing.	Create or modify annotation within or associated to parcel fabric, legal description fabric, or measurement network to support display and formatted output.	PM06. Edit Parcel Annotation	(same)	(same)	Standardized annotation. Professional looking documents. Gis environment.

All land management related processes are performed as daily, on-going tasks during the normal business cycle.

GeoCommunicator Business Area					
Description of Current Process	**Proposed Change**	**Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Expected Benefits**
Manually find information, references and existing data for an assigned task.	Process to find data references, reference documents and events. Establish or modify search parameters that define a research scope and submit query. Example parameters include: ▪ data category; ▪ event category; ▪ spatial extent; ▪ logical operators; ▪ temporal constraints; ▪ reference document category Subscriber may opt to save search parameters for re-use at a later time.	GC01. Conduct Research	Federal, state, county and local government land management specialists; private concerns	Most Critical	▪ Provide an easy to use interface. ▪ Data sharing. ▪ Readily available data. ▪ Many sources of data ▪ GIS and Internet-based environment and activities.

GeoCommunicator Business Area					
Description of Current Process	**Proposed Change**	**Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Expected Benefits**
Review located information.	▪ View, evaluate, and/or remove items (data references, reference document and events) returned from the conduct search process. ▪ The Actor may navigate to on-line data references (URLs).	GC02. Browse/Search Results	(same)	(same)	▪ Facilitates analysis of potential land uses, opportunities, and alternatives for planning, environmental analysis and other decision making processes. ▪ GIS and Internet-based environment and activities
Communicate with interested parties and co-workers concerning tasks and problems; requent information from the same.	▪ Process to submit an event and/or add a new event category. ▪ NOTE: Specific events may be automatically triggered by other system events. Event Providers submitting events would have their stored account information pre-populated into the event submission form. Any Actor can become an Event Provider by establishing a provider account.	GC03. Submit Event	(same)	(same)	▪ Facilitate data exchange, permit pooling of resources ▪ GIS and Internet-based environment and activities

GeoCommunicator Business Area					
Description of Current Process	**Proposed Change**	**Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Expected Benefits**
No Current, existing process.	System administration of errors related to events and triggered notifications including the resolution of errors involving subscription and event notification. Also resolve failed e-mail notification and remove outdated events. Approve requests for new event categories. Note: system automatically: ▪ creates a list of subscribers to be notified (by event category and spatial extent) by matching key criteria from the event and subscriber databases; ▪ sends e-mail notification to the appropriate subscribers; and ▪ logs communications and produces an event/notification error list.	GC04. Manage Event Notification Process	(same)	(same)	▪ Improve operational efficiency. ▪ Will automate communication among participants and customers. ▪ Automated process monitoring and control. ▪ Improve interoffice communication. ▪ GIS and Internet-based environment and activities

GeoCommunicator Business Area					
Description of Current Process	**Proposed Change**	**Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Expected Benefits**
No Currrent, existing process.	Process to establish or modify a data provider account or an event provider account (provider information).	GC05. Manage Provider Account	(same)	(same)	▪ Distributed data storage saves hardware, system and data administration costs. ▪ Standardized, controlled participation methods. ▪ GIS and Internet-based environment and activities

GeoCommunicator Business Area					
Description of Current Process	**Proposed Change**	**Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Expected Benefits**
Share data with interested persons via various media and in various formats.	Process to submit index and catalog information for geo-referenced data, geo-related data and/or reference documents to geocommunicator. THIS INCLUDES: ▪ data reference (URL or physical location); ▪ relevant data catalog information (e.g. metadata); ▪ date; ▪ access restrictions; ▪ spatial reference; and ▪ spatial extent. NOTE: PROVIDER MAY POST PRODUCT AVAILABILITY, RESTRICTIONS, AND SUBSCRIPTIONS IN THE DATA CATALOG. NOTE: PROVIDERS WILL SUPPLY REFERENCES TO DATA HOUSED IN	GC06. Submit Data	(same)	(same)	Distribution and sharing of land information to reduce costs and workload. Controlled data sharing. Gis and internet-based environment and activities

GeoCommunicator Business Area					
Description of Current Process	**Proposed Change**	**Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Expected Benefits**
No Cur g rent, existing process.	Process to establish or modify subscriber account including: ▪ Actor information; ▪ Actor preferences; and ▪ Subscription/notification parameters (spatial extent, event categories, scheduling). NOTE: Browser may elect to become a new subscriber and pass current research scope information into the account setup.	GC07. Manage Subscriber Account	(same)	(same)	▪ Increase staff productivity through email notification of updated information, land activity and land related events ▪ GIS and Internet-based environment and activities

GeoCommunicator Business Area					
Description of Current Process	**Proposed Change**	**Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Expected Benefits**
Maintain, store business data on paper, in data bases and in various record keeping systems.	System administration to: ▪ quality control (QC) data reference information; ▪ insert new/replacement data reference information; ▪ modify data catalog; or ▪ delete data references from the system. NOTE: Some providers will supply physical storage site/contact references to data rather than web site URLs. NOTE: Data submissions will be automated where possible.	GC08. Manage Data Process	(same)	(same)	▪ Improve quality control and support FGDC data content standards ▪ GIS and Internet-based environment and activities
No Cur g rent, existinprocess.	System administration of subscriber and provider accounts including: ▪ certifying new accounts; ▪ resolving errors; and ▪ managing account-related issues.	GC09. Manage Accounts	(same)	(same)	▪ Improve and maintain security. ▪ Monitor proprietary data. ▪ GIS and Internet-based environment and activities

GeoCommunicator Business Area					
Description of Current Process	**Proposed Change**	**Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Expected Benefits**
Communicate with interested parties concerning data and tasks.	Process to handle communication events to: ▪ a topical forum (via e-mail); ▪ e-mail group (e.g. to review proposed data); ▪ data provider (e.g. to report errata); ▪ publish an information notice (e.g. an RFP, a Public Notice, or data discrepancy); or ▪ publish an information call (e.g. data request, reference request or event request). NOTE: Browsers may have limited communication access. Subscribers may have enhanced access to forums	GC010. Post Comment	(same)	(same)	▪ Provide functionality that compliments clearinghouse activity. ▪ Achieve significant increases in customer service. ▪ GIS and Internet-based environment and activities

GeoCommunicator Business Area					
Description of Current Process	**Proposed Change**	**Business Process**	**Customers for Final Product from Process**	**Criticality of Process to Business Area**	**Expected Benefits**
Maintenance, recording of communications by individual; group communications.	The System Administrator: ▪ sets up and closes communication forums, e-mail groups; ▪ monitors content; and ▪ manages errors.	GC011. Manage Forums	(same)	(same)	▪ Improved security. ▪ GIS and Internet-based environment and activities

All land management related processes are performed as daily, on-going tasks during the normal business cycle

3.2.1 Tie Businesses to the Bureau Architecture

All of the NILS extensions have been correlated with the Bureau Architecture at a high level. The current progress in the Analysis phase has provided enough information to allow Survey Management and Measurement Management extensions to be correlated, in more detail, to the third level of the Architecture. See Appendix 7.

3.2.2 Business Process Improvement

The design methodology for NILS is entirely based upon the Object Oriented Analysis and Design (OOAD) techniques which, in turn, are centered upon user involvement. The functional requirements for the Project were gathered in a series of workshops attended by users, technical experts, managers and consultants. The requirements were then refined, ie., analyzed for redundancy and overall relevancy. They were consolidated in a draft of the Concept of Operations and User Requirements document. Public review meetings were held in Portland, OR, Denver, CO, Phoenix, AZ, Atlanta, GA and Washington, DC. Comments from the review meetings were used to finalize and publish the document, which is available for viewing on the website, http://www.blm.gov/nils.

The NILS concept will completely re-engineer the Survey Management, Measurement Management, Parcel Management and data sharing business processes of the BLM. The proceses will be moved from manual bookkeeping tasks into a computerized GIS environment. In addition, the Analysis phases and its associated use case will analyze and refine the processes to remove redundant, inaccurate and inefficient practices.

3.2.3 End users/Customers

End users and customers are cadastral surveyors and land management specialists (development planners, consultants, data stewards, assessors, case recordation specialists, recreation planners). Their employer may be the Federal government; state, county or city governments or private concerns. NILS will serve any individual or organization whose primary data/information requirements are current, consistent and accurate parcel and survey data.

NILS has been accepted by the cadastral community as a much needed and pertinent effort to consolidate land management data and make it easily available. The positive response to the Project is apparent from the activity on the website, the requests for presentations and the attendance at the public review meetings.

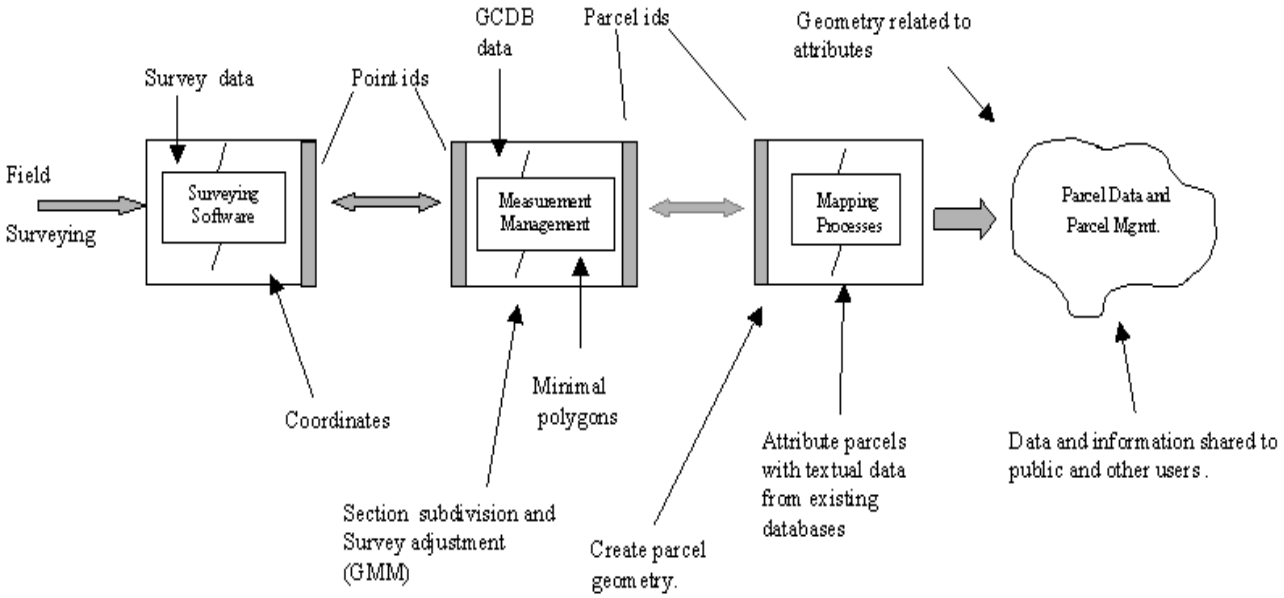
The functional requirements for NILS were gathered with the assistance of subject matter experts at the user level. During the Analysis and Design phase, user involvement would be solicited in the same manner as a means to identify any shortcomings and to create a product which serves the needs of the customer.

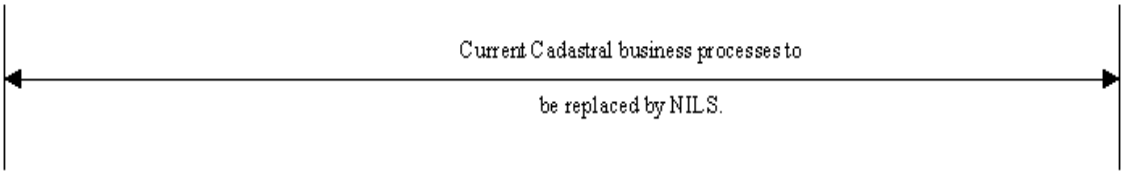
3.2.4 Other Business Areas/Programs

Since the NILS is a project directed at creating an efficient means of working with land data and information, it will integrate with the business processes and activities of the BLM because BLM's functions are land based. This also pertains to other agencies and organizations involved in land management. The functionalities of LR2000, GCDB, RAS, leasing, rights-of –way, mining claims and the many other land-based activities within the BLM will benefit from a common land data model and set of tools.

3.3 High LevelBusiness Process Flow Diagrams

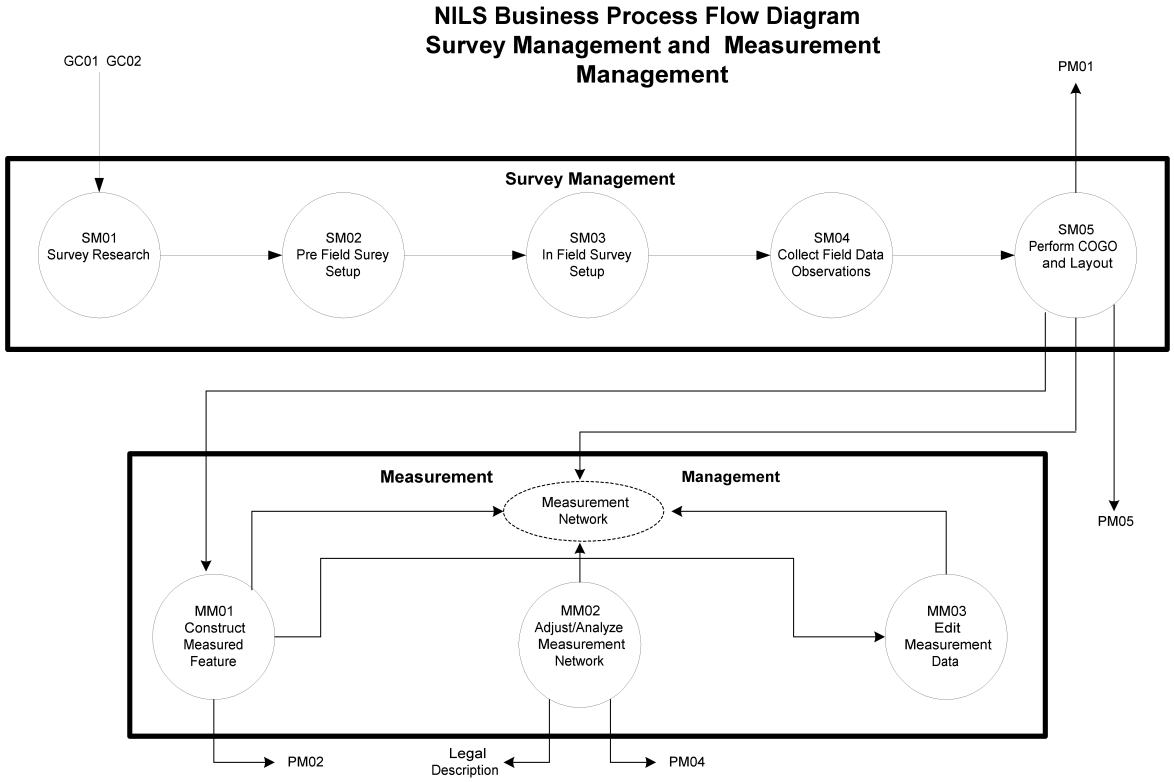
3.3.1 As Is System





3.3.2 Target System

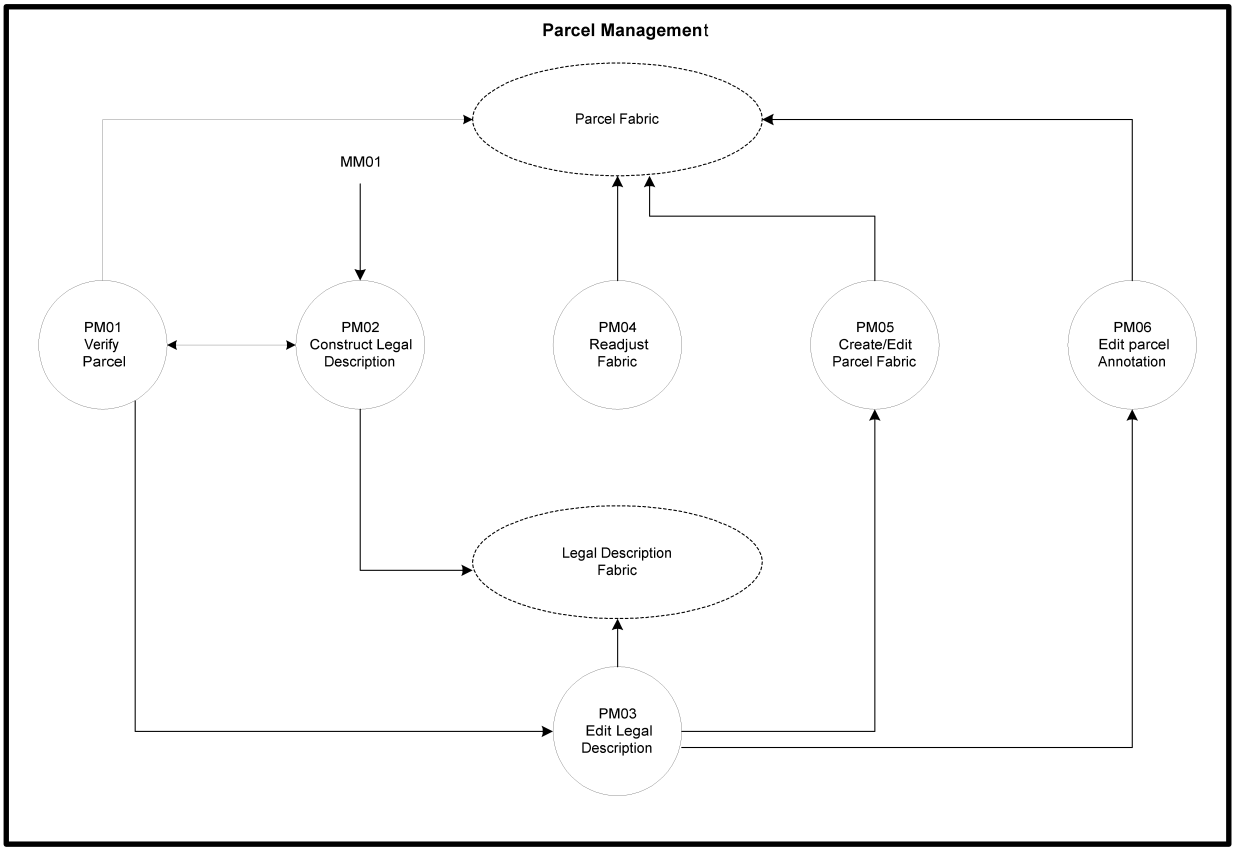
The business processes contained in NILS are shown in the following diagrams



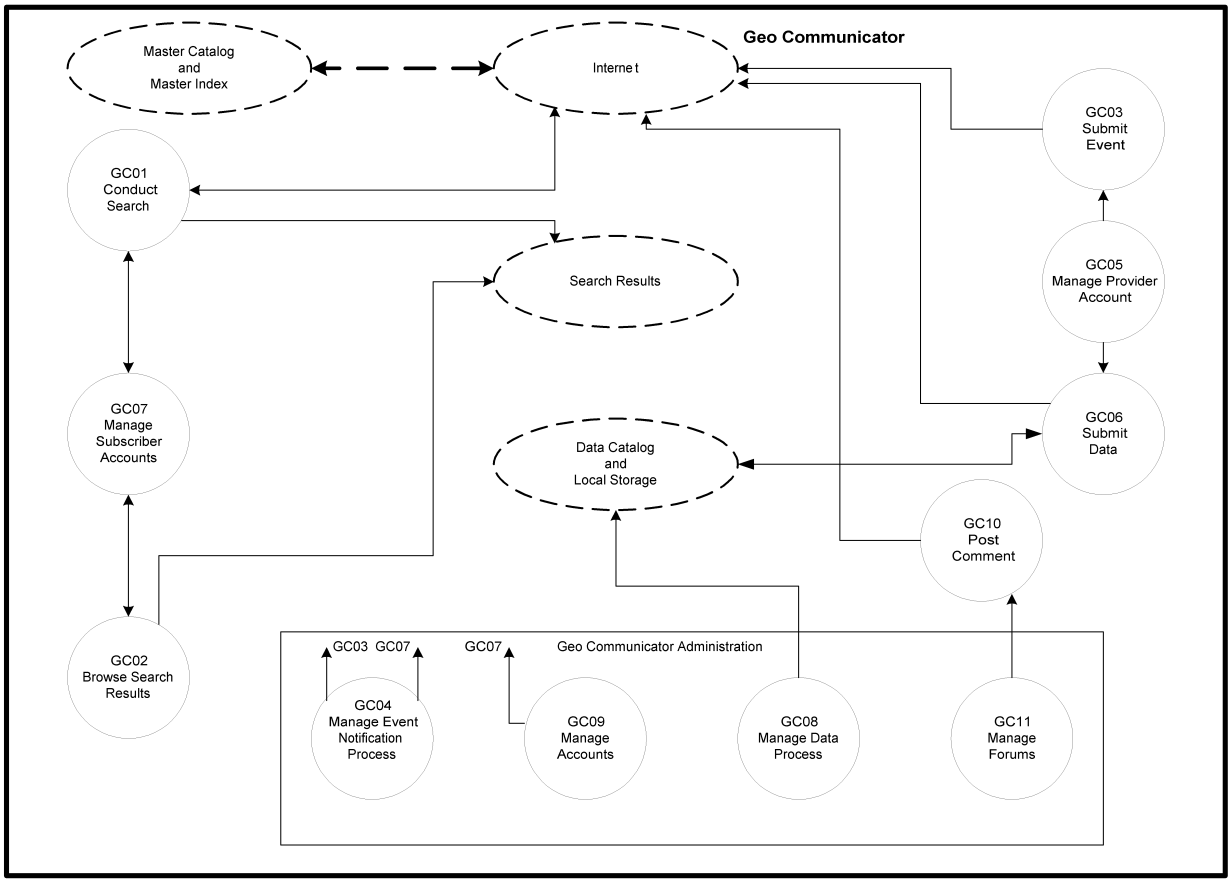
Legend.

GC01,etc. – GeoCommunicator use cases (includes GeographyNetwork).
SM01, etc - Survey Management use cases.
MM01, etc. - Measurement Management use cases.
PM01, etc. - Parcel Management use cases.

NILS Business Process Flow Diagram
Parcel Management



NILS Business Process Flow Diagram - GeoCommunicator



3.4 Data Management Documentation

3.4.1 High Level Data Groups

(Not Available until completion of Data Modeling)

3.4.2 Data Sources

Data sources for parcel mapping fall into one of two general categories: primary or secondary data. Primary data sources include data compiled directly from field measurements using traditional surveying methods or GPS. The most common methods of producing parcel maps depend on secondary sources. Secondary data sources include data compiled from deeds, legal descriptions, survey maps or previously compiled hard copy parcel maps, such as tax maps. The quality of spatial data secondary sources depends not only on the accuracy of the descriptions and extractions but also on the ability of the cadastral mapper to interpret the information in the documents

Parcel data are available from various sources. The most common data sets are the maps and deeds that can be found at in county courthouses across the country. In the federal government the BLM is designated as the official keeper of the land records for federally owned land. Other land agencies such as the Forest Service, Fish and Wildlife and the National parks also have land information that can be used to build parcel maps.

Specifically, for the BLM, data for NILS will be obtained from existing systems. The Data Integration Analysis (DIA) project is an effort to determine the scope, level of effort and impact of integrating Land Data from LR2000 and other existing BLM systems into a common data set in preparation for migration to the NILS Project. Results of DIA will be shared and used as the basis for the design, development and deployment of a consolidated cadastral land record data set.

New databases within the BLM and specifically NILS would be implemented in accordance with the FGDC Cadastral Data Content Standard.

3.4.3 Data Sharing

NILS will provide for receiving or disseminating land information within the cadastral community using the GeoCommunicator (GC, or GeoCom). GC would provide the business processes necessary to communicate land-related activities and data over the Internet. Consumers of spatial information may use GeoCommunicator to discover:

- data and activities related to their personal area of interest (e.g. a state or county) and how to access the information,

- geographic extent of specific data and activities (e.g. Public Land Survey coordinate data sets, planned field survey projects) are linked to the land and how to access that information.

Providers (NILS customers/end users) of spatial information describe would their data and activities in a searchable index, locate their geographic extents on a map interface, and enable information flow through email contact and links or paths to existing data stores. The GeoCommunicator would also be used to coordinate ongoing information and establish a system where agencies and people that download information from the Internet can have a sense of updates and notifications related to that data.

3.4.3.1 DataExchange Agreements

None.

3.4.3.2 Metadata Standards

All NILS data will be collected and shared in conformance with the FGDC metadata standards.

3.4.4 Data Contacts

The entire cadastral surveying community, government and non-government.

3.5 Maximizing the usefulness of the information within the system

The common data model of NILS would contain information about the BLM's (and others) land; it would contain the land information assimilated from the many existing systems. One data model would efficiently, accurately and consistently make use of land data used in the BLM's business processes.

For customers internal and external to the BLM, information would be more readily available. The time to gather data for internal and external reports, etc. would be greatly reduced if it were available from a common source and not researched from among several offices and then analyzed and reformatted before distribution. Integrity of the data would be enhanced.

The confidentiality of parts of BLM's data is an issue being addressed by NILS. Conformance to the practices and regulations pertaining to proprietary data would be maintained.

3.6 Coordination with State, Local and Tribal Governments

The basic processes within the requirements gathering phase of NILS, from the very beginning, has included the expertise of representatives from many agencies at all levels of government (US Forest Service; state, county and local governments).

The Bureau of Indian Affairs (BIA) reviewed the COURS document and provided many valuable comments.

3.7 Summary of Public Outreach/Inreach for the NILS Project

Public Outreach and Communication

February 2001

The National Integrated Land System (NILS) has made a conscious effort to gather requirements and inform the public of the NILS project through public meetings, workshops, presentations at user group meetings, and through the Internet. The NILS goal is to get as much user involvement from the widest audience as possible. This includes involving users through out the United States from the Federal, State, local and regional governments, and from the private sector. The NILS public outreach activities are summarized below.

Requirements Gathering and Review Workshops
The goal of the business requirements workshops was to develop cadastral and land requirements for Survey Management, Measurement Management, Parcel Management, GeoCommunicator, and the components of NILS. High-level business requirements and detailed analysis workshops are held through out the year at various locations to gather and refine requirements, to develop and review design specifications and prototypes, etc.

Representative users are:
- BLM (AK, AZ, CA, CO, OR, MT)
- Forest Service (AZ, CO, GA, OR, WO)
- Boulder County
- Salt Lake County-UT
- Polk County-OR
- Oakland County-MI
- Pinal County-AZ
- Maricopa County-AZ
- State of Arizona
- State of Washington
- Private industry
- University of Maine

Site Visits
The purpose of the site visits was to verify the requirements use cases with the business processes from the State, Federal, and County agencies in the Pacific Northwest and in the Eastern United States on their survey, record management, and GIS business practices. The information was used in the validation of the business process requirements being gathered for the National Integrated Land System (NILS).

The following sites were visited:
- BLM Oregon State Office Portland, OR
- Forest Service Region 6 Portland, OR
- Polk County, OR
- Washington State Dept. of Natural Resources Olympia, WA
- Thurston County, WA

- Forest Service Region 2 Atlanta, GA
- TVA Chatanooga, TN
- Fulton County, GA
- State of Florida Tallahassee, FL

User Group Meetings and Presentations
The purpose of the presentations is to give an overview of the NILS project, and to inform the general public of where and how to comment on any aspects of the project. NILS project overviews were conducted at the following meetings:

- National Association of Counties, St. Louis, MO (July 1999)
- Utah GIS Council Conference, Snowbird, UT (Sept. 1999)
- GIS in the Rockies Conference, Denver, CO (Oct. 1999)
- FGDC Group, Washington, DC (Oct. 1999)
- SWUG Conference Breckenridge, CO (Oct. 1999)
- National States GIS Council, New Orleans, LA (Aug. 1999)
- BIA Denver, CO (Feb. 2000)
- IRMAC (Mar. 2000, Aug. 2000)
- Western Governors Association Meeting, UT (March 2000)
- Arizona Professional Land Surveyors (ALPS) Show Low, Kingman, Benson, Tucson, and Phoenix, AZ (2000)
- ESRI User Conference San Diego, CA (1999, 2000)
- BLM GIS Phoenix, AZ (April 2000)
- Integrating GIS and CAMA, Miami, FL (April 2000)
- BLM Wyoming State Office (July 2000)
- Fluids conference (July 2000)
- DOI Information Technology Conference, Denver, CO (October 2000)

NILS requirements review presentations were conducted at the following meetings:
- Geographic Coordinate Database (GCDB) Technical Advisory Group (GTAG) at the University of Maine in Orono-ME (Sept. 1999),
- Southwest Users Group Breckenridge-CO (Oct. 1999),
- GCDB Management & FGDC Cadastral Subcommittee Billings-MT (Nov. 1999)
- BLM and US Forest Service Lands Group Billings, MT (Nov. 1999).

NILS Public Meetings
Public meetings were conducted in five cities across the country to present the draft *Concept of Operations and Business Process Requirements Document*. Announcement of the meetings was sent to all public agencies in the area via mail, E-mail, and through the Internet via the NILS web site. The goal of the public meetings was to inform the public of the NILS project, to present the requirements document, and to solicit comments. The public meetings were held in:
- Portland, OR
- Phoenix, AZ
- Denver, CO
- Atlanta, GA

- Washington, DC

One hundred eighty nine people attended the public meetings. Sixty-five organizations were represented. The number of participants by organization type is as follows:

City	4
County	16
Federal Agency	116
BLM	48
MMS	2
National Geodetic Society	3
NPS	8
NSZ	3
USACE	1
USBOR	9
US Census Bureau	1
USOSM	1
Farm Service Agency	1
USFS	13
USFWS	19
USGS	7
Non-profit Assoc./Organ.	3
Private Firm	32
Regional Government	2
State Agency	13
Tribe	1
University/College	2

Comments have been received on the draft *Concept of Operations and Business Process Requirements Document* as follows:

- 12 comments received on-line
- 21 comments received through E-mail/US mail

Internet/Intranet

The National Integrated Land System Project maintains two web sites to keep the general public, BLM employees, and NILS partners up-to-date on all activities related to the project. The NILS Internet site is located at http://www.blm.gov/nils and the Intranet site is located at http://web.blm.gov/lris/nils. The NILS Internet web site has received 5,800 visits since January 2000.

The NILS web site contains planning documents, a calendar of activities, meeting/workshop notes, informational slide shows, business requirements, detailed analysis specifications, comment forms, links, etc. The public can register on-line, through the mail, or by phone as an interested party, as a vendor of products and services, or to submit comments. New and updated project information is put on the web site, as it becomes available. Mass mailings through E-

mails and the general mail are made periodically to inform the registered parties and partners of new and updated information, to review detailed requirements specification, to inform them of public meetings, and to requests comments.

The NILS project used Team Room to develop a forum and place to archive documents for the development of GeoCommunicator. Team Room was used to communicate between team members from different agencies and the public; to announce meetings; to display meeting notes, project design, and PowerPoint mockups; to gather comments; and to hold discussions.

NILS continues to use all methods necessary to inform the public and team members and to seek their involvement at all levels in the project.

3.8 System Accessibility

The BLM Information Technology Architecture Technical Reference Model (TRM), version 0.9, 7/31/00 makes recommendations for the usability of computer systems and software applications. It refers to and makes use of Human Factors Engineering (HFE), which provides standards and guidelines to accommodate physically disabled users and to ensure their maximum productivity as well as that of all users. HFE employs the concepts of adaptive and assistive technologies which apply to the design and implementation of human-computer interfaces and computer applications. These recommendations, along with the requirements of the Rehabilitation Act of 1973 will be incorporated into the COTS, custom software and system designed for NILS.

The TRM addresses the following architectural principles and technology components.

Effective human-computer interfaces and application should:

- Behave in ways that are consistent with users' expectations.
- Be intuitive to the users.
- Allow for a wide range in variations of user skills.
- Not require the users to become involved with the inner workings of the system.
- Provide the means to save the work, undo operations and abort the activities.
- Require a minimum amount of input from the user.
- Anticipate the users' requirements.
- Provide a standard and predictable behavior.
- Have consistent appearance.
- Have a consistent behavior.

The Graphical User Interface (GUI) should:

- Allow for color vision deficiency among users.
- Avoid use of color schemes to interpret critical information.
- Accommodate user color preferences and allow screen customization.
- Not have color dependent, on-line documentation.

Adaptive and Assistive Technologies for computer desktop workstations:

- Keyboard enhancement
- Enhanced monitors and video displays.
- Verbal enhancement, e.g., verbal echo of the screen display.
- Printers which verbally announce the front panel displays.
- Voice recognition software.

4.0 Target System Requirements

4.1 Supporting Documents

Document Citation	Date	Information Content	On Web Site?
NILS Concept of Operations and User Requirements document.	March , 2000	Project requirements which would drive the analysis/build/review phase	http://www.blm.gov/nils
Manual of Surveying Instructions	1973	BLM surveying business rules	No
BLM Information Technology Architecture Technical Reference Model Vol. 1, Management Overview	7/31/00	Direction for design, construction, purchase, deployment and management of Information Technology	http://web.wo.blm.gov/blma
National Integrated Land System Requirements	10/00	Refined and Expanded Use Cases	http://www.blm.gov/nils

4.2 General NILS System Requirements Description

Functional Category	Functional Requirement	Description
Cadastral/land data Data Architecture	Object-oriented Data model	Implementation with extensible architecture adaptable to custom deployment.
	FGDC Compliance	NILS architecture will comply with and possibly extend the FGDC content.
	Tiered Network	Support map management as topologically related layers of parcel-based features.
	Feature-level Metadata	Automatically capture the metadata of parcel-based features.
	History/Lineage management	Maintain parent-child relationship of cadastral data.
Geographic Information systems	Map Data and Display	Display, pan zoom, modify, select, annotate feature-level geometry.
	Query	Search for and refine selected features and feature sub-sets.
	Analysis	Spatial, logical, boolean, mathematical analysis.

Functional Category	Functional Requirement	Description
	Reporting and Plotting	Create text reports, map plots of specialized cadastral/land management information.
Database Management	Manage Data and Subsets	Find and manage files; select, create subsets, merge, append data.
	Manage Data Properties and Relationships	Edit properties of selected data.
	Perform Datum Transformation	Convert projections, perform x,y,z data transformations.
	Administer Access Rights	In mulit-user environment, maintain passwords and database security.
	Transactions and Versioning	Manage locking, commits, rollbacks, version conflicts
	Data Automation Support	Provide tools which support migration from existing databases to the NILS data schema ; support digitizing, scanning, manual data entry.
	Import/Export	Ability to share data in various formats.
System Integration	Workflow, Document and Event Management	Guide and track business tranactions
	Architecture for Data Sharing	Access, integrate, manage spatial and tabular datasets across various platforms.
	Audit Support	Quality control, auditing, system event logging, operational review.

5.0 Target System Architecture

5.1 Supporting Documents

Document Citation	Date	Information Content	On Web Site?
BLM IT Architecture Study	March, 2000	BLM IT requirements, business structure and future direction.	Soon to be posted.
BLM Strategic Plan	March, 2000		
BLM Enterprise Architecture	March, 2000		

5.2 Planned Architecture

5.2.1 Operational Architecture

5.2.1.1 Existing System

The existing BLM hardware architecture configuration consists of IBM AIX, NT, Macintosh and SUN platforms. Server configurations incorporate the SUN E10K as the Bureau enterprise server, AIX J50's as departmental servers and NT's as the workgroup servers and desktop clients. There are presently 684 servers Bureau-wide and 9362 desktops of which 3000 are IBM AIX, 6800 NT's, 500 Novell and 500 other platforms. BLM's State and Field Offices are operating a 10/100 megabit LAN within the office, 56K to 1.5 megabit WAN, 56K WAN between State and Field Offices, 1.5 Megabit between State Offices and the World Wide Web backbone.

5.2.1.2 Proposed System

No changes to overall Bureau architecture would be required to support NILS. NILS applications would be built upon existing COTS, GIS software. New hardware and software requirements would be fulfilled by spreading new purchases among other proposed projects (RTSS and Immediate Spatial).

5.2.1.3 Modified Components

The hardware/software requirements required of a NILS application installation are listed in the following table). As stated in 5.2.1.2, these items would be shared with other projects**.**

Architecture Components Required by NILS:

Required Component	Characteristics	Location	Source/Own-ership
NT workstation	Desktop computing environment	Local to office implement-ing NILS. Provided by local office.	

Required Component	Characteristics	Location	Source/Own-ership
Microsoft Office Professional	Business tools		
Web Browser	Basis for GeographyNetwork and GeoCommunicator		
Lotus Notes	Inter-office communication		
ESRI ARC INFO, Ver. 8	GIS environment to support NILS land management tools		
Database engine	Store for NILS data model		
ESRI SDE	Data serving software.		
Data Server	Physical data storage		
LAN/WAN/Internet	Provide transmission media for data sharing and communication		
ESRI Internet Map Server	Functionality to provide GIS products (maps) to the Internet.		

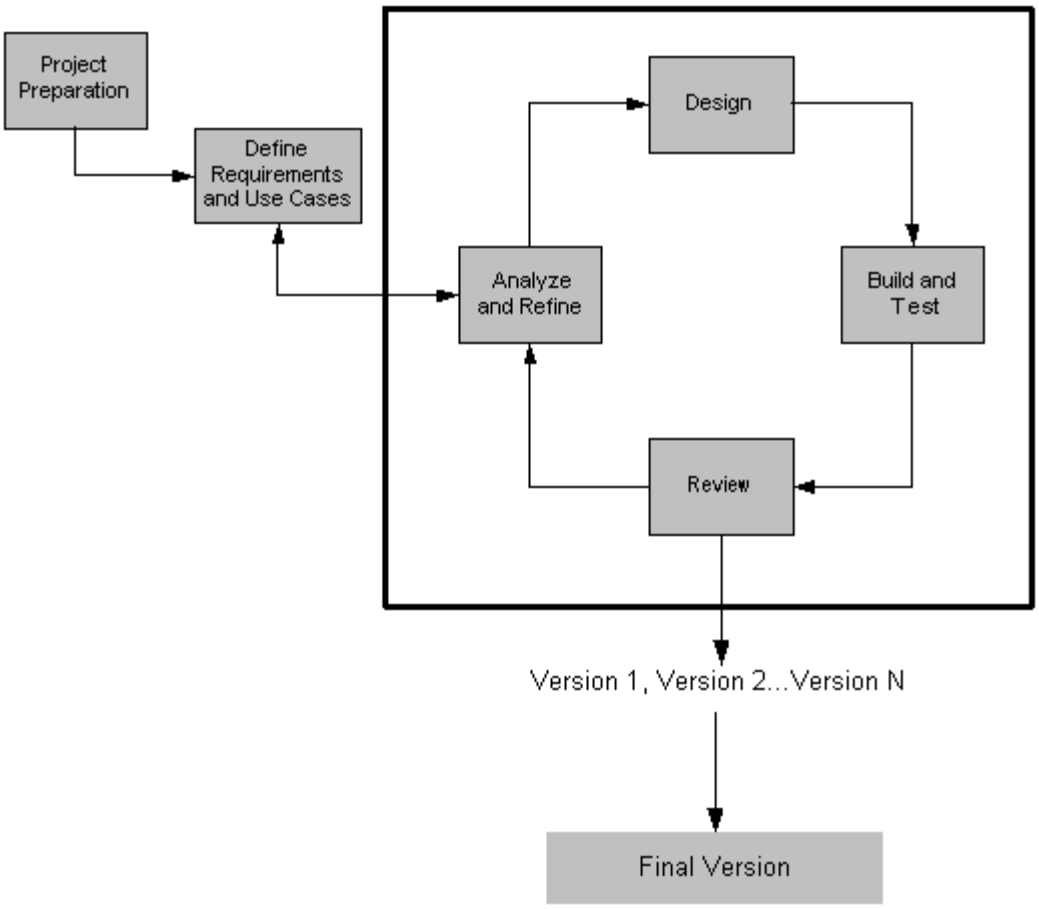
5.2.2 Development Environment

The NILS and GeoCommunicator application software would be analyzed, built, reviewed and developed by a contractor in their corporate offices. The contractor's progress would be tracked by the NILS Project Staff Team Leads. Development would be in a Rapid Application Development (RAD) environment. Object-oriented Analysis and Design, Managed Evolutionary Development and Life Cycle Management techniques would be applied throughout the entire evolution of NILS.

5.2.3 Test Environment

NILS is being developed using Object-Oriented Analysis and Design (OOAD) techniques. OOAD is based upon the iterative development process in which specifications and requirements are constantly reviewed and revisited by workshop teams. This approach eliminates the design-and-develop-once model. Thus, during the analysis/build/review phase, testing is a continual process until a solid application is completed.

The following diagram depicts the iterative analysis/build/review cycle:



Prior to actual implementation and roll-out, the NILS application would be tested on the appropriate platforms and in the required environments following approved Bureau guidelines.

5.2.4 Training Environment

Since NILS and GeoCommunicator applications would serve users other than those of the BLM, training must accommodate several agency environments. The contractor would develop a training plan to address the various differing needs. Possible alternatives include Internet-based training and local instruction sessions.

5.2.5 Back-Up and Recovery Architecture

Back-up and recovery for the NILS data would comply with the existing BLM procedures for servers and workstations. The Partners would comply with their own procedures.

6.0 Master Plan and Schedule

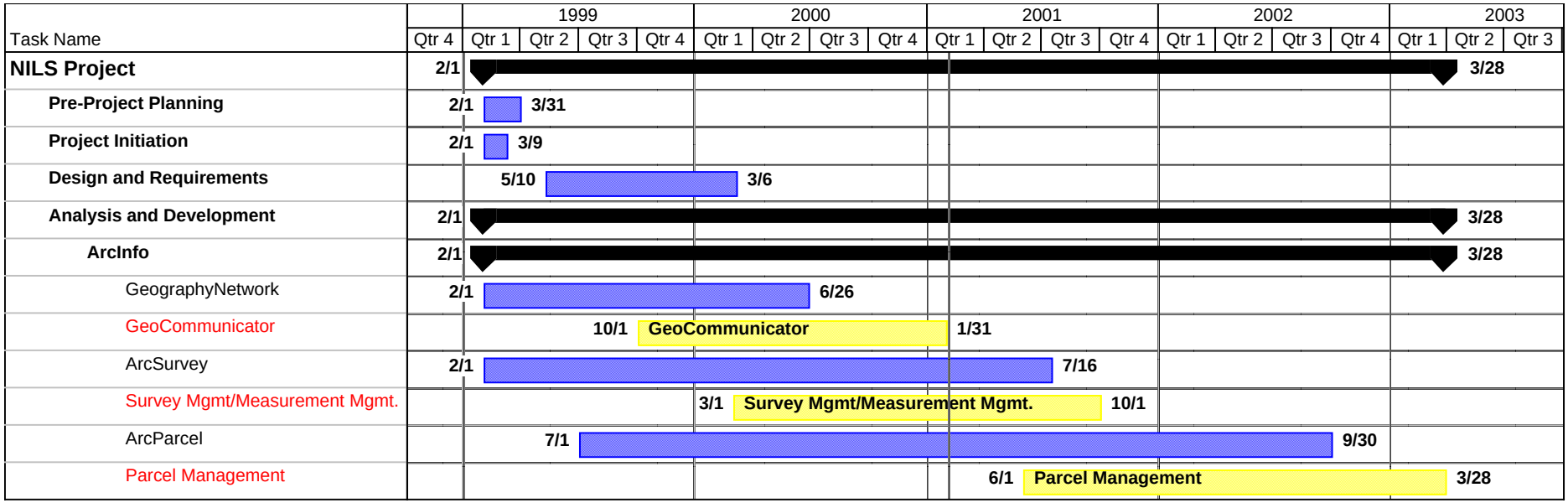
6.1 Implementation Plan for Project

6.1.1 Roles and Responsibilities

Key Project Roles	Name	Phone	Email Address
NILS Project Manager	Leslie Cone	303-236-0815	Leslie_Cone@ blm.gov
NILS Deputy Project Manager	Chris Hamilton	303-236-6539	Chris_Hamilton@ blm.gov
NILS Technical Lead	Roy King	303-236-2628	Roy_King@ blm.gov
Staff Lead - Field Survey	Jerry Sullivan	303-236-1089	Jerry_Sullivan@ blm.gov
Staff Lead - Measurement Management	Jerry Sullivan	303-236-1089	Jerry_Sullivan@ blm.gov
Staff Lead - GeoCommunicator	Ginny Pyles	303-236-4034	Ginny_Pyles@ blm.gov
Staff Lead - Data Modeling	Ginny Pyles	303-236-4034	Ginny_Pyles@ blm.gov
Technical Lead - Field Survey	David Grainger	916-978-4327	David_Grainger@ blm.gov
Technical Lead - Measurement Management	Dennis McKay	602-417-9579	Dennis_McKay @blm.gov
Technical Lead - Parcel Maintenance	Rick Dickman	406-896-5157	Richard_Dickman@ blm.gov
Technical Lead - GeoCommunicator	Brent Blair	503-952-6177	Brent_Blair@ blm.gov
NILS GIS Specialist	John Reitsma	303-236-1984	John_Reitsma@ blm.gov
Technical Lead - Data Modeling	-----	-----	----

6.1.2 Project Schedule

6.1.2.1 High Level Gantt Chart



6.1.2.2 Detailed Gantt Chart

See Appendix 1. (Detailed Gantt Chart and Detailed Work Breakdown Structure are contained in this appendix.)

6.1.3 Project Activities – Work Breakdown structure

6.1.3.1 Summary Work Breakdown Structure

See Appendix 2. (Summary Work Breakdown Structure is contained in this appendix).

6.1.3.2 Detailed Work Breakdown Structure

See Appendix 1. (Detailed Work Breakdown Structure and Detailed Gantt Chart are contained in this appendix.)

6.1.4 Key Milestones and Products

Milestones	Product
Partnership Agreement	
Completion of Requirements Document	Concept of Operations and user Requirements document.
Completion of Analysis Documents	Use Case Analysis Document
Completion of Development Plans	Software Development Document
GeoCommunicator close-out	Geocommunicator software and functionality.
Measure Mgmt./Survey Mgmt. close-out	Measure Mgmt./Survey Mgmt. software and functionality.
Parcel Management close-out	Parcel Management software and functionality.
NILS roll-out	Complete NILS Software, Data Model and functionality.
Project Close-out	Project wrap-up

6.1.5 Resource Requirements

6.1.5.1 Detailed Resource Requirements

Resource	Title/Position	Commitment
Leslie Cone	NILS Project Manager	100%
(vacant)	NILS Deputy Project Manager	-
Janet Beavers	Admin. Assistant	100%
Roy King	NILS Technical Lead	100%
Jerry Sullivan	Domain Staff Lead	100%
Ginny Pyles	Domain Staff Lead	100%
Brent Blair	Domain Technical Lead	100%
Dennis McKay	Domain Technical Lead	100%
David Grainger	Domain Technical Lead	100%
Rick Dickman	Domain Technical Lead	100%
John Reitsma	GIS Specialist	100%

6.1.5.2 Future Resource Requirements

Future resource requirements would be defined by evaluations conducted during the Operations and Maintenance phase of the project.

6.2 Project Justification and Investment Management

6.2.1 Project Justification

The mission of the Bureau of Land Management (BLM) is "to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations." The BLM maintains land and mineral records for the Nation's public and Indian lands, including over one billion documents such as land surveys, surveyor notes, tract books, Master Title Plats (MTP), Historical Indices land patents, mining claims, oil and gas leases, and land and mineral case files. Many of these paper documents are deteriorating and some are becoming illegible. Most of the original records and plats are manually maintained and stored in a number of locations throughout the western United States and several locations in the East. Some of the information contained in these documents has been entered into various databases beginning in the 1970s.

When the energy boom began in the early 1980s, BLM found it could not handle the paper workload demand and recognized the need to become more efficient and cost effective by automating many of its public land tenure records.

Looking to the future, the examples of non-automated, non-standardized record keeping cited above, are indicative of what is to be expected as requirements increase in number and complexity. The workload, inefficiency and low customer satisfaction associated with manual land management record keeping will be the foremost obstacles to the BLM's mission

accomplishment. Cadastral data, land management business processes and land record maintenance must be automated .

The NILS project is an initiative to create standardized data models for the storage and maintenance of land records, to automate land business processes in a field-to-fabric implementation and to provide common tools for land management specialists. NILS will provide a business process method to collect, maintain, and store parcel-based information that meets the needs of the BLM and the widest possible spectrum of land title and resource information providers and customers. Common, standardized models and processes will eliminate the uncertainties, redundancies and inefficiencies associated with the many existing systems.

6.2.2 Return on Investment Summary

	B	C	D	E	F	G	H	I	J	K
1										
2										
3	**Total**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
4		$0.00	$0.00	$33,917.76	$872,475.47	$1,696,915.42	$1,696,915.42	$1,696,915.42	$1,696,915.42	$1,696,915.42
5		$2,740,702.41	$2,546,420.96	$9,229,715.43	$2,188,740.52	$734,847.40	$756,039.67	$777,867.70	$800,350.58	$823,507.94
6		$2,740,702.41	$2,546,420.96	$9,263,633.19	$3,061,215.99	$2,431,762.83	$2,452,955.09	$2,474,783.13	$2,497,266.00	$2,520,423.36
7	$29,989,162.95									
8	$27,720,192.31	$2,740,702.41	$2,479,475.13	$8,782,951.06	$2,826,068.22	$2,185,946.06	$2,147,026.38	$2,166,132.05	$2,185,810.90	$2,206,080.11
9	0.000									
10	$0.00									
11	$27,720,192.31									
12										
13		$0.00	$197,110.54	$334,609.38	$6,251,764.74	$12,370,549.19	$12,728,165.67	$13,096,510.64	$13,475,905.96	$13,866,683.14
14	$72,321,299.24									
15		$0.00	$191,928.47	$317,246.78	$5,771,534.50	$11,120,061.94	$11,441,528.45	$11,772,638.97	$12,113,682.79	$12,464,957.94
16	$65,193,579.83									
17	$37,473,387.52									
18	**2.4**									
19		$0.00	$191,928.47	$509,175.25	$6,280,709.74	$17,400,771.68	$28,842,300.13	$40,614,939.10	$52,728,621.90	$65,193,579.83
20		$2,740,702.41	$5,220,177.54	$14,003,128.60	$16,829,196.82	$19,015,142.88	$21,162,169.26	$23,328,301.31	$25,514,112.21	$27,720,192.31
21		-$2,740,702.41	-$5,028,249.07	-$13,493,953.35	-$10,548,487.08	-$1,614,371.20	$7,680,130.88	$17,286,637.79	$27,214,509.69	$37,473,387.52
22	**2005**									
23										
24	0.027									
25										

6.2.2.1 Tables Summarizing Return on Investment Data

See Appendix 3.

6.2.2.2 Scope of ROI Analysis and Assumptions

See Appendix 4.

6.2.2.3 Costs and Benefits

See Appendix 5.

6.3 Sensitivity Analysis

Resource Risk	Description
Development cost increases by factor of 2	Contractor cost is the most significant factor in determining the ROI ratio.
Project runs 6 months longer than projected	Project management costs for BLM and Contractor for 6 additional months reduces the ROI ratio.
Yearly shared costs double	Reduces ROI ratio.

6.4 Risk Identification and Management

It is uncertain, until the Data Modeling tasks are completed, which functional requirements will be considered Acore@ and commonly shared, and which will be unique to participating members of the Consortium. Maximum use of COTS software and existing software components will be made. NILS Project risks to Consortium members will remain uncertain until a determination is made, during the Data Modeling task, what core functionality ESRI considers part of the ARC/INFO 8.x product line and what constitutes customization for NILS.

The risks and its associated management to the software project undertaken by the contractor are the responsibility of the contractor. Business process risks and project management risks are to be managed by the NILS staff. Section 6.4.1 itemizes the risks which are of concern to the BLM.

Improvements to targeted business practices will depend largely on partner involvement. NILS recognizes the importance of creating a truly common land data base and widely useful tools. The requirements development, through the participation of technical field users from around the country with a variety of business perspectives, should mitigate this risk.

Inexperience with OOAD modeling methodology is being mitigated through a contracted training workshop for Consortium subject matter experts prior to the Requirements Analysis tasks.

6.4.1 Risk Identification

RISK	MITIGATION
Dedicated technology lead from BLM is required	BLM person assigned
Decentralized data conversion effort	QA analysis program; data content standard; GCDB; subsequent enforcement
Missing fundamental user requirements	OOAD process to guide design; user participation in developing requirements.
Late, infrequent deliverables to illustrate progress	Project web site, iterative prototyping; communications plan
Lack of support and/or acceptance because of perceived insufficient input from multiple levels of users	Publicity and support drive, communication plan (outreach program)
Tools do not enforce data model standard and business rules effectively	Methods and behavior inherent in Arc 8 geo object data model, Iterative Prototyping
System not capable of aggregating and splitting land units properly	Design of Use Case functionality for 'Integrate Non-Survey Data', 'Parcel Construction', etc.
Changes in business rules mandated by legislation.	Re-usable software components; versioning; extensibility.
Freedom of Information Act mandates.	Re-usable software components; versioning; extensibility; adaptable security measures.
Software and procedures unfamiliar to users.	Training plans; web-based training; site-specific training programs.
Newly legislated business requirements	Easily versioned software to accommodate new functonalities and business rules.
Changes in Freedom of Information Act (FOIA) requirements.	Same.
Changes in the nature of confidential BLM data and information.	Same.

6.4.2 Risk Management Summary Spreadsheet

See Appendix 6.

Appendix 1. Detailed Gantt Chart and WBS

Appendix 2. Summary Work Breakdown Structure

Appendix 3. Summary of Return on Investment Data

Appendix 4. Return on Investment Assumptions

Appendix 5. Costs and Benefits

Appendix 6. Risk Management Summary Spreadsheet

Priority	Risk Statement	Project Phase	Assigned to:	Overall Risk Rating
1.	Dedicated technology lead from BLM is required	All	NILS Staff	***Risk eliminated*** ***Date : xx/xx/xx***
2.	Decentralized data conversion effort	All	NILS Staff	***Risk static*** ***Date : xx/xx/xx***
3.	Missing fundamental user requirements	All	NILS Staff	***Risk decreasing*** ***Date : xx/xx/xx***
4.	Late, infrequent deliverables to illustrate progress	All	NILS Staff	***Risk eliminated*** ***Date : xx/xx/xx***
5.	Lack of support and/or acceptance because of perceived insufficient input from multiple levels of users	All	NILS Staff	***Risk eliminated*** ***Date : xx/xx/xx***
6.	Tools do not enforce data model standard and business rules effectively	All	NILS Staff	***Risk decreasing*** ***Date : xx/xx/xx***
7.	System not capable of aggregating and splitting land units properly	All	NILS Staff	***Risk decreasing*** ***Date : xx/xx/xx***
8.	Changes in business rules mandated by legislation.	All	NILS Staff	***Risk static*** ***Date : xx/xx/xx***
9.	Freedom of Information Act mandates.	All	NILS Staff	***Risk static*** ***Date : xx/xx/xx***
10.	Software and procedures unfamiliar to users.	All	NILS Staff	***Risk static*** ***Date : xx/xx/xx***
11.	Newly legislated business requirements			

12.	Changes in Freedom of Information Act (FOIA) requirements.	All	NILS Staff	***Risk static*** ***Date : xx/xx/xx***
13.	Changes in the nature of confidential BLM data and information.	All	NILS Staff	***Risk static*** ***Date : xx/xx/xx***

Appendix 7. Business Process Tie to Bureau Architecture