

Design a Geodatabase

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Agenda

Design a Geodatabase

- Overview
- Key Factors
- Design
 - Recommendations

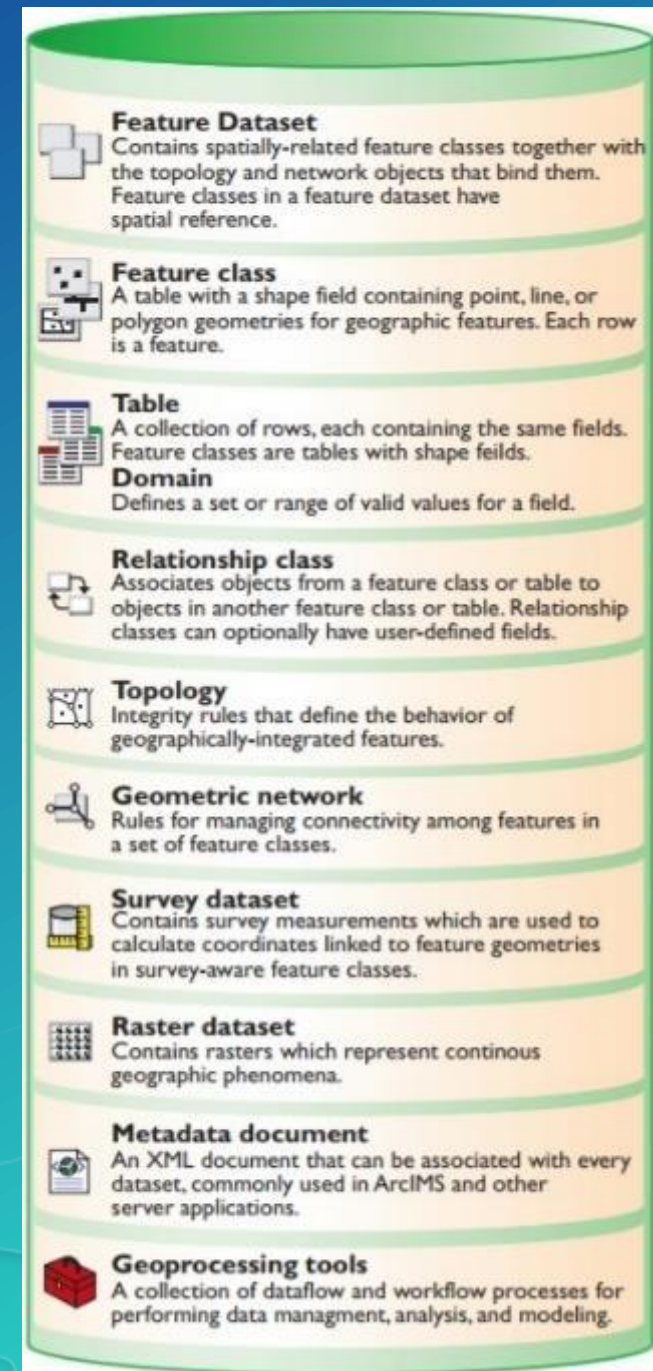
Key Considerations, Best Practices and Recommendations / Lessons Learned!

Overview

What is a Geodatabase (GDB)?

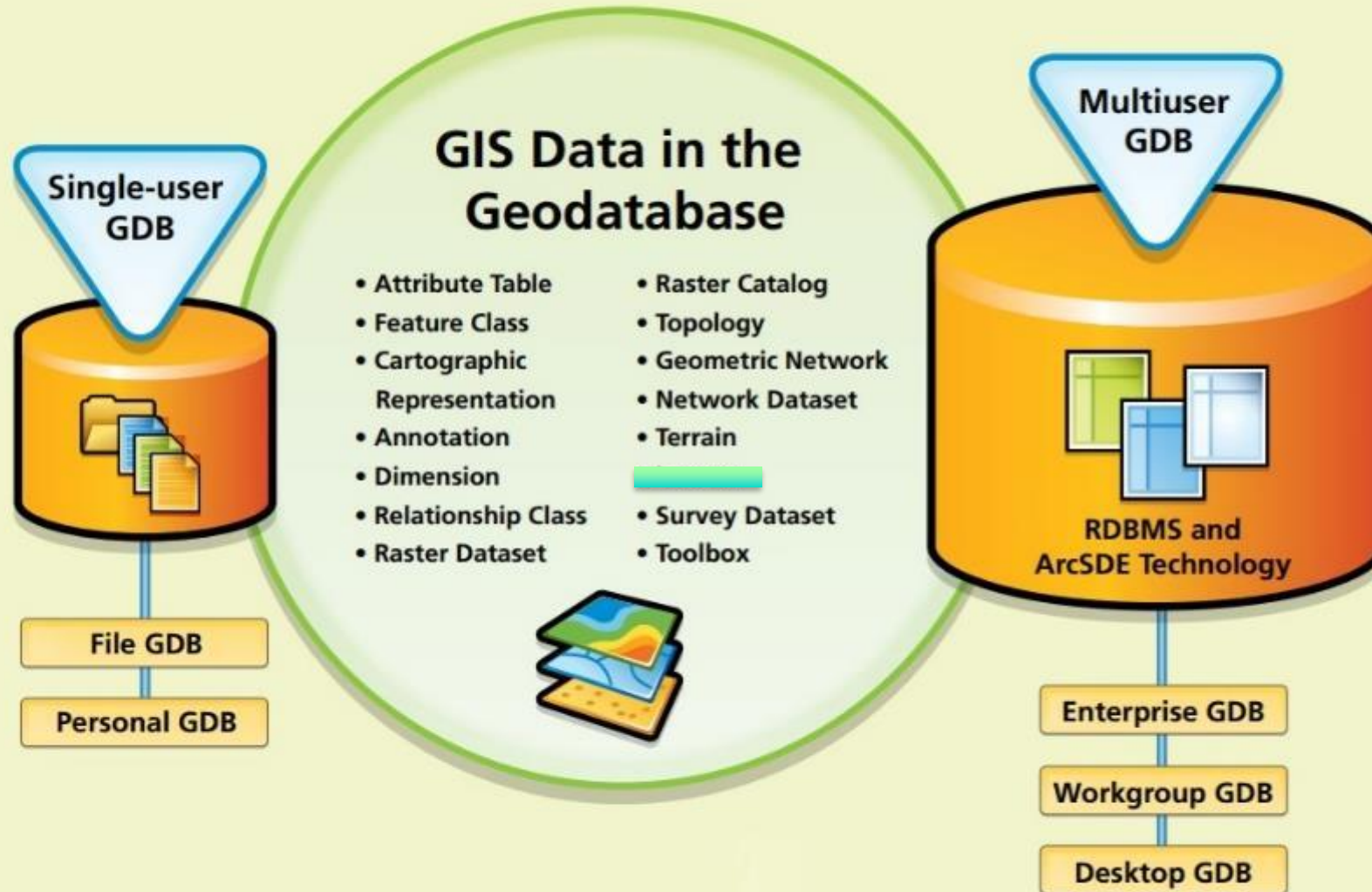
- Collection of Geographic Datasets of Various Types Stored in:
 - Common File System Folder
 - *Microsoft Access Database*
 - Multiuser Relational DBMS* / ArcSDE
 - Oracle
 - Microsoft SQL Server
 - PostgreSQL
 - Informix, IBM DB2
- Native Data Structure for ArcGIS
- Primary Data Format Used for Editing and Data Management
- Comprehensive Approach to Modeling and Managing Spatial Data

* DBMS – Database Management System



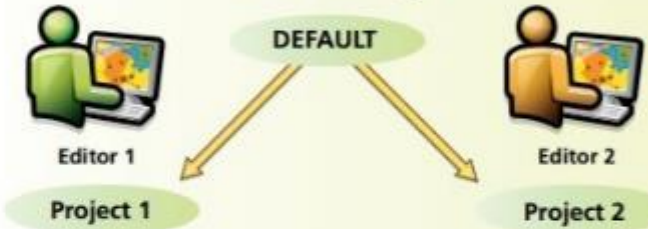
Design a Geodatabase

Types of Geodatabases



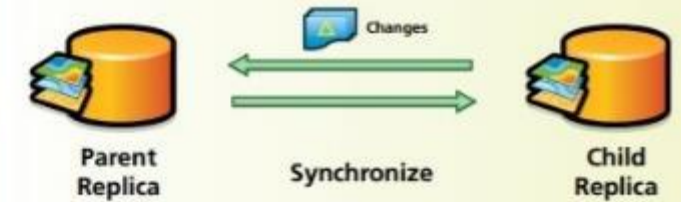
Functionality

Versioning



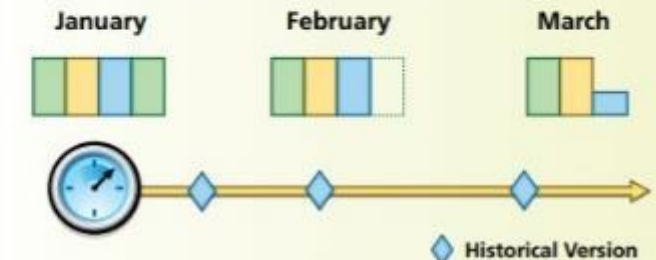
Versioning is the framework that enables multiple users to access and edit the same data simultaneously and provides long transaction (i.e., database changes that span long periods of time) support.

Geodatabase Replication



Enables GIS data to be shared across two or more geodatabases. Data changes can be made in each geodatabase, then synchronized. Two-way, one-way, and checkout/check-in replication workflows are supported.

Geodatabase Archiving



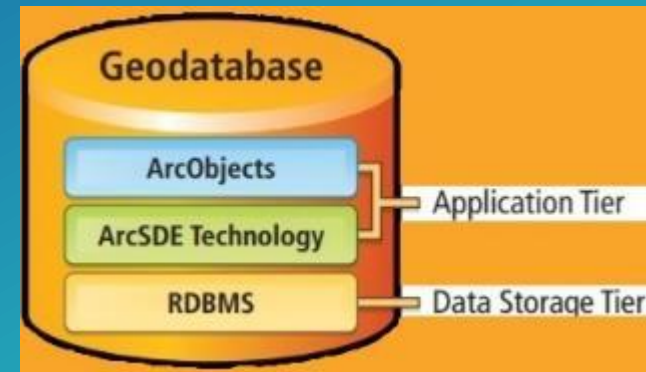
When enabled on a dataset, archiving captures any and all changes made to the dataset in the DEFAULT version of the multiuser geodatabase.

Key Factors

Expensive Rework

Prevention is Better Than Cure!

- Data Model Designs
 - *Change in XY Tolerance*
 - *Multiple Projections*
 - *Objectid as Primary Key for Relationship Classes, etc.*
- Data Conversion Specifications
 - *Extra Vertices*
 - *Insufficient QA/QC*
 - *Large Feature Extent*
 - *Possibly by Data Conversion / Testing*
 - *Loading Static Raster Data Into GDB, etc.*



Avoid Pitfalls!

Expensive Rework

Prevention is Better Than Cure!

- **Hardware**
 - Older Processor
 - Lesser Capacity, etc.
- **Software**
 - Version Selection including Patches
 - Utility Industry ArcGIS Desktop Version 10.2.1 (~~10.2.2~~)
 - ArcGIS Server Version Can Be Higher

Avoid Pitfalls!

Expensive Rework

Prevention is Better Than Cure!

- **System Integration**
 - Inefficient Interface Design
 - Version Difference for Each Version
 - Data Sharing with Other Systems Takes Hours, If not Days!
 - Synchronization Frequency
 - etc.

Avoid Pitfalls!

Performance and Scalability

Risks

- Workflow

- Number of Outstanding Versions,
- Versioning Levels
- etc.

- Maintenance

- Compact and Compress FGDB
- Total Delta Table Records,
- GDB Maintenance
- etc.

```
Exec DEMS_STATS.GATHER_SCHEMA_STATS ('ARCFM', estimate_percent=>100,  
DEGREE=> 7, CASCADE=>TRUE, No_Invalidate=>false);  
SQL> select sum(num_rows) as Total_A_Table_Rows from dba_tables  
       where table_name in (select 'A' || registration_id from sde.table_registry);
```

TOTAL_A_TABLE_ROWS

3,813,927

```
SQL> select sum(num_rows) as Total_D_Table_Rows from dba_tables  
       where table_name in (select 'D' || registration_id from sde.table_registry);
```

TOTAL_D_TABLE_ROWS

3,560,428

Separate Myths from Evidence Based Facts!

Dependencies

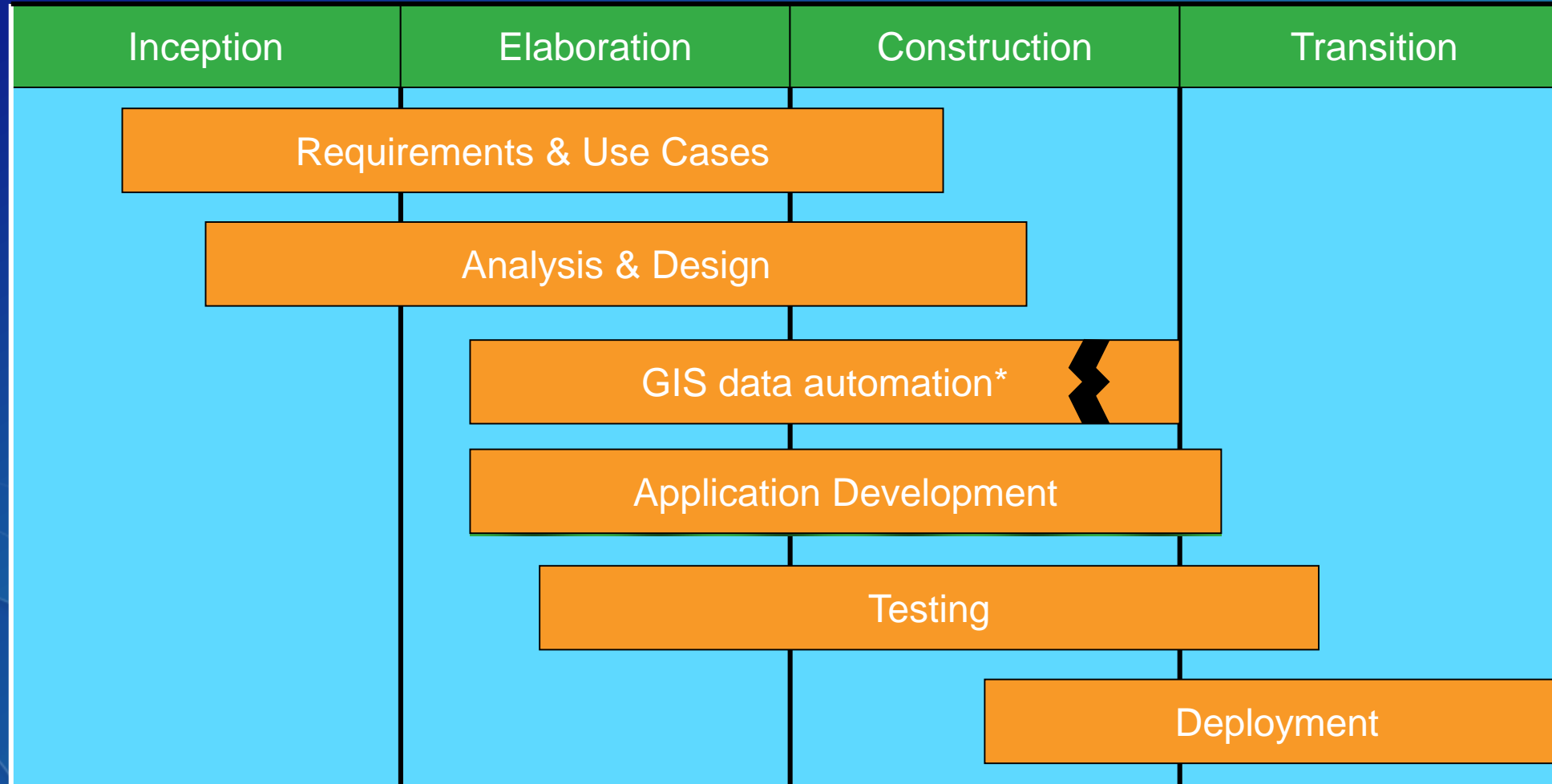
Intrigue Challenges!

- **Key Inputs**
 - User / Business Groups
 - Functional and Non-Functional Requirements
 - Application Designs
 - etc.
- **Need a Dedicated / Assigned ArcSDE Administrator**

Talk to the Right People to Get the Right Information!

Design

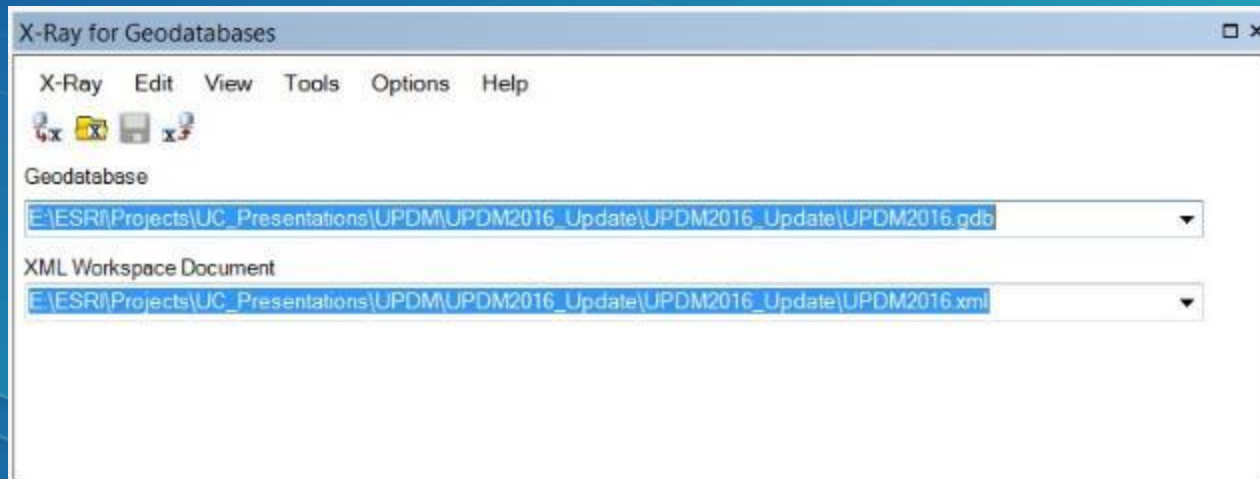
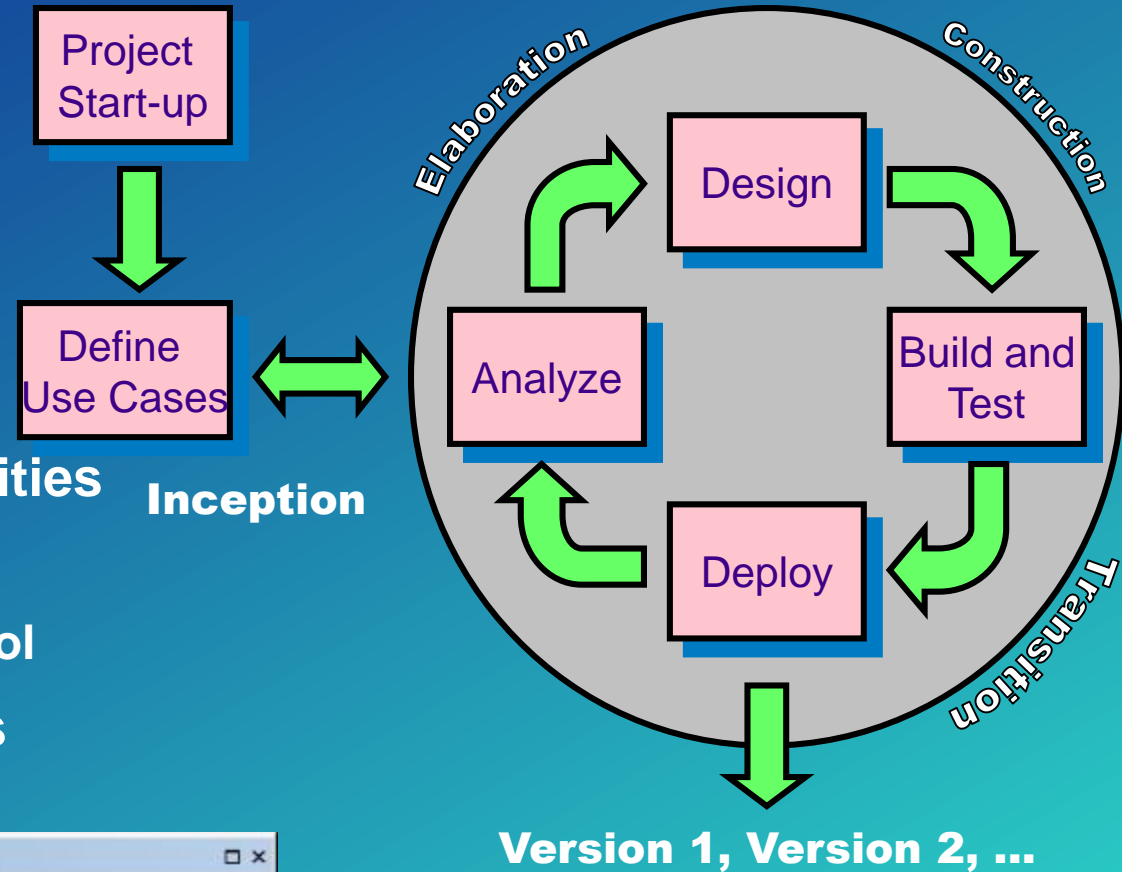
Geodatabase Design - Phases



Time – per iteration

Geodatabase Design – Process

- Identify and Characterize Each Thematic Layer
- Develop Geodatabase Elements and Properties
- Define the Data Capture Procedures and Responsibilities
- Test, Refine and Document the Design
 - X-Ray, Microsoft Visio and Geodatabase Diagrammer Tool
- Agile (Incremental) Vs Waterfall (Sequential) Methods
 - Agile Works Better!

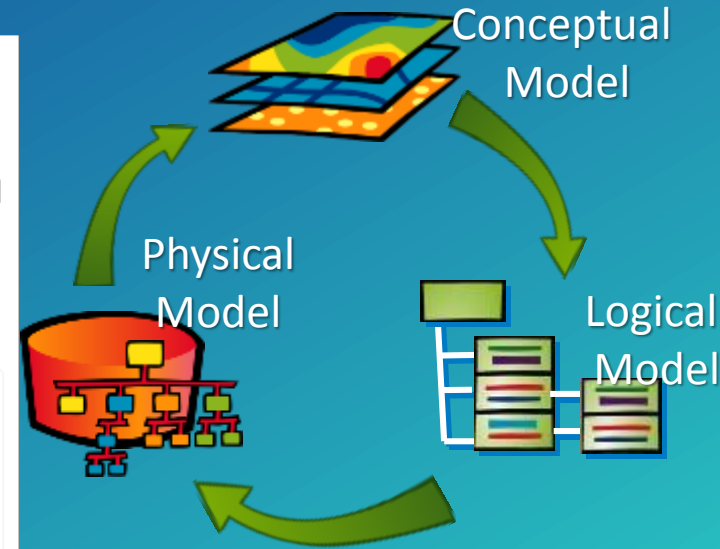


**THE
SCIENCE
OF
WHERE**

- **Identify Business Requirements**
- **Identify Thematic Layers**
- **Identify Required Applications**
- **Leverage Data Model Templates**
- **Document**

- **Define Tabular Database Structure**
- **Define Relationships**
- **Determine Spatial Properties**
- **Document**

- **Create and Implement Model Design**
- **Generate Physical Schema in the RDBMS / FGDB**
- **Testing and Validation**
- **Document**



Geodatabase Design – ArcGIS Data Models



and platform configurations to meet your needs, and practices for your organization.



Air Quality



Gas



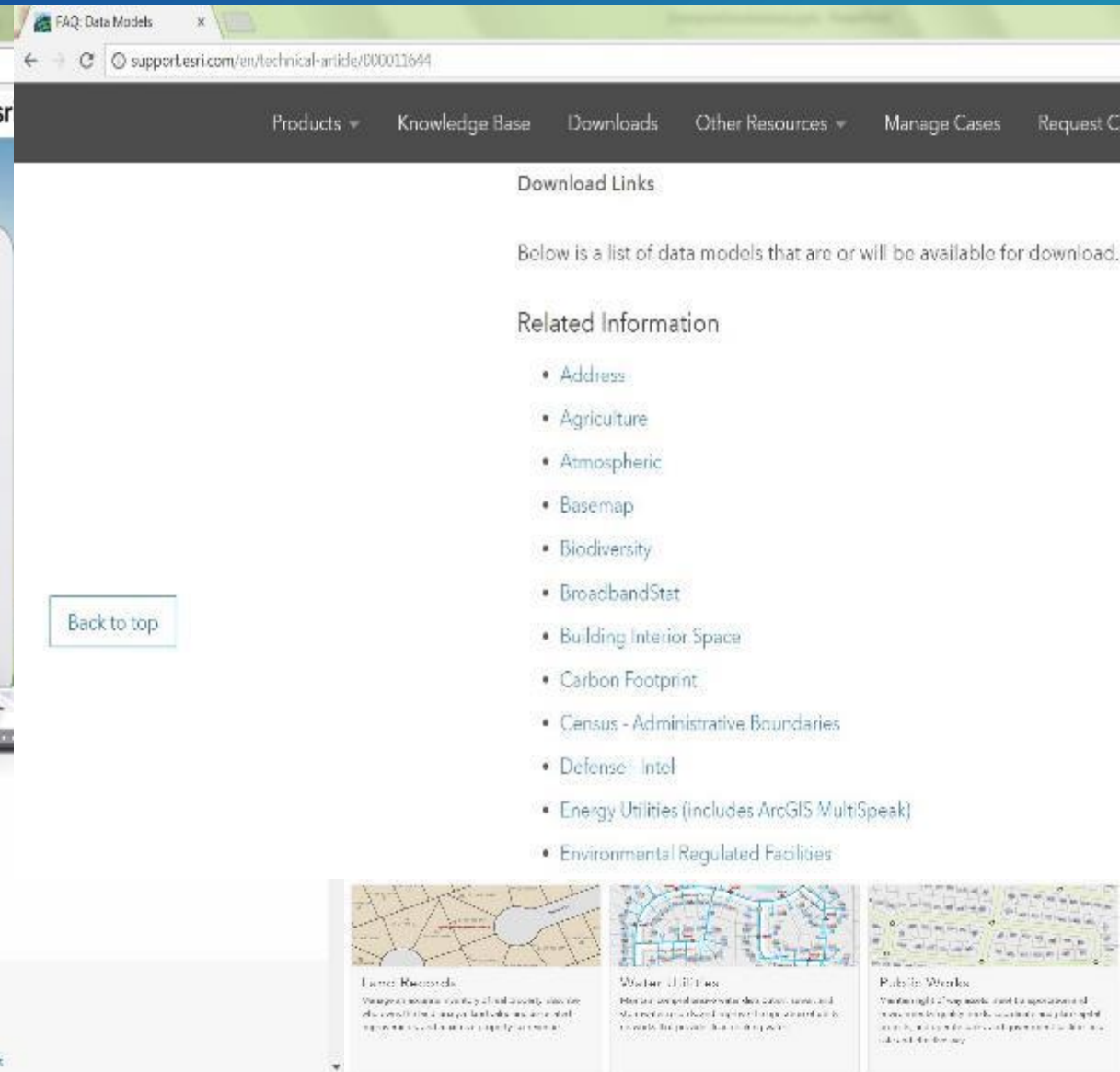
Defense



Telecommunications Parks and Gardens



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Download Links

Below is a list of data models that are or will be available for download.

Related Information

- [Address](#)
- [Agriculture](#)
- [Atmospheric](#)
- [Basemap](#)
- [Biodiversity](#)
- [BroadbandStat](#)
- [Building Interior Space](#)
- [Carbon Footprint](#)
- [Census - Administrative Boundaries](#)
- [Defense - Intel](#)
- [Energy Utilities \(includes ArcGIS MultiSpeak\)](#)
- [Environmental Regulated Facilities](#)





Geodatabase Design – Key Considerations

Poor Design = Slow Performance and Bugs

- Empty Feature Classes / Columns Forever
- Redundant/Duplicate Columns / Domains, etc.
- Missing / In-Correct Domains and Aliases for Fields
- Column / Domain Names and Field Lengths

- >10 Characters in Field Names
- Length of Text/NCLOB – 256 or 1,073,741,822
- Choice of Field Type
 - Short Integer
 - Long Integer
 - Float
 - Double.
- Selection of Precision and Scale
- Define Not Null Fields

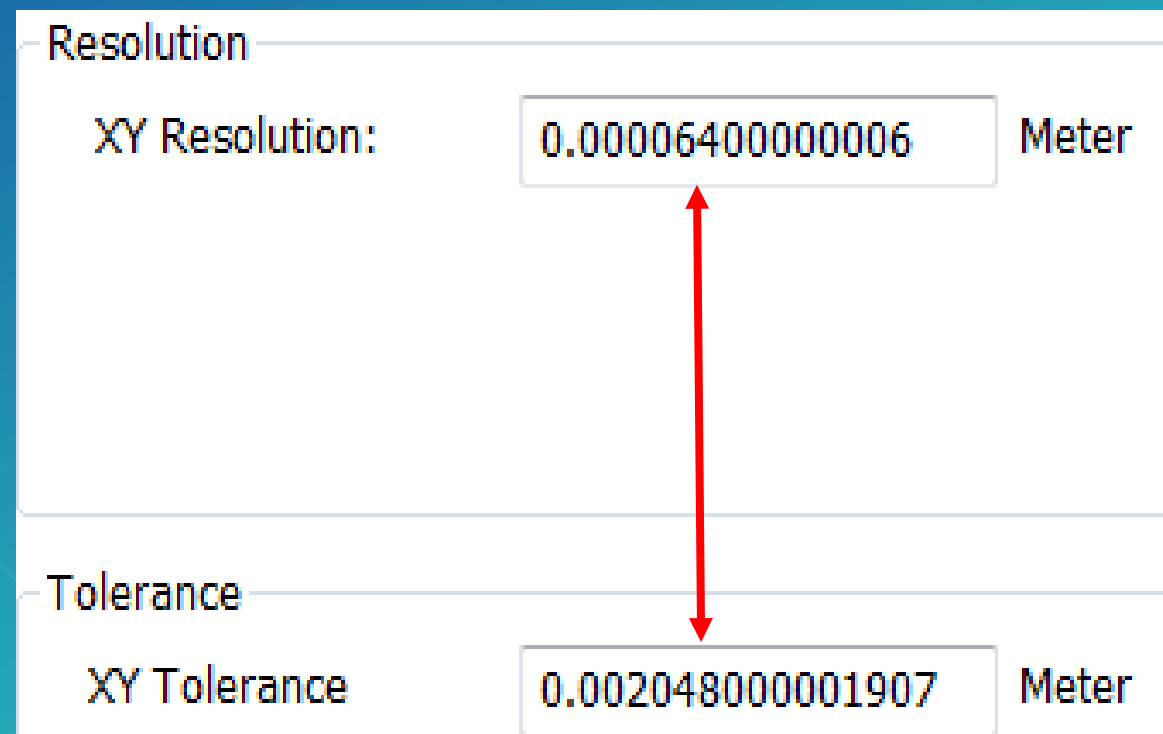
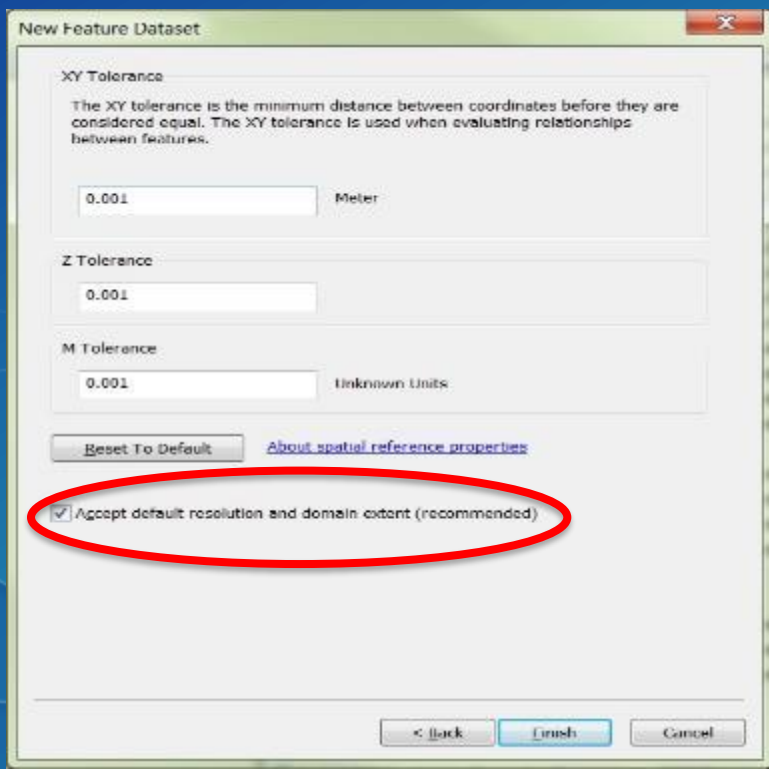
Field Properties	
Alias	CustomerName
Allow NULL values	Yes
Default Value	
Domain	
Length	1073741822



Geodatabase Design – Key Considerations

Poor Design = Slow Performance and Bugs

- Change in XY Tolerance
 - Default = 10x Times of XY Resolution
 - Introduces Complexity (#NIM090335) for Geometric Network, etc.
 - Impacts Performance

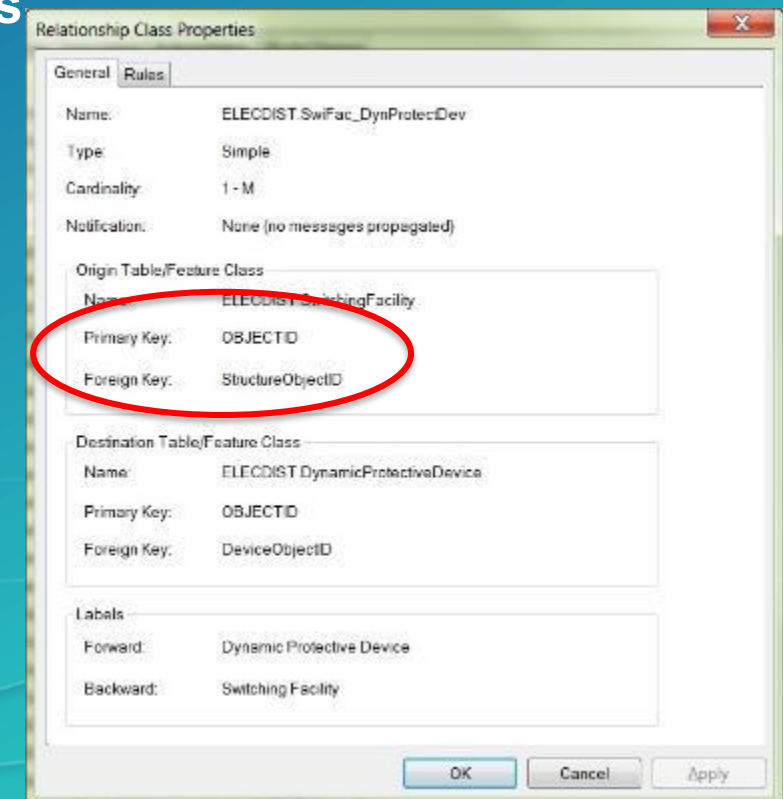


Geodatabase Design – Key Considerations

Poor Design = Slow Performance and Bugs



- No Attributed Relationship Classes for Empty Tables!
- Use Many to Many Relationship Classes Only When Necessary
- Don't Use Objectid as Primary Key for Relationship Classes
 - Unexpected Replication Behavior
 - Additional Processing During Synchronization



Design a Geodatabase

Geodatabase Design – Best Practices

- **Leverage the Existing ArcGIS Data Models**
 - Drop the Un-Necessary Feature Classes, Columns, etc. (Normalization)
 - Possibly Split the Feature Classes Pertaining to Different Scale Levels
 - Test, Refine and Tune the Data Models

Justify Every Single Geodatabase Element!

Geodatabase Design – Best Practices

- **Select Single Coordinate System for the Geodatabase**
 - On the Fly Projection is Expensive
 - No Support for Geometric Network Editing
- **Create Feature Datasets or Databases for Different LOB (Line of Businesses)**
 - Depends on Size, Access, Usage and Maintenance
 - Larger Companies Generally Require a Separate Landbase GDB

Geodatabase Design – Recommendations

- Review the Labeling Requirements Ahead of Time
 - For Multi-Field Complex Labeling
 - Add/Calculate a New Field and Auto Update
 - Convert Labels to Annotations
- Analyze Requirements and Choose Proper Annotation Reference Scale
- Reduce Number of Annotation Classes within an Annotation Feature Class
- Add Attribute Indexes for Where Clauses
 - Label Expression
 - Definition Queries
 - Application Design



Questions and Answers

Contact Info:

Rasu Muthurakku

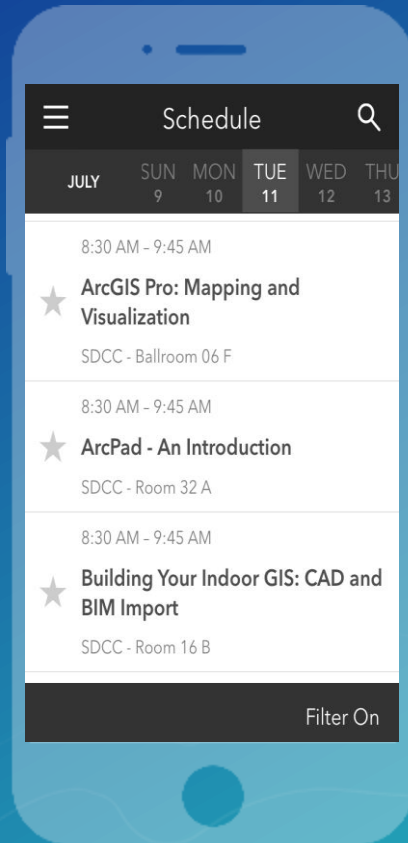
rasu@esri.com

Thank you for Attending.
Please Take Our Survey on the **Esri Events App**!

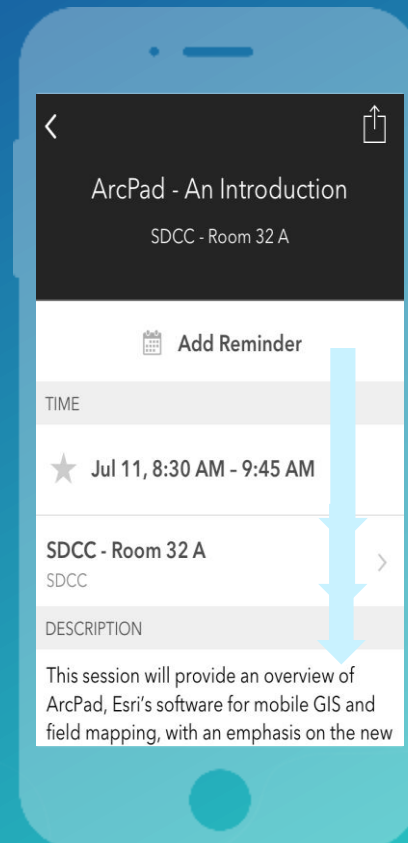
Download the Esri Events app and find your event



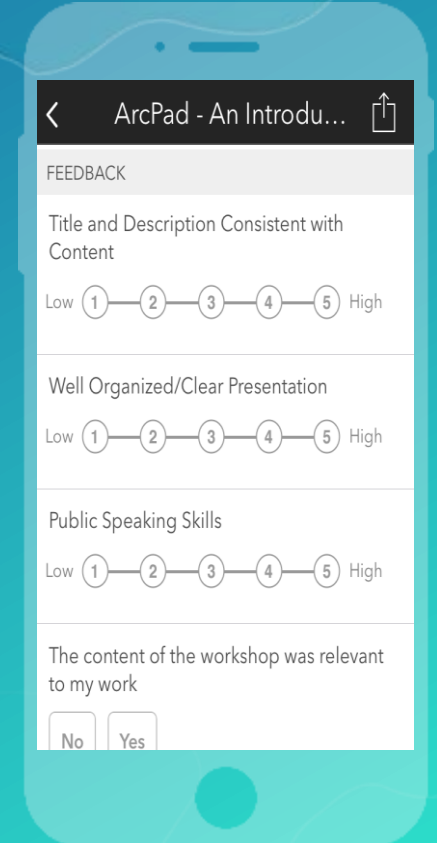
Select the session you attended



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Complete Answers and Select "Submit"



Design a Geodatabase

Thanks



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