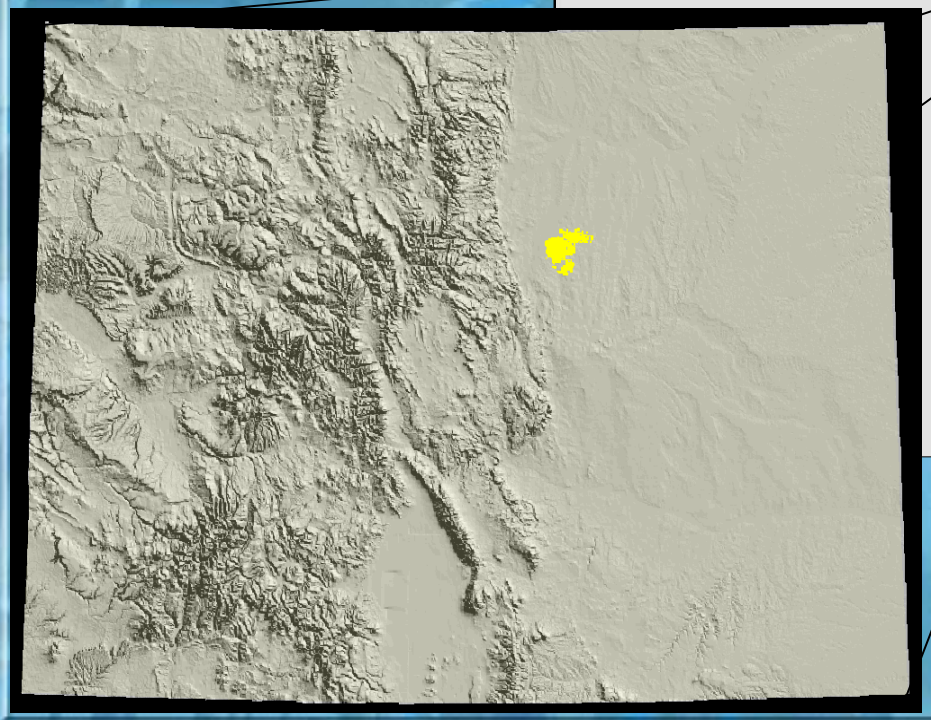
Constructing a Practical and Powerful GIS Web Portal Framework

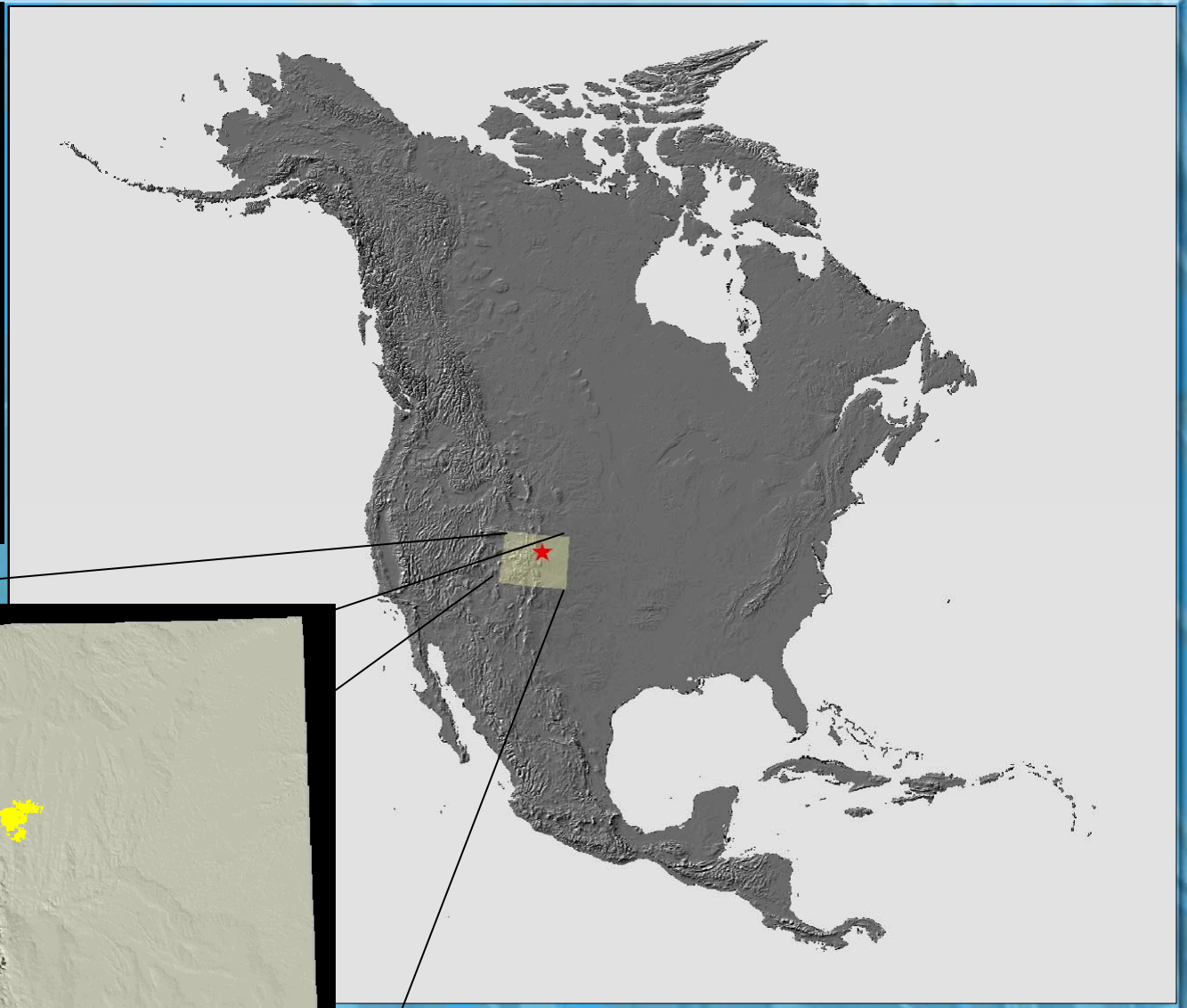
Bill Keever
GIS Coordinator

City of Aurora, Colorado

Current Conditions

- Population: 309,416 (56th Largest in Nation)
- Area: 154 MI^2 (74th Largest in Nation)
- Elevation: 5,434’ MSL (72nd Highest in Nation)





City of Aurora, Colorado

GIPSE v1.0

Geographic **I**nformation **P**ortal
System for **E**veryone

GUTS

Geographic **U**ser **T**echnology **S**ystems

GRIT

Geographic **I**nformation **R**egional **T**hingy

City of Aurora, Colorado

Testimonial

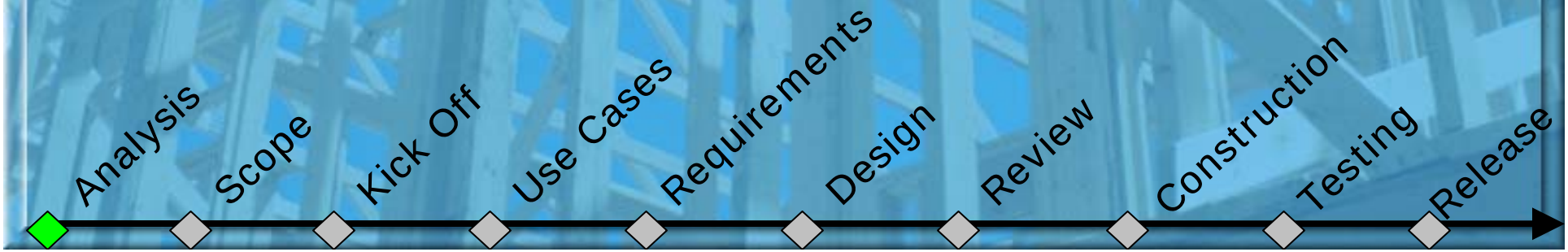
"Finally a tool that pulls the city information together in one place. That is a huge step in helping us assist the citizens of Aurora. It saves time and so much work when you are trying to find information from three or four different departments."

Darren Akrie

Real Property Technician

GIPSE Project Stages and Artifacts

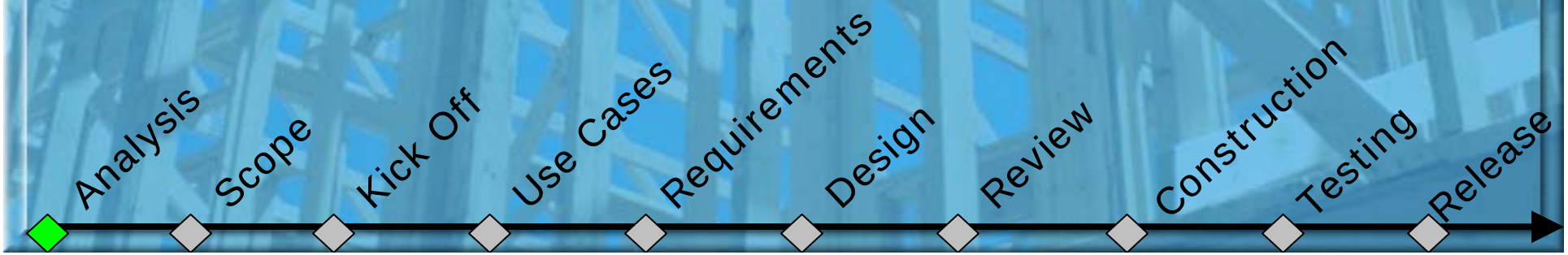
- Planning Phase
  - Project Analysis
  - Project Scope
  - Kick Off Meeting
- Design Phase
  - Core Team Meetings
  - Use Case Workshops
  - Software Requirements Specification
  - Software Design Specification
  - Design Review Meeting
- Construction and Testing Phase
- Release – Splash
- Feedback and Future Versions



Project Analysis

Problem Statement:

- The methodology of answering citizen, city council, or staff questions concerning data based around a geographic location is…
  - Time consuming
  - Inefficient
  - Difficult to research in depth
  - Manual in compiling the results/response



Old Process Example:

Planning - Zoning and Development Review Division in 2006

- 13,188 hours were expended on information retrieval
- 54,317 events (calls, walk-ins, developer requests)

Estimated Benefit Savings of Improved Info Retrieval:

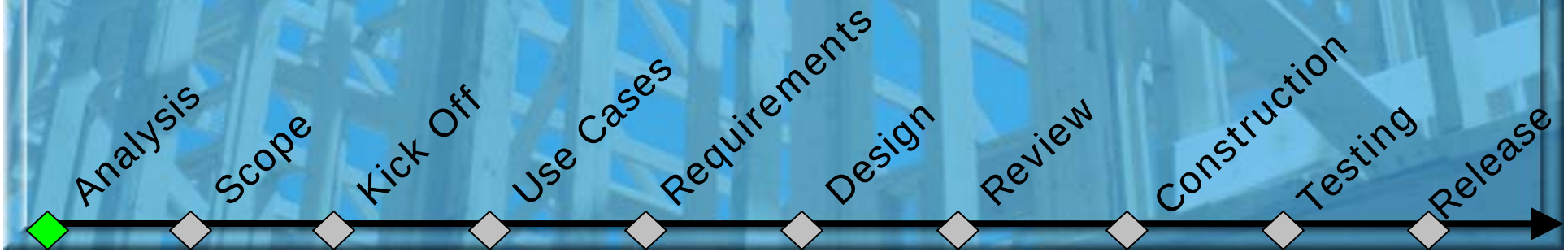
Based on an estimated time savings of 10%...

- Planning - Zoning and Development Review Division
  - 1,319 MH of effort annually
- Utilities and ODA Departments
  - 2,137 MH of effort annually
- Not including other departments!

Bottom Line:

- Assuming a blended burden rate of $25/MH that would result in an efficiency

SAVINGS OF $86,400 ANNUALLY

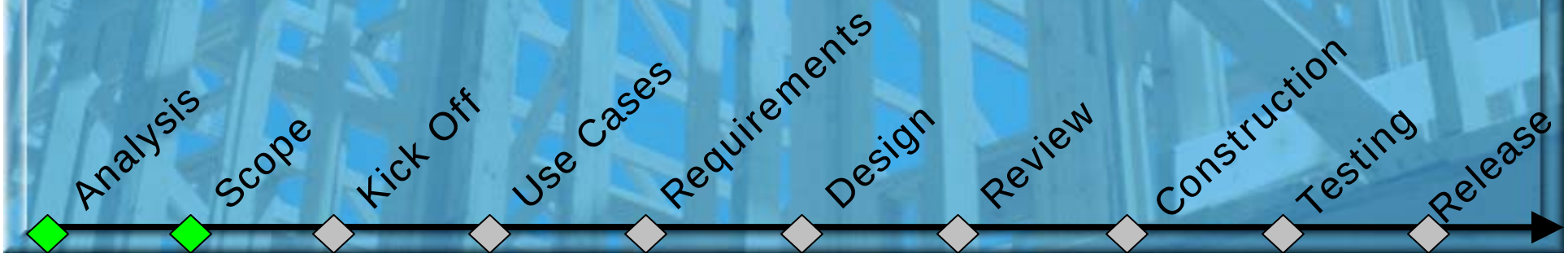


Project Scope

Project Summary:

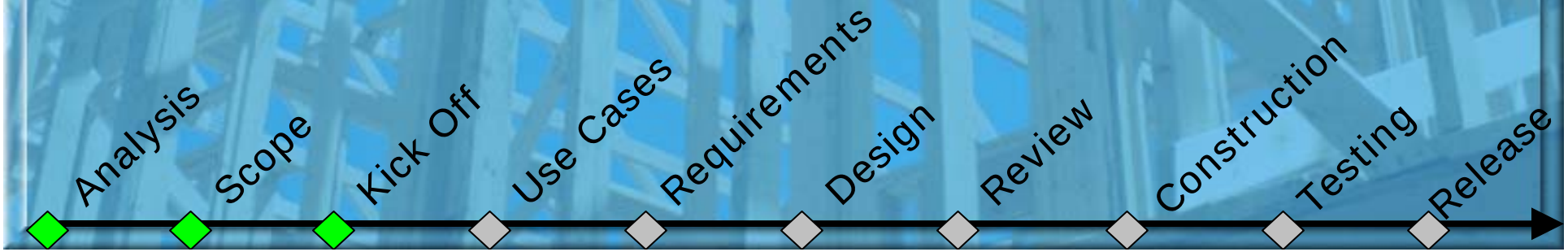
The purpose of this project is to…

- Deploy intranet web portal with an intuitive map based user interface
- Present info for a selected geographic location or area
  - City data
  - City digital documents
- Create an information and analytical tool to be used by development review staff



Kick Off Meeting

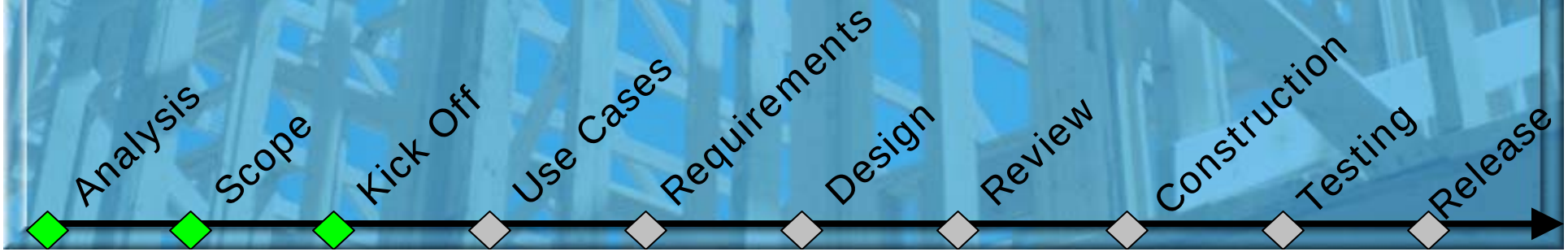
- Attended by representative Stakeholders from invested departments/divisions
- Core Team members were selected from the various depts.
  - » Capital Improvements
  - » Comprehensive Planning
  - » Zoning and Development Review
  - » Streets
  - » Office of Development Assistance
  - » Parks and Open Space
  - » Real Property
  - » Water



Core Team Meetings

Meetings were held weekly…

- Business Core Team
  - Opportunity to shape requirements for business needs
- Design Core Team (Technology)
  - Discussions to select most appropriate technologies

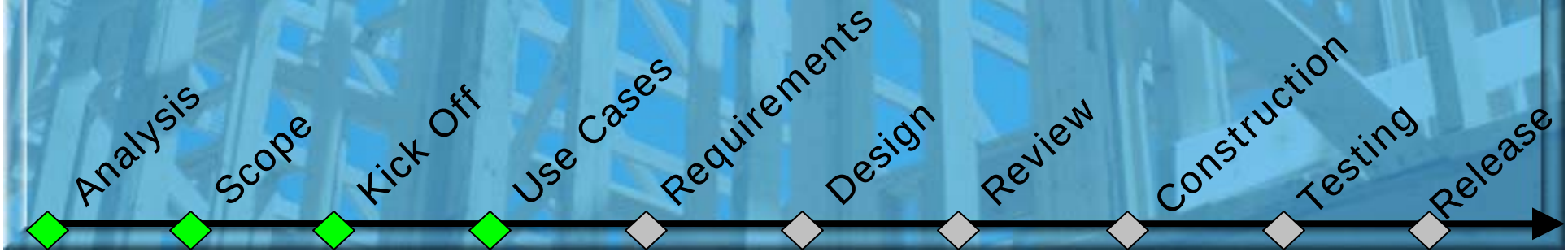


Use Case Workshops

- Yielded 39 unique use cases

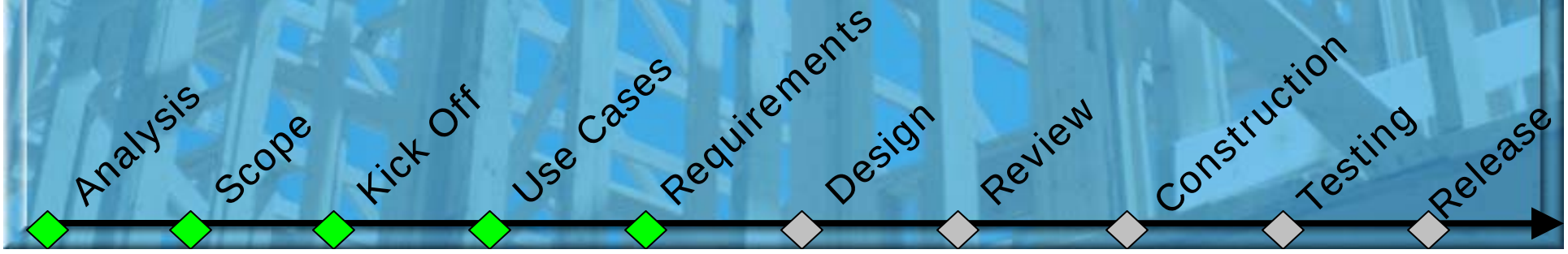
  Examples:

  - Discover of Subdivision data/documents
  - Discover of Property Owner and summary info for address
  - Finding Annexation documents
  - Finding PDF maps for particular quarter section
  - Finding Site Plans, Civil Plans, Agreements for a location
  - Determining active development or permits
  - Pre-Application checklist



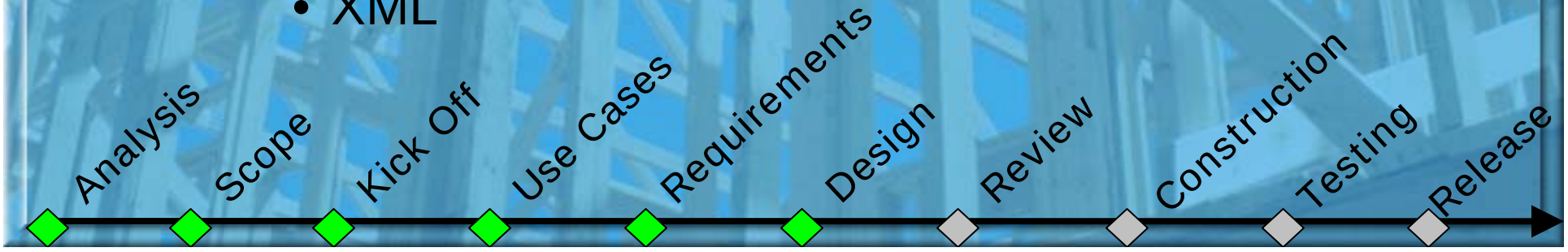
Software Requirements Specification

- Structure use cases and Core Team discussions
- Refine requirements
- Core Teams reviewed the SRS and commented



Software Design Specification

- Define technology to be used
- Design solution “blue print” and implementation
  - Technologies used:
    - ArcGIS Server – WebADF
    - ASP.NET, C#, .NET Web Services
    - Microsoft AJAX
    - XML

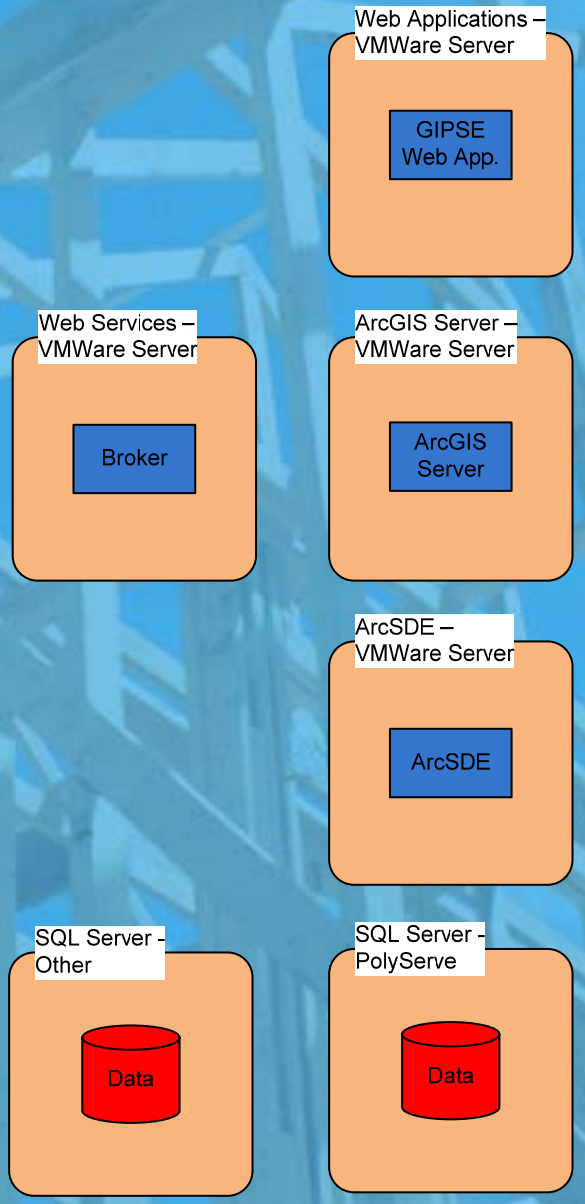


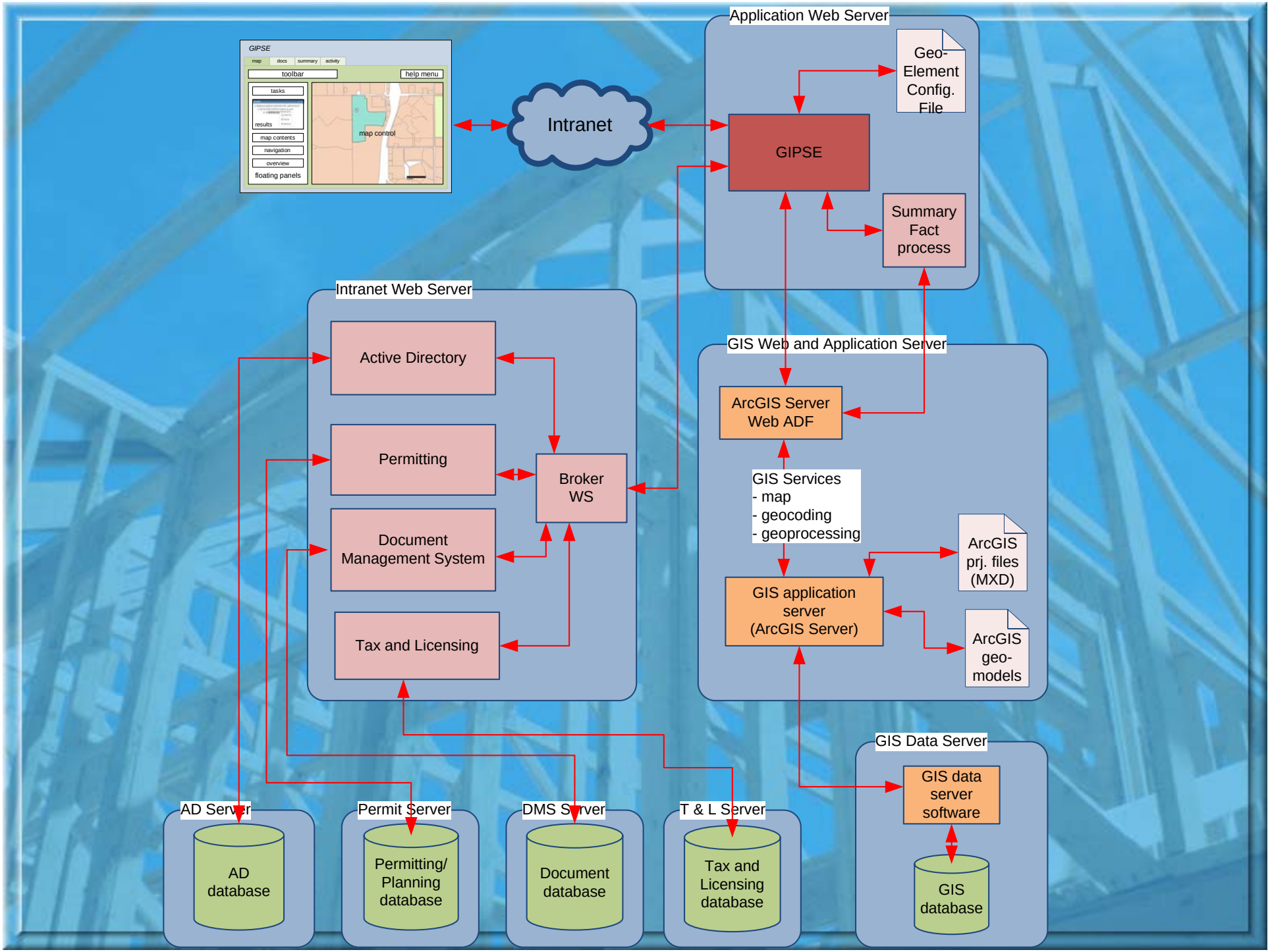
Application Tier

Web Services Tier

Data Services Tier

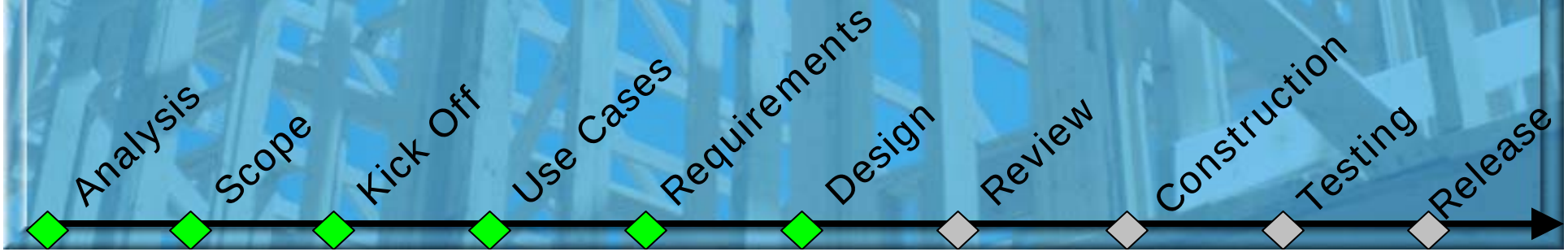
Data Tier




GIPSE
map
docs
summary
activity
toolbar
help menu
tasks
results
map contents
navigation
overview
floating panels
map control
Intranet
Application Web Server
Geo-Element Config. File
GIPSE
Summary Fact process
Intranet Web Server
Active Directory
Permitting
Broker WS
Document Management System
Tax and Licensing
GIS Web and Application Server
ArcGIS Server Web ADF
GIS Services
- map
- geocoding
- geoprocessing
ArcGIS prj. files (MXD)
GIS application server (ArcGIS Server)
ArcGIS geo-models
GIS Data Server
GIS data server software
GIS database
AD Server
AD database
Permit Server
Permitting/ Planning database
DMS Server
Document database
T & L Server
Tax and Licensing database

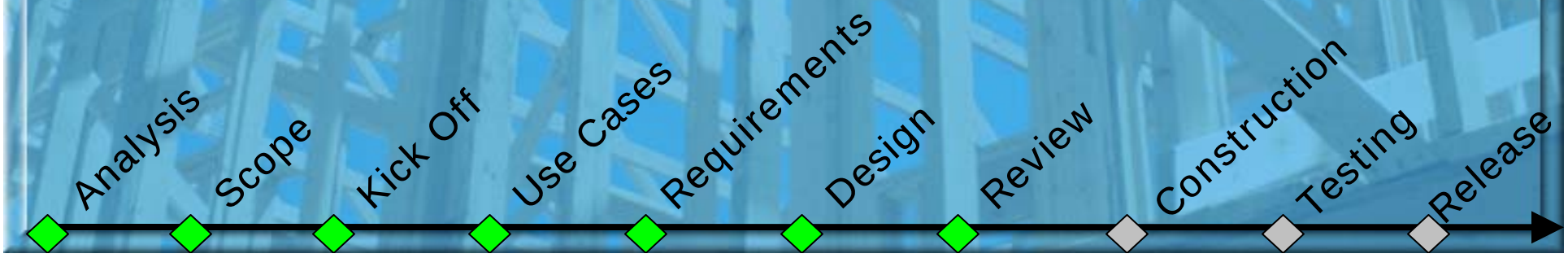
Significant Technical Requirements

- Design a framework not an application
- Web application doesn't need a re-compile to add new data streams
- Generic ~ nothing hard coded
- Create data web services that are re-usable
- Spread services over many servers



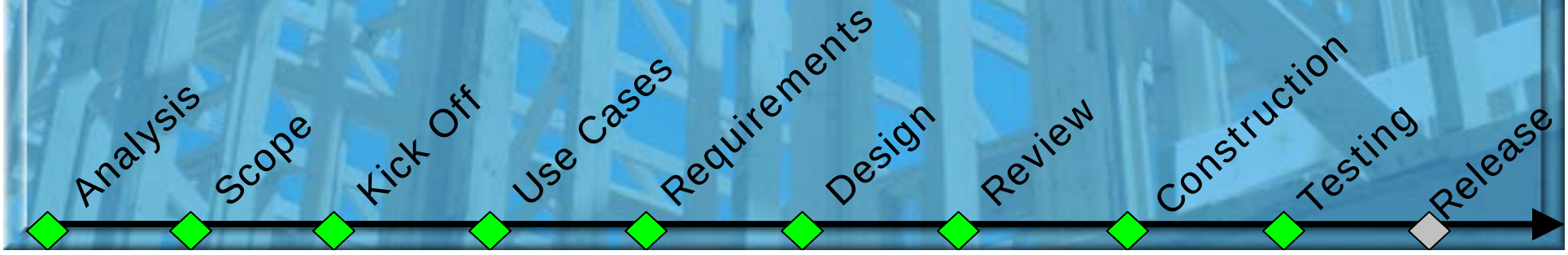
Design Review Meeting

- Stakeholders and Core Team reviewed Requirements and Design documents
- Received Sign off from Stakeholders



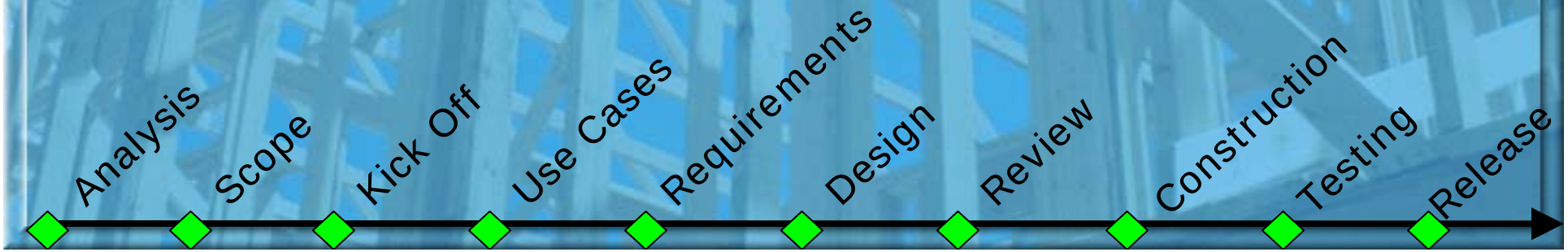
Construction & Testing Phase

- Development Approach:
  - Iterative – Agile
  - Object Oriented – Generic Lists
- Testing
  - Unit Testing
  - Load Testing
  - Acceptance Testing



Release / Splash / Training

- Published to the city's intranet site
- Internal Marketing
- Conducted in house training
- Pushed additional functionality to future release



Resources out there…

- ArcGIS Server Development Blog

blogs.esri.com/Dev/blogs/arcgisserver/

- ESRI Developer Network

edn.esri.com

- Dave Bouwman’s Blog

davebouwman.net

Take Away & Lessons Learned

Authoring MXD for Map Services

- **If dynamic**
  - use annotation instead of labels
  - don't use complex symbols
  - use ESRI_Optimized symbol set
  - Image type: PNG8
- **If tiled**
  - Larger tile sizes (default 512 x 512) won't repeat labeling as much
  - Tiled image library doesn't need to match contains of MXD map service
  - Have a development server to pre-generate tiles on a scheduled basis
  - Image type: JPEG
- **Issues**
  - Convert data with true curves to shapefiles (periodically update via schedule task batch)
- **Approaches**
  - Generic & Object Oriented
  - Pre-generate overlay output data if needed, via scheduled batches

Questions / Comments