Planning an Enterprise Implementation

Kate Taylor

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

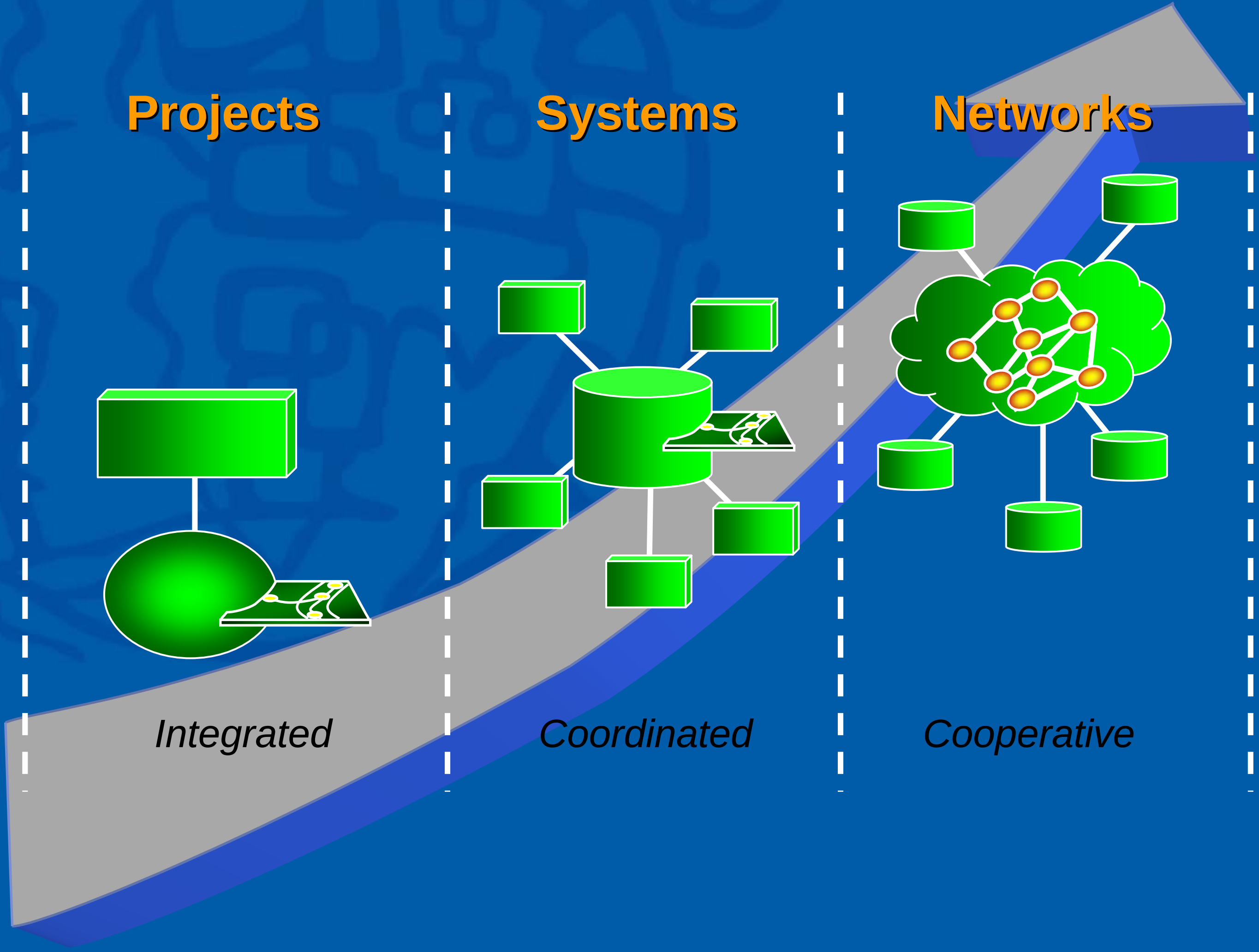
Includes

- 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

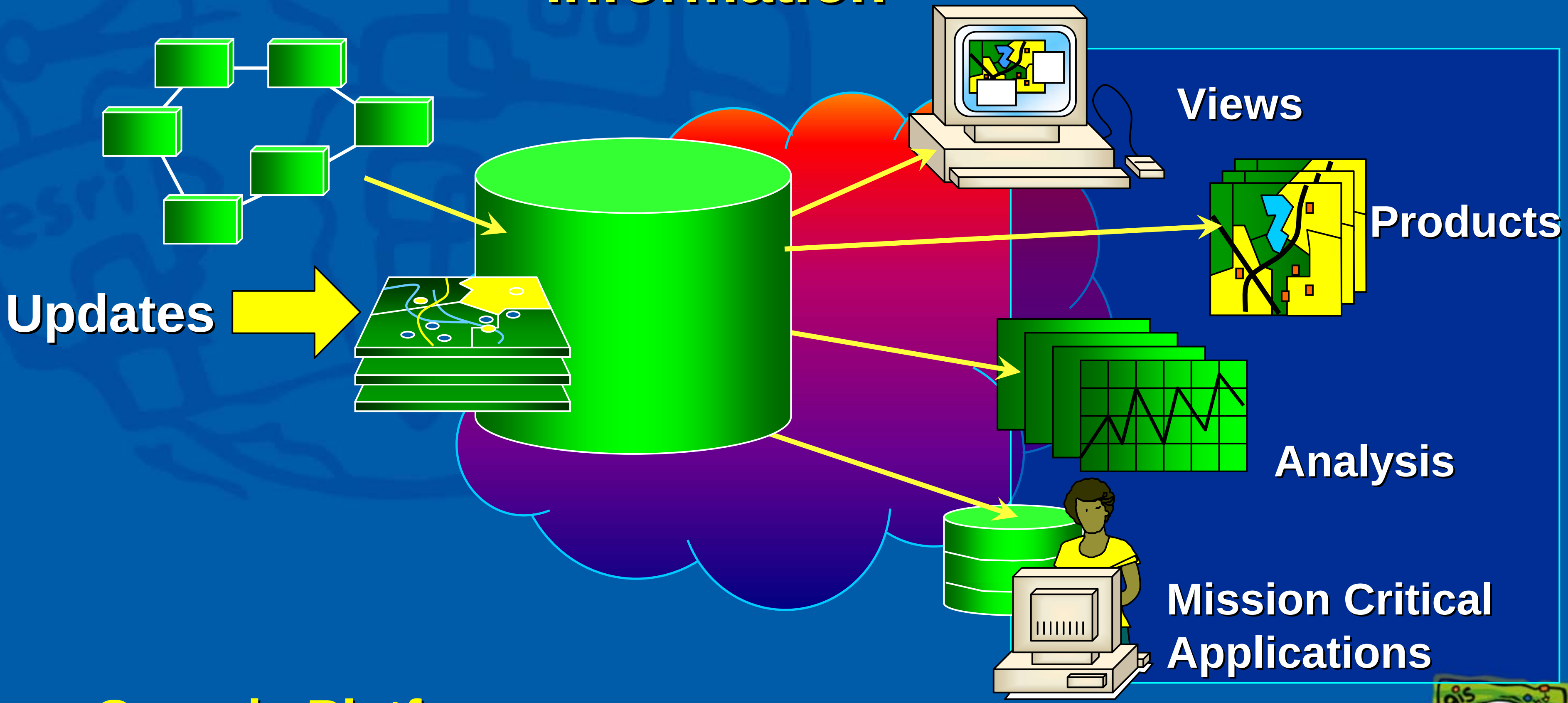
Enterprise GIS

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…

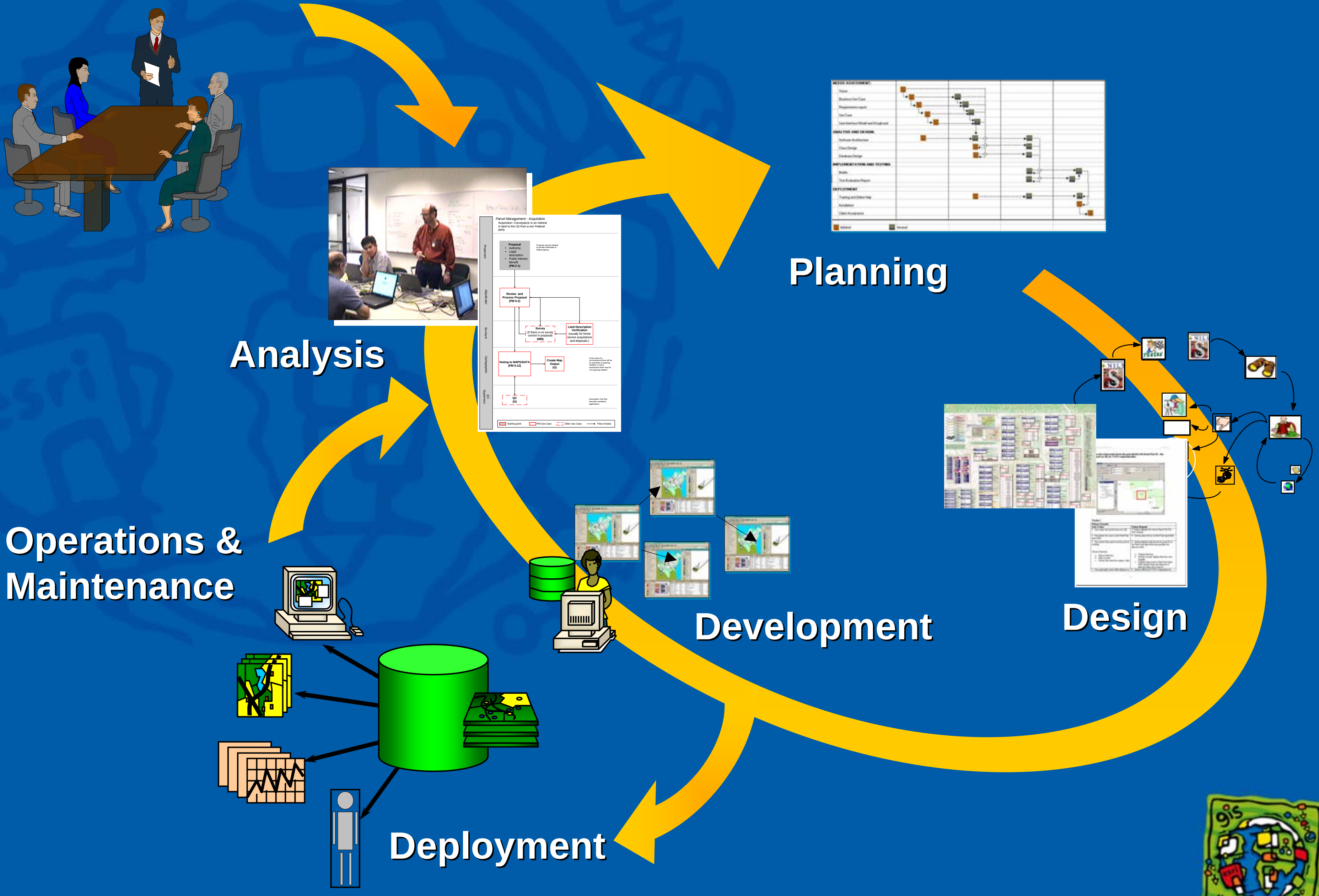
GIS is an Information System

For Creating, Maintaining and Using Spatial Information



….A **Generic Platform** for Working With Geographic Information
…Editing, Mapping, Spatial Analysis And Visualization

Project Initiation



Analysis

Planning

Design

Development

Deployment

Operations & Maintenance

Parcel Management - Acquisition
Acquisition: Conveyance in an interest in land to the US from a non Federal party
Proponent
Adjudicator
Surveyor
Cartographer
QC Supervisor
Proposal
• Authority
• Legal description
• Public Interest Benefit
(PM 2-1)
Proposal may be initiated by private individuals or federal agency
Review and Process Proposal (PM 0-2)
Survey (if there is no survey control in proposal) (MM)
Land Description Verification (usually for forest service acquisitions and disposals)
Noting to MAPS/DATA (PM 0-12)
Create Map Output (G)
In the case of a reconveyance there will be an automatic re-opening notation; in some acquisitions there may be a re-opening notation
QC (G)
Assumption: this flow describes serialized applications
Starting point
PM Use Case
Other Use Case
Flow of tasks
NEEDS ASSESSMENT
Vision
Business Use Case
Requirements report
Use Case
User Interface Model and Storyboard
ANALYSIS AND DESIGN
Software Architecture
Class Design
Database Design
IMPLEMENTATION AND TESTING
Builds
Test Evaluation Report
DEPLOYMENT
Training and Online Help
Installation
Client Acceptance

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

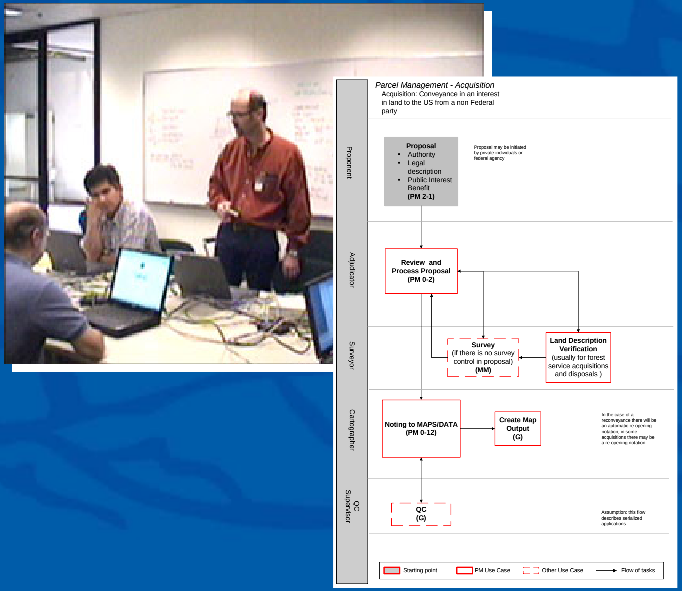
Project Initiation:
Gaining Sponsorship

- What are the benefits of the project?
- What are the estimated costs?
- What is the expected return on investment (ROI) ?
- New book from ESRI Press: *Measuring Up*
  - 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



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▨ Starting point □ PM Use Case ⬚ Other Use Case → Flow of tasks

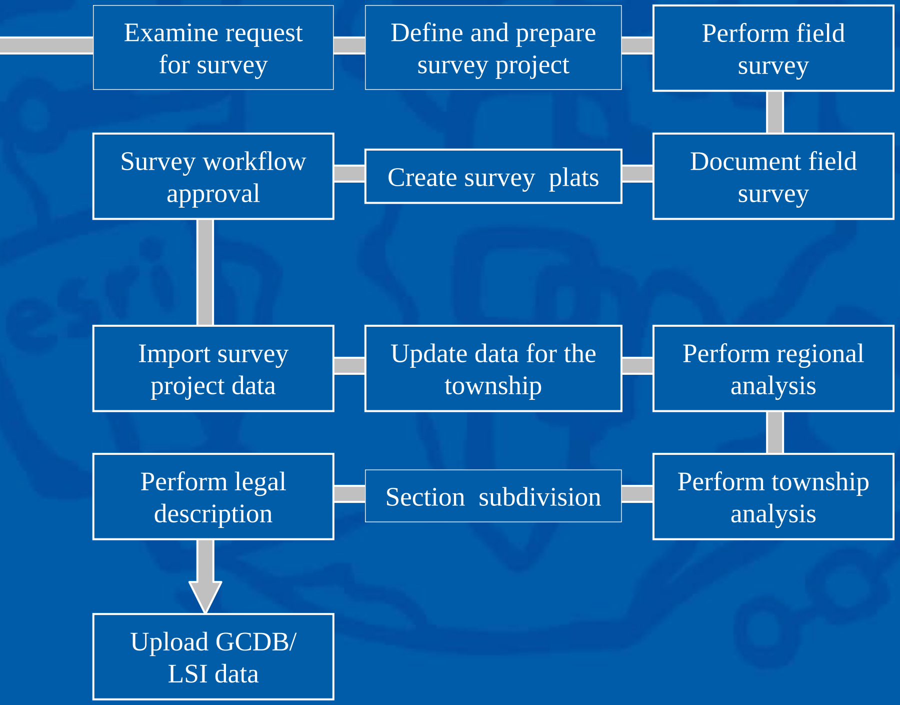
Business Processes

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

Document field survey

Create survey plats

Survey workflow approval

Import survey project data

Update data for the township

Perform regional analysis

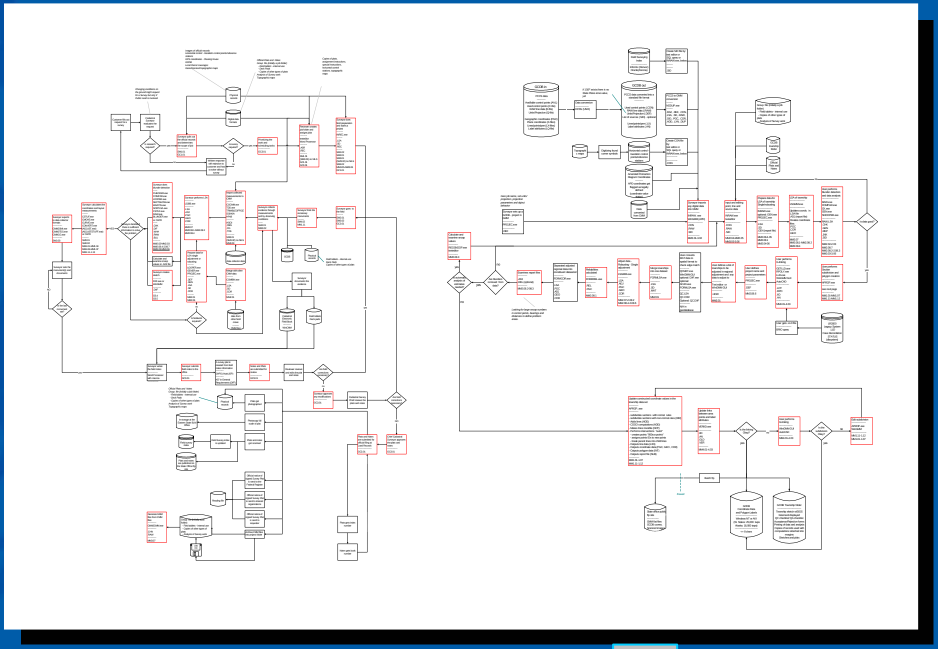
Perform township analysis

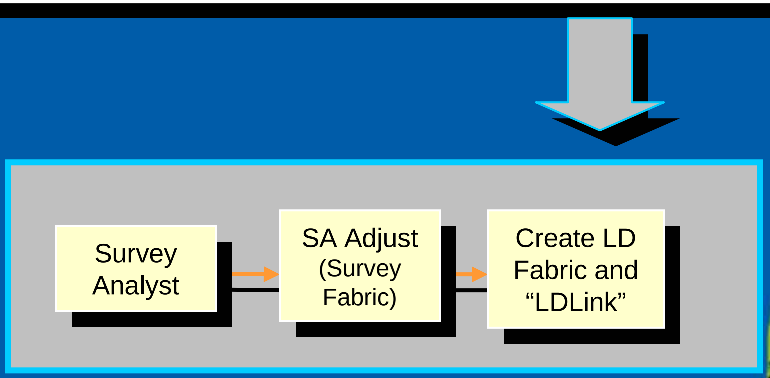
Section subdivision

Perform legal description

Upload GCDB/ LSI data

Detailed workflow process





Survey Analyst

SA Adjust (Survey Fabric)

Create LD Fabric and “LDLink”

…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

Analysis: Lessons Learned

- ✓ Define and maintain a common vocabulary

What is a parcel?…

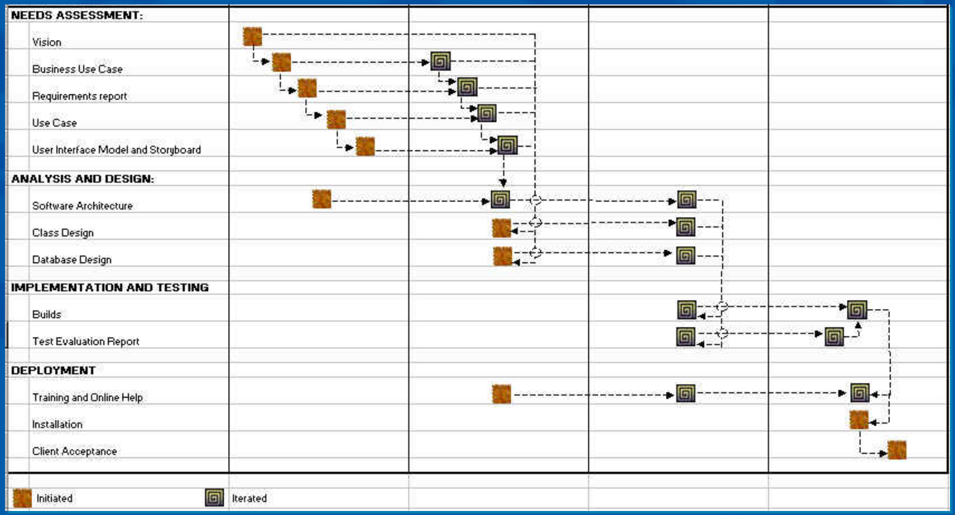
- ✓ Define requirements in terms of the business need, NOT the technical solution

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

- ✓ Document exceptions as well as normal courses

Sometimes the standard format is not standard…

Planning



NEEDS ASSESSMENT:

Vision

Business Use Case

Requirements report

Use Case

User Interface Model and Storyboard

ANALYSIS AND DESIGN:

Software Architecture

Class Design

Database Design

IMPLEMENTATION AND TESTING

Builds

Test Evaluation Report

DEPLOYMENT

Training and Online Help

Installation

Client Acceptance

▨ Initiated ▣ Iterated

Scope

Schedule

Resource Requirements

Budget

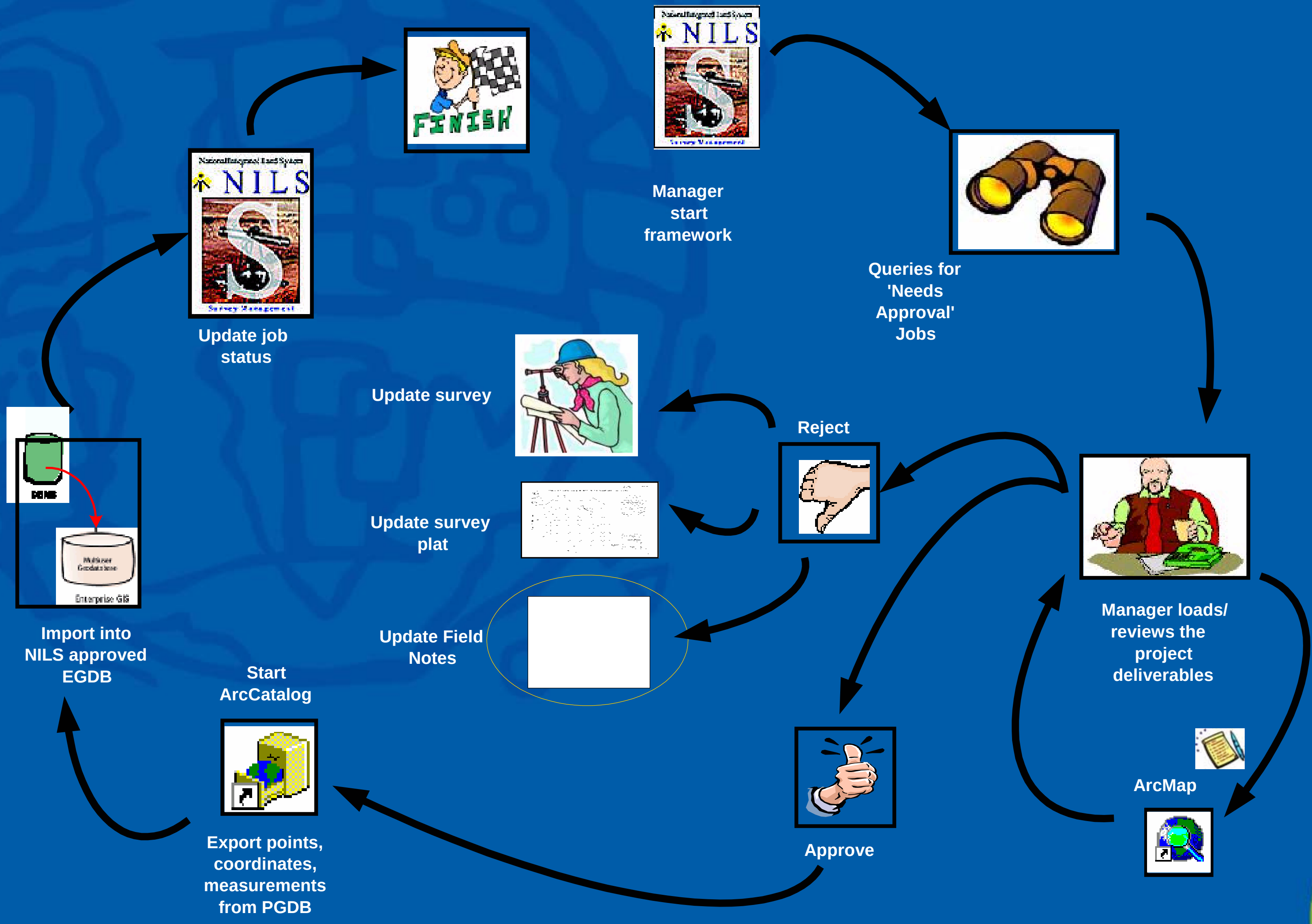
Risks

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 start framework

Queries for 'Needs Approval' Jobs

Manager loads/ reviews the project deliverables

ArcMap

Reject

Update survey

Update survey plat

Update Field Notes

Approve

Start ArcCatalog

Export points, coordinates, measurements from PGDB

Import into NILS approved EGDB

Update job status

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

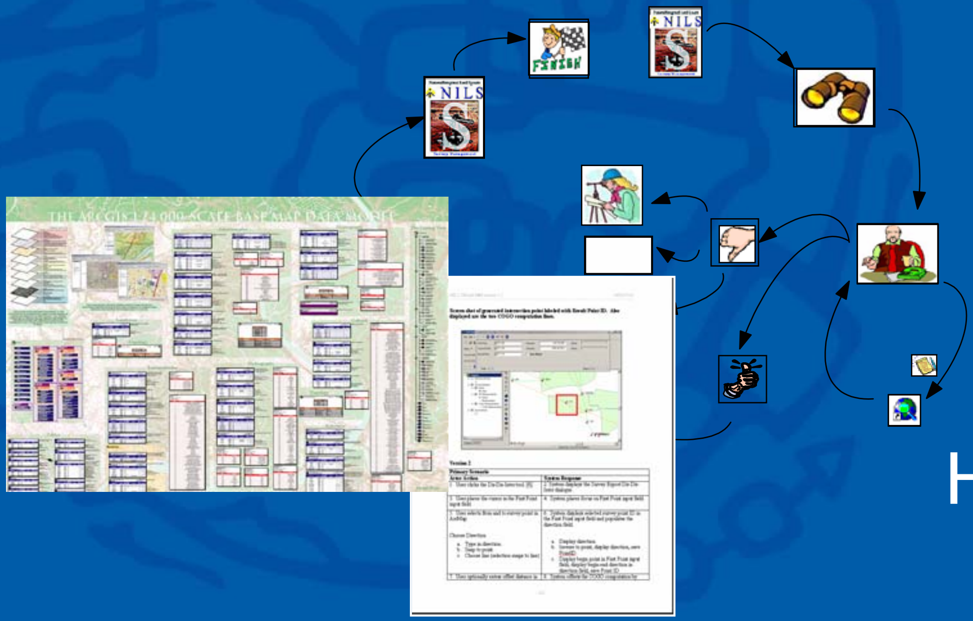
✓ Allow enough time/budget for performance tuning – both during and after deployment

✓ Release activities are expensive – space releases accordingly

The case of the missing flat files

At this rate it going to take 38 years….

Design



Screen shot of generated intersection point labeled with Result Point ID. Also displayed are the two COGO computation lines.

Version 2

Primary Scenario	
Actor Action	**System Response**
1. User clicks the Dir-Dis Intersection tool.	2. System displays the Survey Report Dir-Dis Inters dialogue.
3. User places the cursor in the First Point input field	4. System places focus on First Point input field.
5. User selects from and to survey point in ArcMap. Choose Direction a. Type in direction. b. Snap to point. c. Choose line (selection snaps to line)	6. System displays selected survey point ID in the First Point input field and populates the direction field. a. Display direction. b. Inverse to point, display direction, save PointID. c. Display begin point in First Point input field, display begin-end direction in direction field, save Point ID.
7. User optionally enters offset distance in	8. System offsets the COGO computation by

Data Model

Application Components

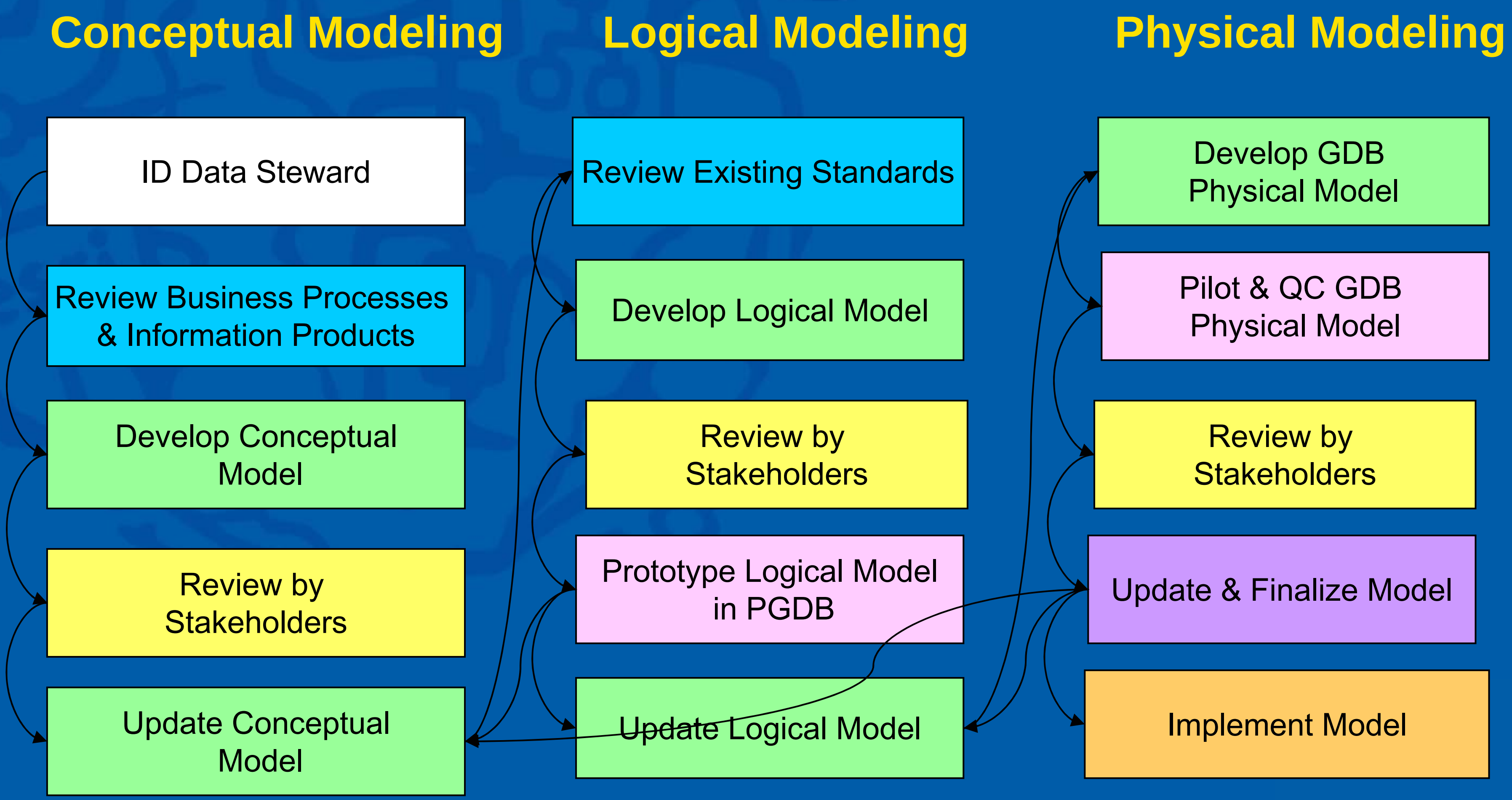
HW/SW Architecture

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



Database Design: Best Practices

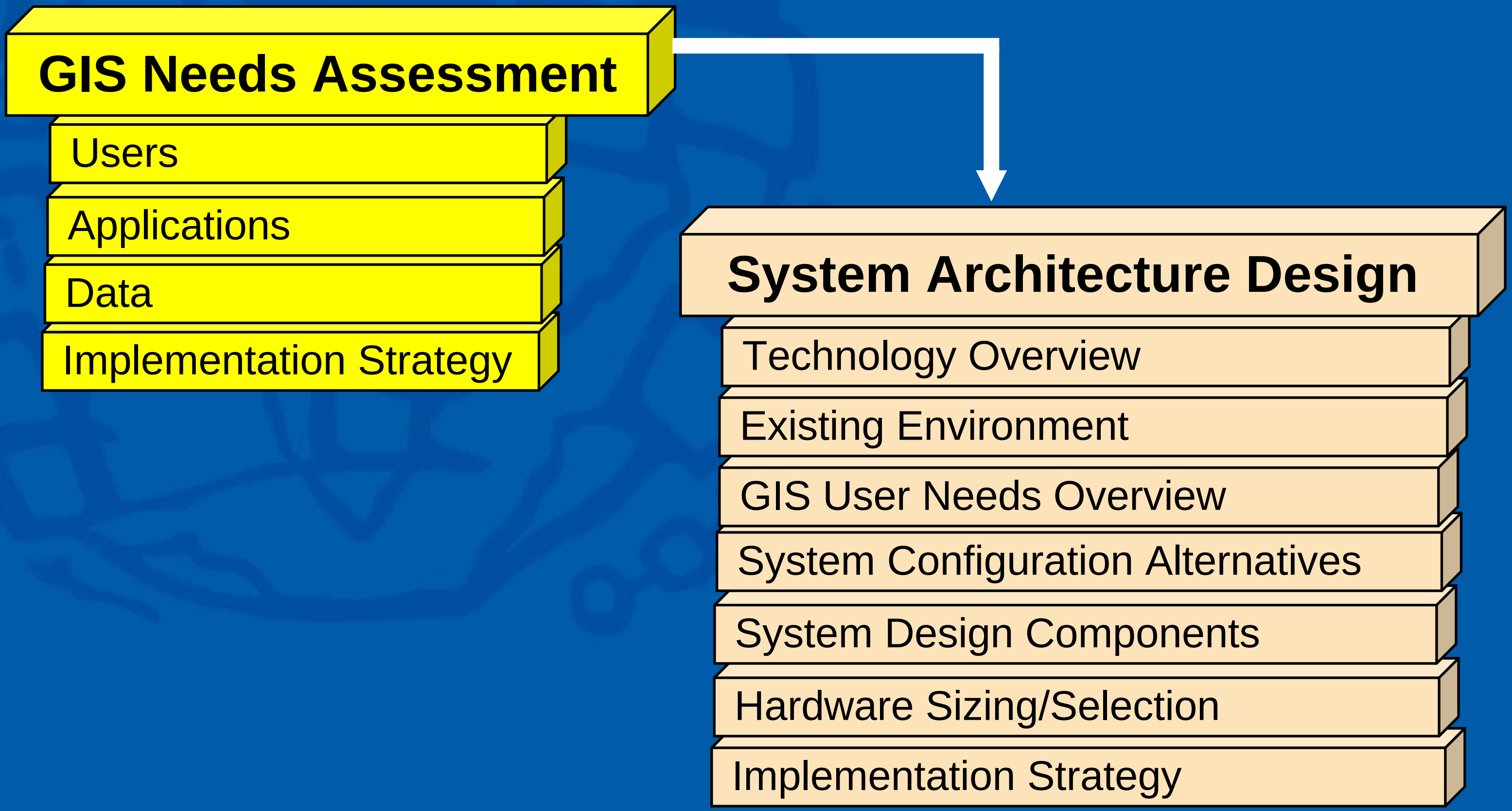
- Begin with a review of the solution requirements
- Identify requirements for integration with other enterprise systems
- Leverage existing standards and best practices
- Start with a conceptual design, gain buy-in, then elaborate through the logical and physical models

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:
Hardware Architecture



GIS Needs Assessment

- Users
- Applications
- Data
- Implementation Strategy

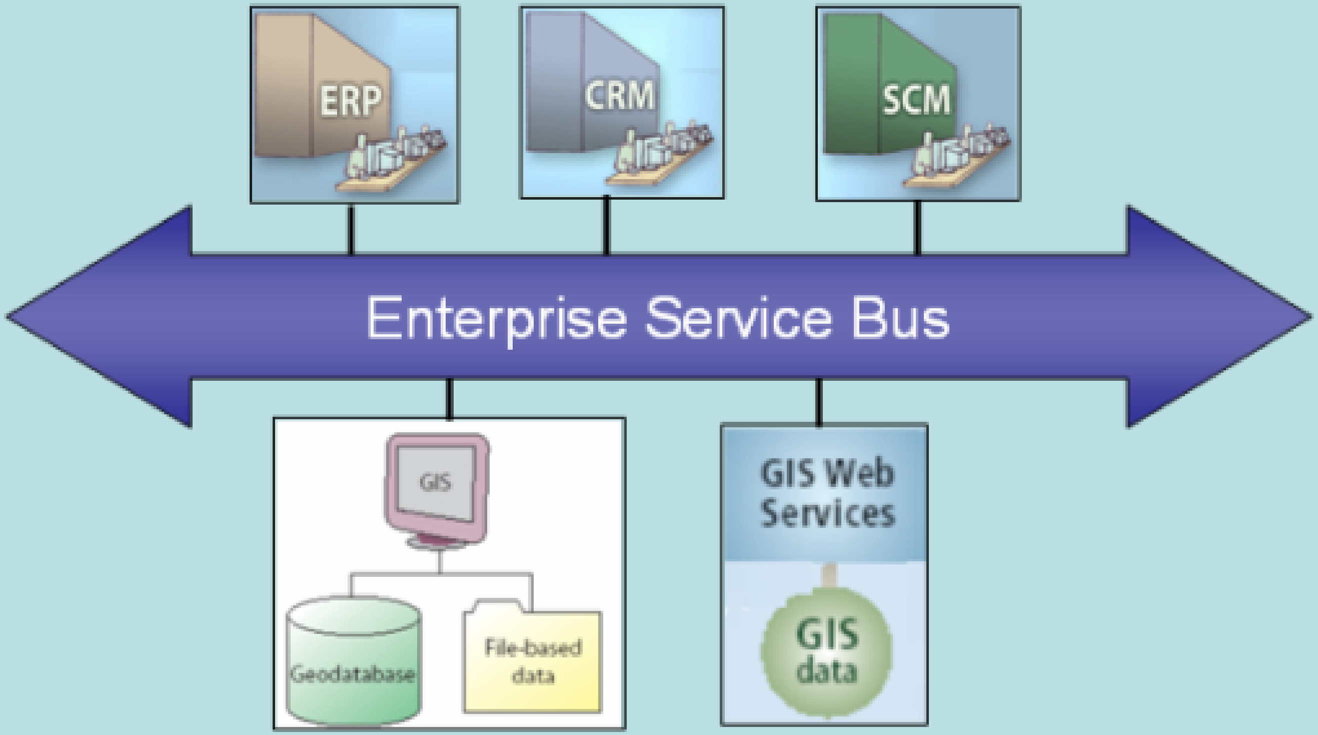
System Architecture Design

- Technology Overview
- Existing Environment
- GIS User Needs Overview
- System Configuration Alternatives
- System Design Components
- Hardware Sizing/Selection
- Implementation Strategy

More Info: TW – Enterprise GIS: System Design and Configuration Strategies

Design:
Integrating with Other IT Systems

Services-Oriented Architecture



ERP

CRM

SCM

Enterprise Service Bus

GIS

Geodatabase

File-based data

GIS Web Services

GIS data

Workflow integration via web services and messaging

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

The case of the custom table editor

✓ Design for scalability

86 million rows in the states lineage!

✓ Document why design decisions were made

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

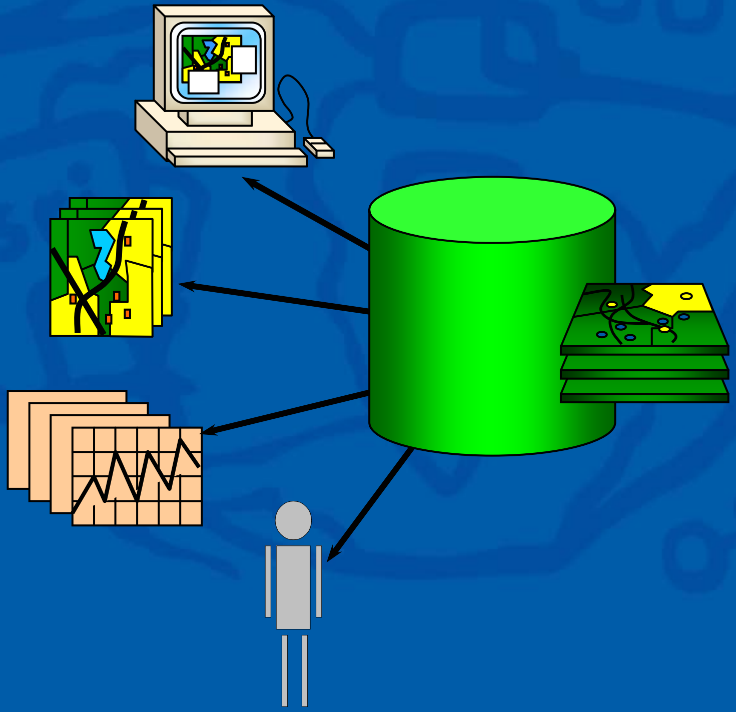
✓ Conduct peer reviews and communicate with your peers

The case of the two status tables

✓ Development must be done using target technology e.g. Citrix, ArcSDE, etc.

“The maps look great on my machine”

Deployment



Installation

Testing and Acceptance

Training

Tuning

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

The Project Lifecycle does not end with deployment!

User Support

Release Management

Change Control

System Tuning

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
  - http://www.esri.com/eeap/index.html
  - this should be the bare minimum on large enterprise projects
- Project Center Website
  - support.esri.com
- ESRI Professional Services
  - http://www.esri.com/consulting/index.html
- ktaylor@esri.com

Questions?