Planning an Enterprise Implementation

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Agenda

- Review of Session Goals
- What is Enterprise GIS?
- Overview of the Enterprise Implementation Process
- Step-by-Step Discussion of the Implementation Process and Recommended Best Practices
Goals for This Session

1. Provide a road map for planning an enterprise GIS project
2. Describe best practices for implementing a successful project
3. Help you plan for risks and avoid common mistakes
4. Provide information on available project planning resources
Scope of This Session

Includes
• Project management perspective
• Best Practices for project lifecycle planning
• Lessons learned from past Enterprise GIS implementations

Does Not Include
• Specific Geodatabase planning advice
• Specific systems architecture sizing guidelines
• Programming advice
GIS Implementation Evolution

Projects

Systems

Networks

Integrated

Coordinated

Cooperative
Enterprise GIS

An enterprise GIS is an integrated, multi-departmental system of components used to collect, organize, analyze, visualize, and disseminate geographic information using a distributed network architecture.

The goal of an enterprise GIS is to implement interoperable technologies, standards, and methods so that GIS data and services can support core business needs more efficiently and more effectively…
GIS is an Information System

For Creating, Maintaining and Using Spatial Information

A Generic Platform for Working With Geographic Information

...Editing, Mapping, Spatial Analysis And Visualization
Project Initiation

Analysis

Operations & Maintenance

Deployment

Planning

Development

Design
Project Initiation

Vision
Approach
Sponsorship
Project Initiation: Defining the Project Vision

• What is the business problem being solved?
• What is the proposed solution?
• Who will be the users?
• How does this solution integrate with other existing or planned systems?
• How will this solution benefit the organization?
• What are the criteria for success?
Project Initiation: Defining the Project Approach

- What are the major components of the solution?
- Will the project be implemented incrementally?
- What will be included in each of the planned phases?
- What is the proposed schedule for all phases?
- What internal resources will be required?
- Will contract support be required?
- What new hardware & software may be required?

...initial scope, schedule, budget
Project Initiation: Gaining Sponsorship

- What are the **benefits** of the project?
- What are the estimated **costs**?
- What is the expected return on investment (**ROI**)?

  – outlines a number of case studies and general methodology for doing cost benefit analysis
Project Initiation: Best Practices

- Identify project stakeholders and understand their criteria for success

- A well defined vision will help avoid scope creep at all stages of the implementation

- Sponsors need to understand real costs – both soft costs and hard costs
  - Will we need to retrain current employees?
  - What are the operational costs after deployment?
  - Will we need to pay for maintenance of custom software?
Analysis

Business Processes

Functional Requirements

Non-Functional Requirements
Analysis: Understanding Your Business Processes

High-level workflow process

- Examine request for survey
- Define and prepare survey project
- Perform field survey
- Survey workflow approval
- Create survey plats
- Document field survey
- Import survey project data
- Update data for the township
- Perform regional analysis
- Perform legal description
- Section subdivision
- Perform township analysis
- Upload GCDB/LSI data

Detailed workflow process

...and Re-Engineering the Process
Business Process Modeling: Best Practices

- Spend time with the users understanding their current processes and pain points

- Document the As-Is and To-Be business processes

- Choose an effective method for documenting the processes and communicating with the Subject Matter Experts
  - Cross Functional Flow Diagrams (Swim Lanes)
  - Use Cases
  - Many others….
Analysis: Defining Requirements

- Requirements should
  - describe WHAT not HOW
  - only contain one requirement
  - be unambiguous, measurable, and achievable
  - be “testable”

- Use the Socratic method to ensure complete communication
Analysis:
Non-Functional Requirements

- User Interface Requirements
- Integration/Interoperability Requirements
- Operational Requirements e.g. 24 x 7 uptime
- Security Requirements
- Accessibility/Section 508 Compliance Requirements
- Maintenance and System Administration Requirements
- Documentation Requirements
Analysis: Best Practices

• **Communicate** the project vision to the users and developers

• Identify **subject matter experts** to help define the “what”

• Do not confuse “how” with “what”

• Each functional and non-functional requirement should meet a specific **business need**

• Verify that the requirements are **correct and complete** – get sign-off
Define and maintain a common vocabulary

Define requirements in terms of the business need, NOT the technical solution

Document exceptions as well as normal courses

What is a parcel?…

“System must provide the ability to edit in a spreadsheet”

Sometimes the standard format is not standard…
Planning

Scope
Schedule
Resource Requirements
Budget
Risks
Planning
(Mapping the Solution)

• Define the overall scope and an *iterative release plan*

• Define the team *roles & responsibilities*

• **Communicate the solution** strategy to the stakeholders and user community

……be realistic !
Communicating the Proposed Solution

Manager starts framework

Queries for 'Needs Approval' Jobs

Manager loads/reviews the project deliverables

Export points, coordinates, measurements from PGDB

Start ArcCatalog

Update job status

Update survey

Update Field Notes

Update survey plat

Approve

Reject

Import into NILS approved EGDB

ArcMap

ArcCatalog

NILS

FINISH

ESRI International User Conference 2004
Planning:
Defining a Detailed Workplan

• Demo/Example
Planning: Identifying Resource Requirements

- **People**
  - Identify available resources
    - Subject Matter Experts
    - Business Analysts
    - Database Specialists
    - Programmers
    - Testers
    - Trainers
    - Database Administrators
  - Identify training, hiring, and/or contracting needs

- **Stuff**
  - Identify existing data resources
  - Identify existing HW/SW infrastructure

- Conduct a **gap analysis** between available and required resources
Planning: Identifying Risks

• **Internal**
  – Staff
  – Budget
  – Schedule
  – User Expectations

• **External**
  – Hardware failure
  – “3rd party” software release schedules
  – Integration issues
  – Natural disaster
Planning: Best Practices

• Each release should provide a measurable business benefit

• Allow enough time/budget for “invisible tasks”
  – user and design reviews
  – code management
  – test environment management

• Include Pilots/Prototypes in the schedule

• Plan for follow-up performance tuning review and updates

• Keep the end goal in sight
Planning: Lessons Learned

- Plan for the unexpected, be agile

- Allow enough time/budget for performance tuning – both during and after deployment

- Release activities are expensive – space releases accordingly

The case of the missing flat files

At this rate it going to take 38 years....
Design

Data Model

Application Components

HW/SW Architecture

Integration
Design
(Architecting the Solution)

• Begin with a **conceptual design** for the overall solution
• Gain approval for the concept
• Divide the solution into manageable **components**
• Identify teams for component design and development
• Periodically **revisit the overall vision**!
Design: Database Design

**Conceptual Modeling**
- ID Data Steward
- Review Business Processes & Information Products
- Develop Conceptual Model
- Review by Stakeholders
- Update Conceptual Model

**Logical Modeling**
- Review Existing Standards
- Develop Logical Model
- Review by Stakeholders
- Prototype Logical Model in PGDB
- Update Logical Model

**Physical Modeling**
- Develop GDB Physical Model
- Pilot & QC GDB Physical Model
- Review by Stakeholders
- Update & Finalize Model
- Implement Model
Database Design: Best Practices

• Begin with a review of the solution requirements

• Identify requirements for integration with other enterprise systems

• Leverage existing standards and best practices

• Start with a conceptual design, gain buy-in, then elaborate through the logical and physical models

Many other TWs this week…. e.g Planning an Enterprise Geodatabase Solution
Design: Application Design

- Understand **COTS capabilities**; conduct a gap analysis against required functions

- **Describe** the proposed solution(s)
  - Use Cases
  - GUI-based storyboards
  - Design/Component Specifications

- **Communicate** the proposed solution to the end users

- **Iterate** the design based on user feedback
Design: Integrating with Other IT Systems

Services-Oriented Architecture

Enterprise Service Bus

GIS Web Services

GIS data

Workflow integration via web services and messaging

ERP

CRM

SCM
Design:
Integrating with Other IT Systems

• Identify **touch-points** between systems

• Review **network configuration**

• Identify available **interfaces**
  – ArcGIS Server / web services
  – Review DBMS and ArcSDE interfaces
    • **DBMS**: JDBC, SQL, OLEDB/ADO, ODBC, DBMS specific APIs
    • **ArcSDE**: OLEDB/ArcObjects, C and Java API, SQL

Identify a solution suited to the end user…which may not be GIS-centric
Design: Best Practices

- Use a common design methodology
- *Leverage COTS* capabilities where possible
- Promote project-wide *reusability*….this requires communication!
- Keep design documentation current
Design: Best Practices

• Hold regular design reviews with the SMEs

• Use web-based demos with distributed teams (Placeware, WebEx, Netmeeting)
Design: Lessons Learned

- Conduct a thorough **gap analysis** of requirements vs. COTS capabilities
- Design for scalability
- Document **why** design decisions were made

The case of the custom table editor
86 million rows in the states lineage!
Evolution back to the ArcGIS parcel model
Development

Configuration Management

Programming

Testing
Configuration Management: Best Practices

• Plan for development & testing hardware
  – need development servers, test servers, etc.
  – should attempt to duplicate the target deployment configuration

• Establish a configuration management team
  – schedule daily builds and installs
  – manage computing resources
Configuration Management: Best Practices

- Implement **source code control** (e.g., Visual SourceSafe)
- Plan for future releases and patches e.g. branch the source for each release
- Establish *and use* a **defect tracking system**
- Communicate the **status** of defects with the users
Development: Managing the Development Cycle

• **Decompose** development cycle into individual tasks:
  – Can be owned by a single lead programmer
  – Can be demonstrated and tested
  – >1 day < 40 days duration

• Work with the programmers to define the development schedule and milestones

• Check status regularly

• Pray
Development: Best Practices

- Technical Lead should conduct regular peer/code reviews
- Implement logging to facilitate problem analysis
- Use the registry for configuration settings (avoids recompiling)
- Beware of so-called "simple" fixes
Testing: Best Practices

- Document the test plan
- Conduct unit testing
- Conduct regression testing
- Test for scalability
Testing: Best Practices

- Define and implement the QA cycle early
- Test environment should be the same as the deployment environment
- Document and automate test protocols
Development: Lessons Learned

✓ The smallest changes can cause the biggest problems

✓ May need multiple test/development environments (servers) to support large projects

✓ Test in true multi-user mode to reveal potential operational problems

Color coding the log file slowed the import process

“Everybody please log off the server”

We optimized the importer and now nothing works!
Development: Lessons Learned

- Conduct peer reviews and communicate with your peers
- Development must be done using target technology e.g. Citrix, ArcSDE, etc.

The case of the two status tables

“The maps look great on my machine”
Deployment: Installation

- Deliver release notes detailing release functionality, known fixes, known defects
- Make any custom application installations as simple as possible
  - Many admins do not read instructions/docs!
Deployment: Installation

- Work with system and database administrators to plan the *install schedule* …they may already have other project deployments planned
- Schedule time for setting up *user accounts* and privileges
- **Train** the administration team in ArcSDE and ArcGIS
Deployment: Testing and Acceptance

- Test plans and scripts should be developed during the design and development phases
- Well defined requirements and use cases can be easily used to create test scripts
- Verify the installation environment
  - Are the user accounts set up properly?
- Test the tests before the test!
  - Avoids surprises
  - Avoids confusion
Deployment: Training

- Training plans are developed during the planning phase

- Start with core technology training

- Consider more in depth training for super users who will support casual users
Deployment: Training

• Schedule a training “refresh” several months after initial training

• Custom application training materials should be *workflow-based* not button-based

• Explain “why” and the users will typically retain more knowledge
Performance Tuning

- Establish appropriate **performance guidelines** based on business needs
- Establish **performance baselines** via ongoing performance monitoring
- Adjust compress/maintenance schedule after deployment based on real-world usage and need
Deployment: Best Practices

• Involve IT/technical staff early and explain the big picture – they can help you get there

• Train the users in COTS ArcGIS skills even if a custom solution is developed
Deployment: Best Practices

- Establish a *chain of command* for:
  - Issues (bug reports)
  - Routine maintenance
  - Troubleshooting
  - Installations
  - General operations and support

- Install a *technical resource* at the client site with the project if possible/necessary

- *Work with users* who are having concerns, questions, or comments and respond in a timely manner
Operations and Maintenance

User Support
Release Management
Change Control
System Tuning

The Project Lifecycle does not end with deployment!
Operations and Maintenance: User Support

- Provide *Ongoing Training*
  - Live
  - Web-based
  - Archives

- Implement a *Support Desk*
  - Bug Reporting
  - Enhancement Requests
  - FAQs

- **Communicate** release plans and target dates for bug fixes
Operations and Maintenance: Release Management

• Plan for **beta releases** and hands-on user review – before going live

• **Allow time** to implement required changes after beta reviews

• Allow enough time between releases
  ~6 months for major releases
Operations and Maintenance: Change Control

- Define a change control process during the planning stage
- Require approval before responding to enhancement requests
- Communicate release plans to the users frequently
Operations and Maintenance: System Tuning

- Set realistic expectations with the users
- Plan for system tuning after each installation
- Develop administrative procedures to automate system tuning
Operations and Maintenance: Best Practices

- Define a Support Desk function at the deployment site
- Train the support staff to diagnose and resolve basic problems
- Plan for remote access to the client site (VPN)
- After each release, review lessons learned and update processes as needed
Summary

Remember the users

Plan for the unexpected

Keep the end goal in sight

Communicate!
More Information

• Other Technical Workshops this week
  – ArcGIS Geodatabase: Planning an Enterprise Geodatabase Solution
    • Wed 8:30 AM Room 15-B (SDCC)
    • Thu 1:30 PM15-B (SDCC)
  – Enterprise GIS: System Design and Configuration Strategies
    • Wed 3:30 Room 3 (SDCC)
  – Enterprise GIS: ArcGIS and Websphere – Adding GIS functionality to Enterprise Applications
    • Thu 3:30 Room 6-D (SDCC)
  – MANY others…..
More Information

• ESRI Enterprise Advantage Program
  – this should be the bare minimum on large enterprise projects
• Project Center Website
  – support.esri.com
• ESRI Professional Services
• ktaylor@esri.com
Questions?