

ESRI Homeland Security GIS Summit *Regional Data Sharing Workshop*

**Scott Kellar, Colorado North Central Homeland Security
Region Director**

**Paul Tessar, Chair NCR GIS Steering Committee and
DenverGIS Data Administrator**

Sun, Jul 10, 2:45PM - 3:45PM, Sapphire Ballroom E



Presentation Overview

- **Overview of NCR GIS Data Repository**
- **Overview of the Agreement Points Project**
- **Agreement Points Project Workflow**
- **Next Steps**



NCR GIS Data Repository Participants

- + Colorado North Central All-Hazards Emergency Management Region
- + 10 Denver metro-area counties
- + Critigen is the project contractor
- + ESRI and Safe Software



NCR GIS Data Repository Purpose

- + Regional GIS data warehouse
- + Intended for public safety and/or homeland security partner use
- + Emergency management planning focus
- + Need for continuous region-wide dataset
- + Coordinating with member counties can be challenging



GIS Project Principles

- + Minimize impact on local government day to day GIS operations
- + Respect existing GIS tools and processes
- + Build repository to enable GIS use by non-practitioners
- + Build repository for de-centralized field use (web enabled)
- + Not a public site & not intended for public use



Phase I Project Challenges

- + Setting the ground rules and building the Team.
- + Building a Common Data Model – 10 Counties and 8 initial layers!
- + Developing 80, 2-way ETL Workspaces.
- + Build the web site – WMS map and up/download.
- + Establishing Standards:
 - + Attribute Content.
 - + Update Frequency.
 - + Map Symbolology.



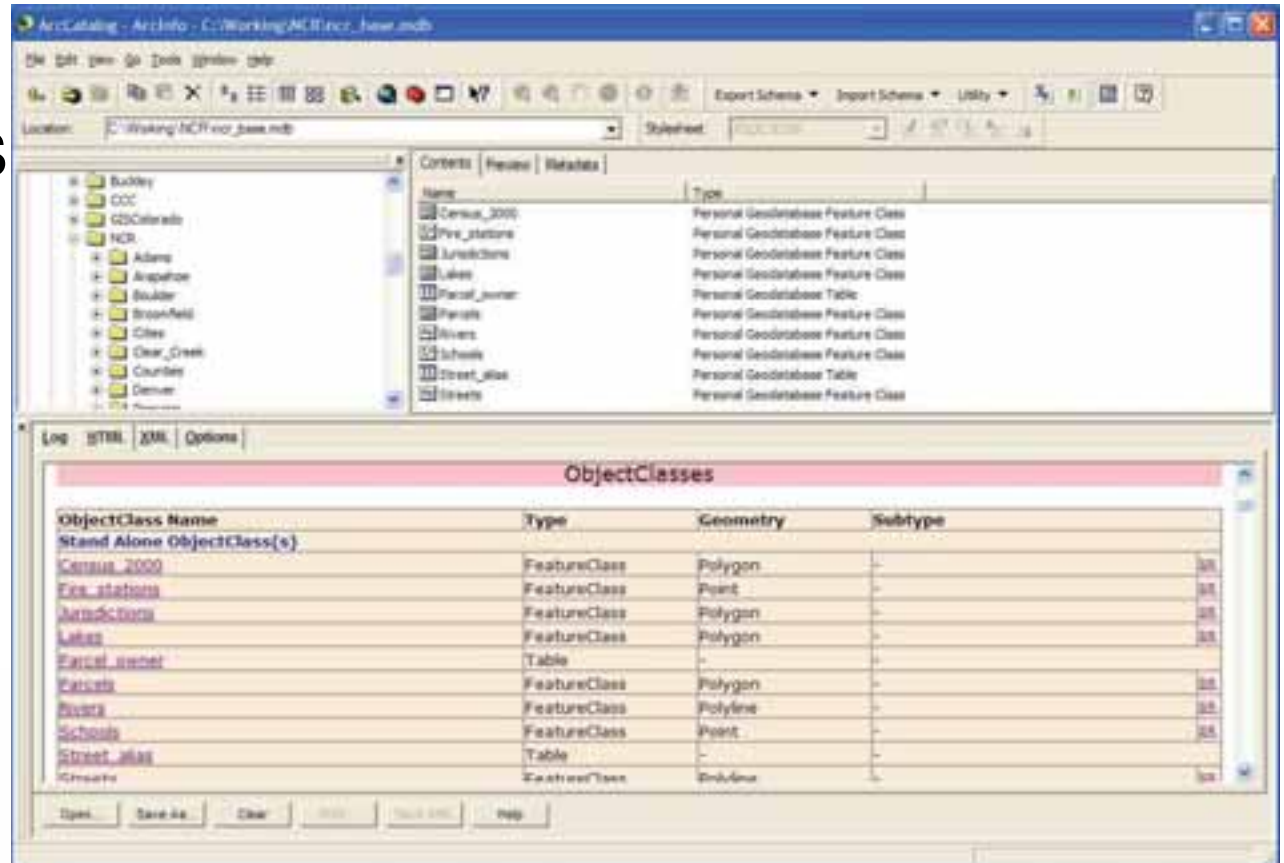
NCR GIS Repository Architecture

- + Password-protected ASP.Net application
- + Web-based mapping application
- + Built upon ArcGIS Server 9.3.1
- + FME Server back-end for ETL
- + ArcSDE with SQL Server 2008
- + Primary and remotely-located secondary servers with replication and failover



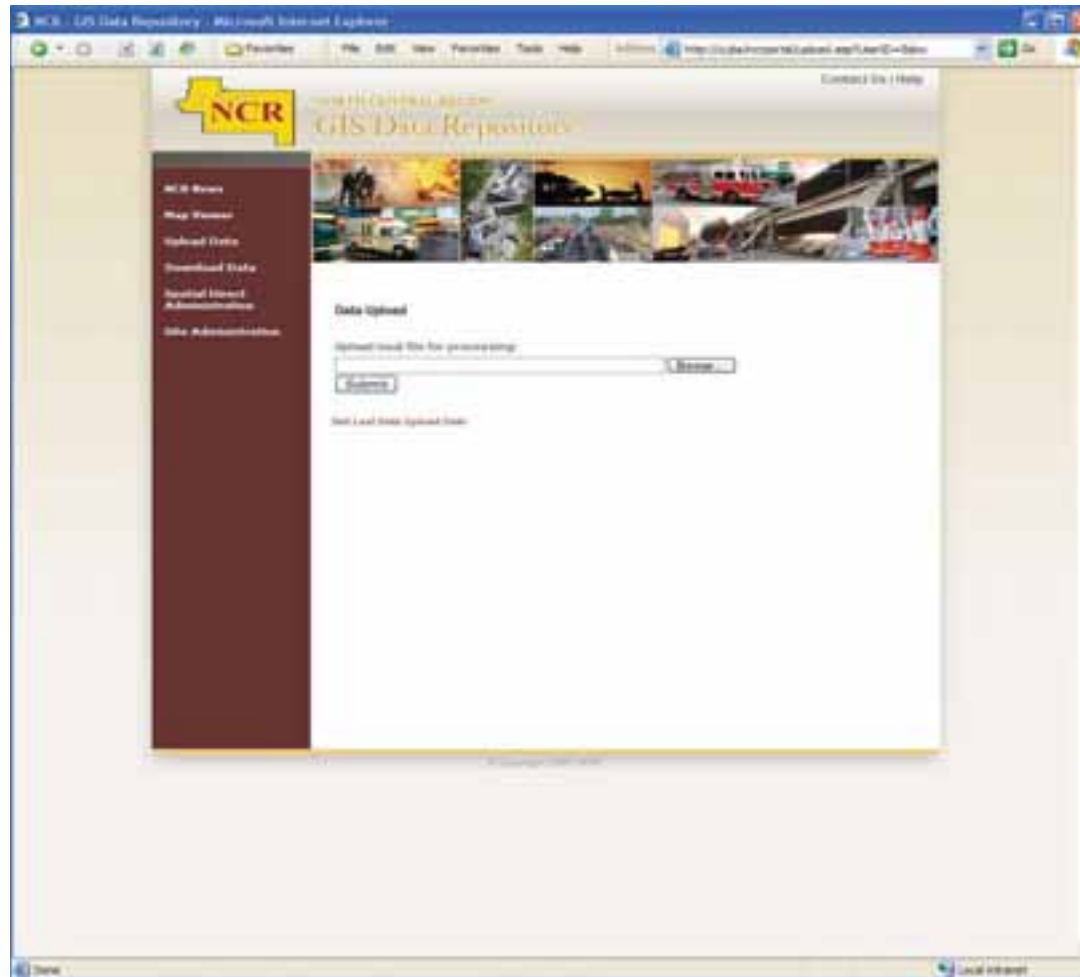
NCR Phase I - Layers

- + Eight base data layers plus one non-spatial class
 - Parcels, with Parcel Ownership detail table (1:M)
 - Roads
 - Census Blocks
 - Municipalities
 - Lakes
 - Streams
 - Fire stations
 - Schools



NCR Phase I - Portal

- + Members can upload their data into a common schema (ETL to Lowest common denominator+)



NCR Phase I - Download

+ Users with sufficient privileges can download data:

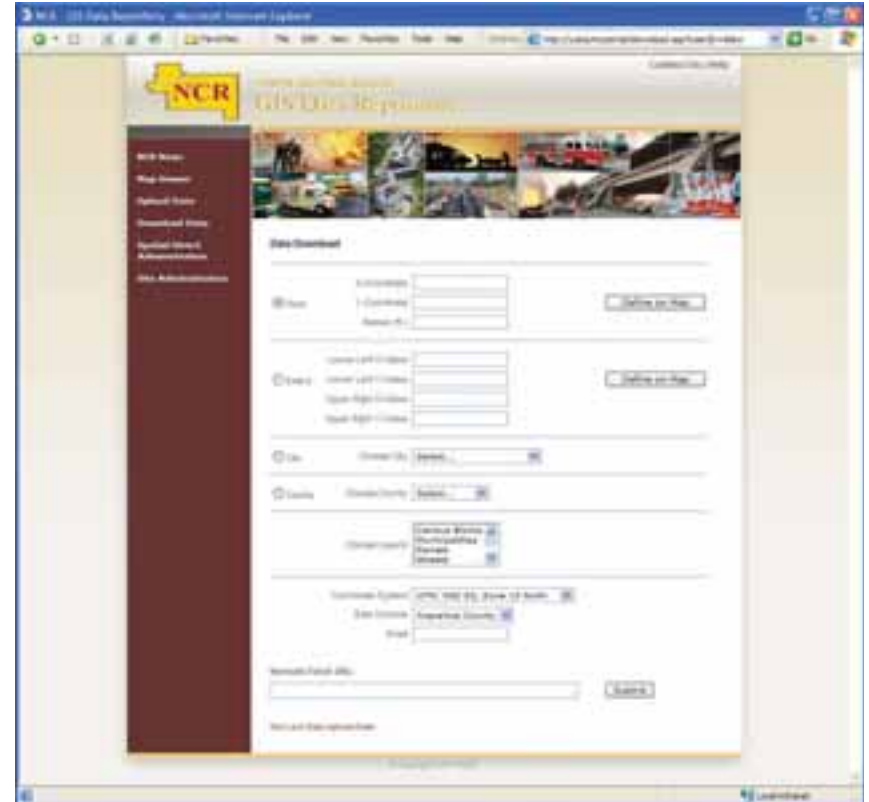
- Spatial
 - Drag a rectangle
 - By Point and Buffer
- Attribute: By Jurisdiction

+ Schema Output Options:

- Any of 10 counties
- NCR master/core schema

+ Coordinate System Options - UTM, State Plane, LL

+ Layer Options - Select any/all available layers



NCR Phase I - AGS Mapping Interface

The screenshot displays the NCR Phase I AGS Mapping Interface within a Windows Internet Explorer browser window. The address bar shows the URL: <https://www.gis.ncrcolorado.org/NCR/default.aspx>. The page title is "NORTH CENTRAL REGION GIS Data Repository".

The interface includes a search bar with the text "Find Jurisdiction" and a dropdown menu set to "Municipalities". Below the search bar is a "Map Contents" panel with a tree view of layers:

- NCR Data
 - Medical Facilities
 - Fire Stations
 - Schools
 - Law Enforcement Facilities
 - Mile Markers
 - Address Points
 - Interstates
 - Highways
 - Major Roads
 - Streets
 - Rivers
 - Railroads
 - Trails
 - Counties
 - Lakes
 - Parks and Open Space
 - School Districts
 - Census Blocks
 - 20-foot Contours
 - Parcels
 - Municipalities
 - Shaded Relief
 - 2006 Aerials

The main map area shows a detailed GIS map with various layers visible, including roads, water bodies, and shaded relief. The map is overlaid with a grid. The status bar at the bottom of the browser window shows the coordinates "3175895.687, 1686400.796", the "Internet" logo, and a zoom level of "100%".



NCR GIS Data Repository Benefits

- + Unique planning tool
- + Continuous region-wide dataset
 - Data no longer ends at county boundary.
- + Dialog between counties improves coordination
- + Potentially serves as a model for inter-region and state-wide coordination



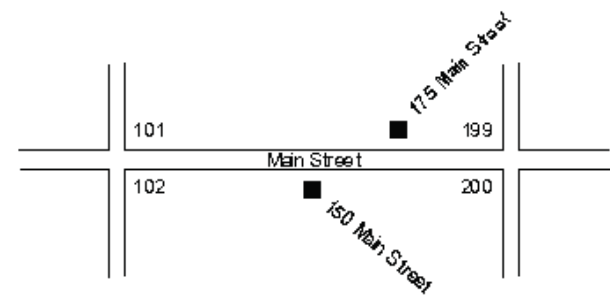
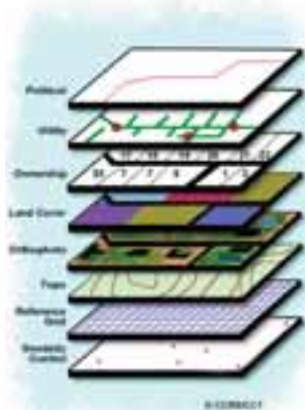
NCR Phase II – 16 New Layers

- + **Railroads**
- + **Address Points**
- + **Trails**
- + **Parks and Open Space**
- + **Flood Zones**
- + **Contour Data (Topography)**
- + **State Highway Mile Markers**
- + **Major Medical Facilities**
- + **Aerial Photography**
- + **Fire Response Districts**
- + **School Districts**
- + **Law Enforcement Facilities**
- + **Police Response Districts**
- + **Radio Towers**
- + **EOC Locations**
- + **Public Safety Answering Points**



NCR Phase II – Expanding Our Reach

- + Developed policy for expanding user community
 - Core Partners (Counties)
 - HLS Planning Partners (Cities, Regional PSAPs)
 - Regional Planning Partners (Denver Water)
 - Other Partners (Private Utilities)
- + Data User Agreement for expanded audience



NCR GIS Data Repository – Next Steps

- + Add more data layers from other partners
- + Enhance existing data layers
- + Add more viewer functionality
 - Geocoding service
 - Advanced spatial queries
 - Routing
- + Edge-match streets at County lines



Overview of the “Agreement Points” Project

- + The concept – From Washington State DOT.
- + The Denver Pilot Project.
- + The Plan for Regional Implementation.
- + Future Efforts



ACROSS BORDERS AND BOUNDARIES: *BUILDING A TRANSPORTATION LAYER USING COLLABORATION*

**NSGIC Transportation for the Nation
September 6, 2008**

Tami Griffin, Project Manager



**Washington State
Department of Transportation**

Washington State Transportation Framework for GIS (WA-Trans)

An NSDI Type Transportation Layer:

- + Best available data from all levels of government,
- + Top priority is road centerline data with addresses and route milepost linear referencing systems,
- + The goal is to include rails, light rail, ferries, aviation, ports and non-motorized transportation infrastructure,
- + Seamless, connected, consistent and continuous data between jurisdictions, boundaries and other layers,
- + Include infrastructure to support maintenance and integration of data,
- + Useful for a wide variety of business needs.



Relationship Building and Collaboration

- + The various states have used a variety of means of developing and maintaining relationships,
- + Advice is exchanged on what works well,
- + WA-Trans invested significant effort here during the early years of the project and it has paid off,
- + Other states are handling this differently but for all it turns out to be critical to success,
- + Determining the **WIFM** for all is critical,
- + Collaboration requires making the case for all partners that may be providing data, time or funds for the project.

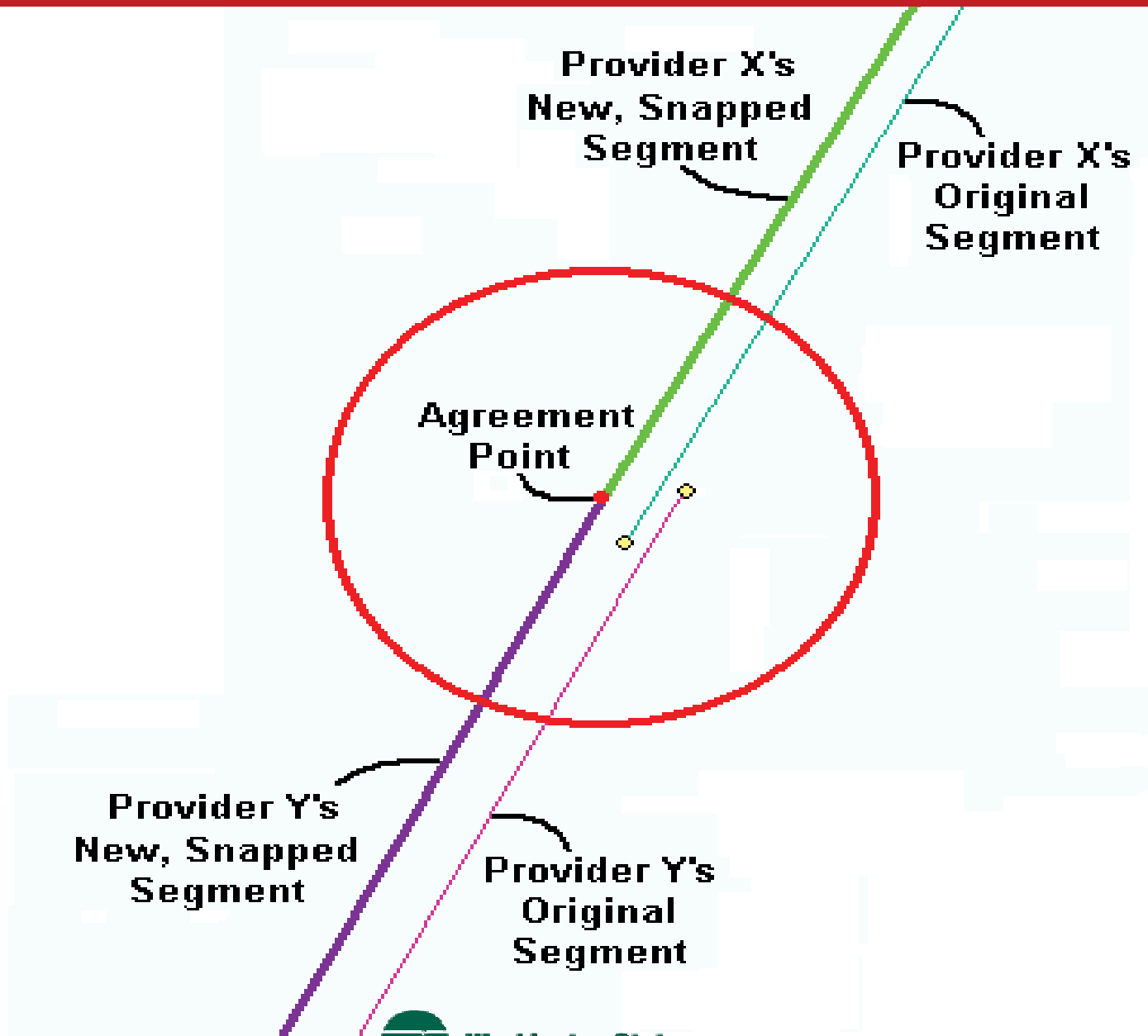


Agreement Points Process

- + Snap data from different providers' to ensure seamless, connected, consistent and continuous data between jurisdictions.
- + Two distinct processes to connect data:
 - Political: Propose Agreement Points and come to an agreement between providers; and,
 - Technical: Implement connectivity between different providers data.
- + Expectations of the data providers.
- + Implementation of a useable, connected dataset.



Implementation of Agreement Points



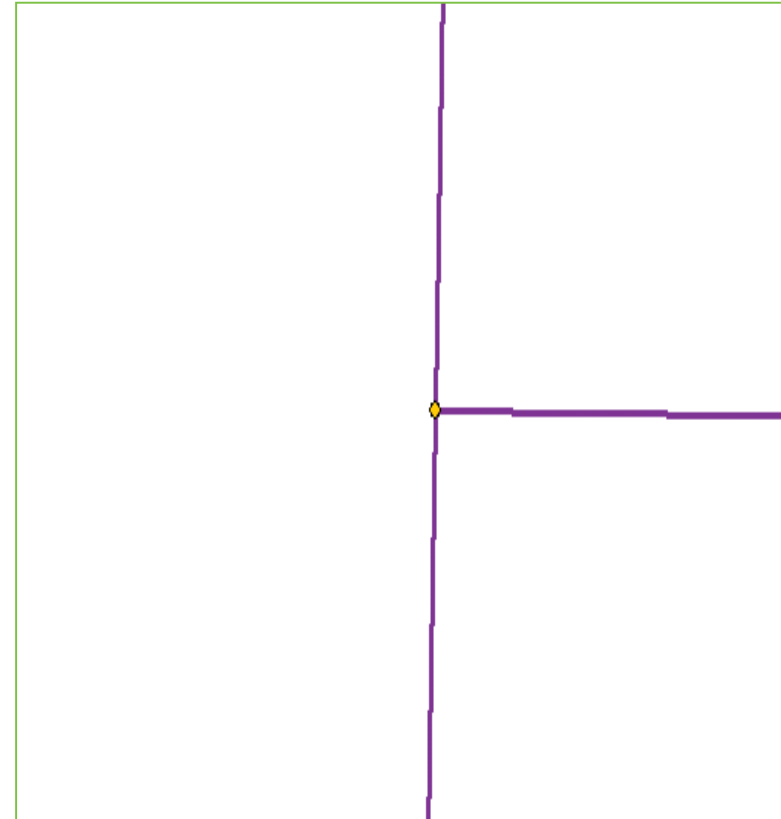
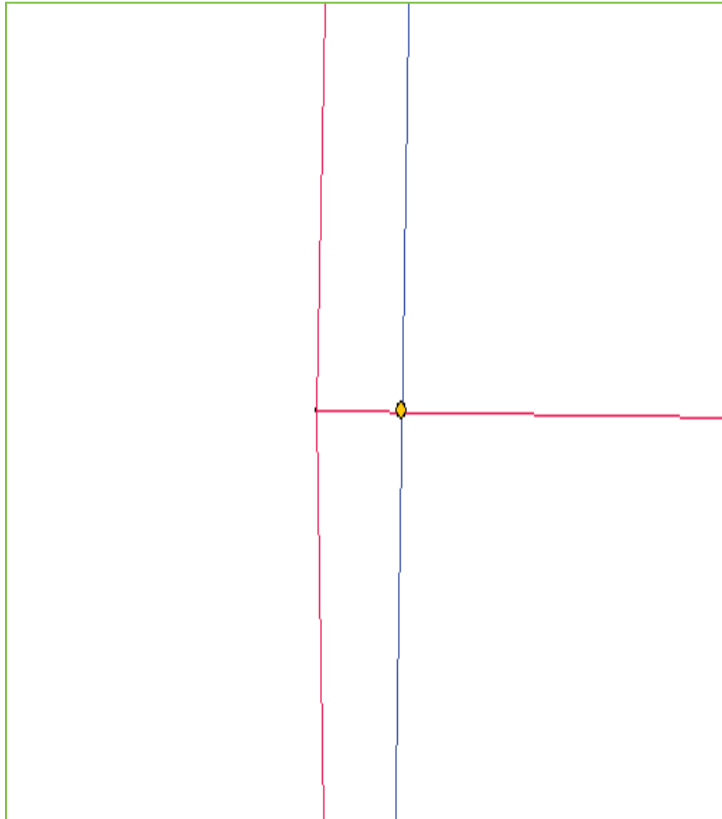
Integration Across a Boundary – With a Nearby Intersection (Before)



Integration Across a Boundary – With a Nearby Intersection (After)



Integration Across a Boundary – Unusual Cases (Before & After)



Pierce County 

Kitsap County 



Washington State
Department of Transportation

CRI+IGEN

Denver Pilot Project Results

- + 443 Agreement Points for multi-jurisdiction alignment completed along 55.5 miles of border.
- + Includes borders between participants:
 - Denver, Aurora, Greenwood Village, ArapCo.
- + All jurisdictions have snapped to these points.
- + Proof of concept established.
- + General procedure prototyped.
- + Knowledge of database design acquired.



Current Project Goals

- + Establish agreement points along all County Boundaries in the 10-Co. North Central Region.
- + Points are maintained over time and reside on the NCRegional GIS Data Repository.
- + All jurisdictions maintaining Centerline layers participate and honor the agreement points.
- + Establish topological integrity for local street layers along boundaries.



Phase III

Project Sponsor

- + North Central All-Hazards Region
 - + Scott Keller and Rachelle Miller

Project Manager

- + Paul Tessar – City and County of Denver

Critigen Team

- + Luke Heyerdahl – Technical Project Manager
- + Scott Cutler – Senior GIS Analyst
- + Frank Orr – Project Continuity
- + Zach Valchar – GIS Analyst
- + Jeremy Quan – GIS Analyst

Key Stakeholders/Participants

- + County and City GIS Leads



Phase III Project Workflow

Task 1A – Agreement Point Project Kickoff Meeting

- + Present project to potential collaborators and invite their participation
- + Refine agreement point feature class data model.
- + Charter of city and county teams.

Task 1B – Agreement Point Team Meetings

- + Develop straw man agreement points for review:
 - + Priority will be given to existing segment nodes
 - + DRCOG 2008 Orthos will be used as a base
- + Conduct agreement point meetings per grouping.
- + Minutes, GIS data, etc. posted on SharePoint site.



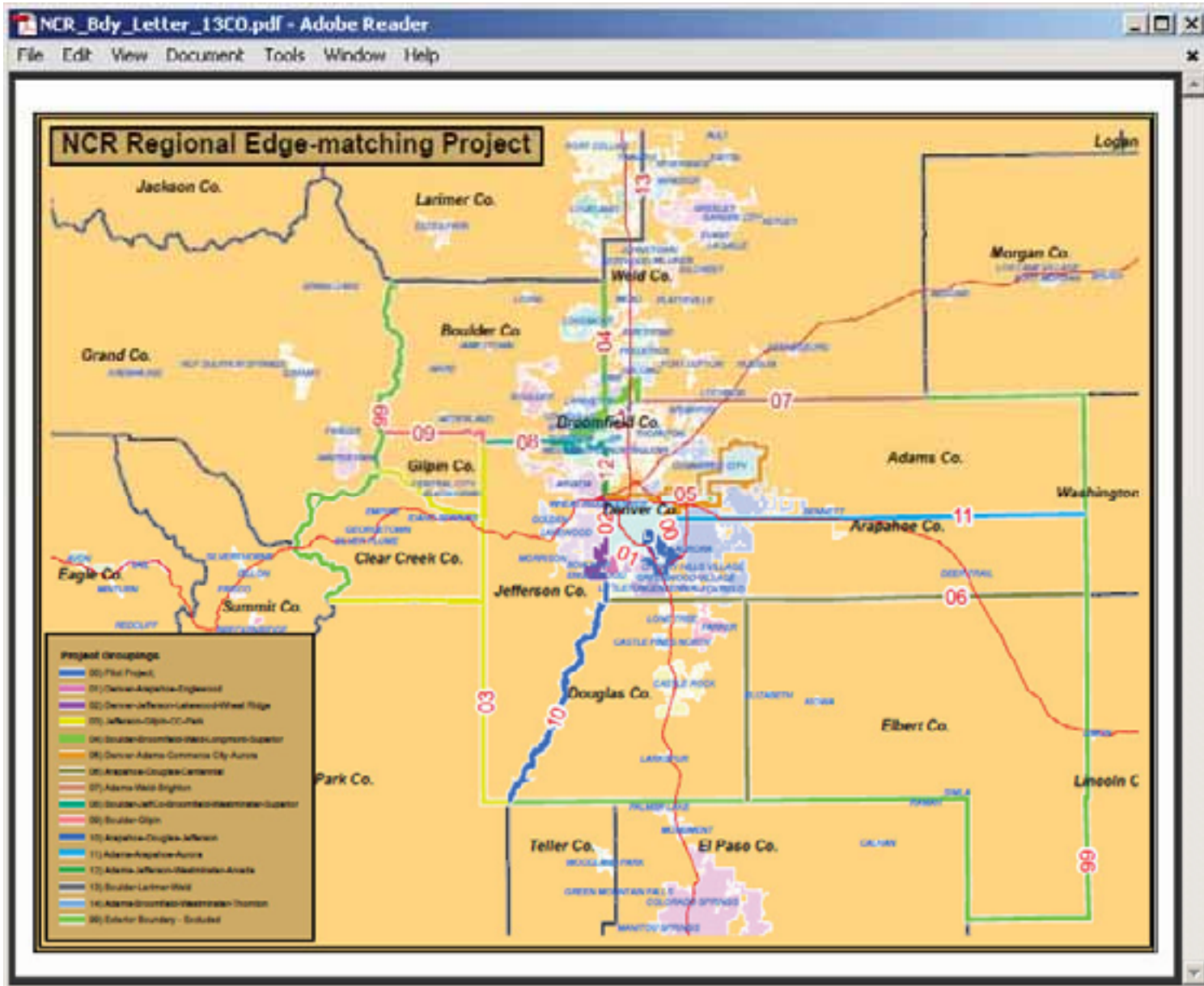
County Groupings (including 16 City participants)

- 1) Denver-Arapahoe-Englewood
- 2) Denver-Jefferson-Lakewood-Wheat Ridge
- 3) Jefferson-Gilpin-Clear Creek-Park
- 4) Boulder-Broomfield-Weld-Longmont-Superior
- 5) Denver-Adams-Commerce City-Aurora
- 6) Arapahoe-Douglas-Centennial-Aurora
- 7) Adams-Weld-Brighton-Northglenn-Thornton
- 8) Boulder-Jefferson-Broomfield-Superior-Westminster
- 9) Boulder-Gilpin
- 10) Arapahoe-Douglas-Jefferson
- 11) Adams-Arapahoe-Aurora
- 12) Jefferson-Adams-Westminster-Arvada
- 13) Boulder-Larimer-Weld
- 14) Adams-Broomfield-Westminster



29 Jurisdictions are participating!

Project Groupings



Collaboration Process Setup

Data Requirements

- + Need current centerlines and boundaries from participating cities.

SharePoint Site Set Up

- + Initial invitations will be sent out - User group will grow as needed.

Agreement Point Data Model

- + Will be posted to SharePoint site for review.
- + Comments will be incorporated and final version made available.

County/City Groups Chartering

- + Groups will be set up with initial members.
- + Additional members will be contacted to expand group if needed.

Agreement Points “Straw Man” Creation

- + Initial points will be provided to participants prior to meetings.



Initial Coordination Meetings

- + There will be one meeting per grouping.
- + Each grouping have a Cri+igen moderator, who will schedule meetings, take notes, etc.
- + Microsoft SharePoint site will provide each grouping with their own online workspace.
- + Comments on specific, proposed points will be incorporated into a comments table and associated with points in the geodatabase.



Agreement Point Data Development

- + Participant comments will drive revision of the points.
- + Each will be classified as follows:
 - + Data points for which all are in agreement.
 - + Alternative points per individual parties.
 - + All points will be retained in the database – they will be “retired” when they are no longer valid.
- + Post-meeting, updated feature classes of agreement and disagreement points will be provided to all parties.
- + Follow-up meetings will be schedule to discuss/review alternative points where parties are NOT in agreement.



Refining Existing Street Centerline Data

- + City and county staff will snap their own street centerlines to the agreement points.
 - + Counties will complete snapping shortly after each grouping finishes and upload an update to the NCR GIS data repository.
 - + Cities will complete the work at their own discretion.
- + Counties and Cities may develop internal city-city and city-county agreement points subsequent to finishing the original project grouping, at their option and using their own staff resources.
- + Critigen will provided limited support as necessary.



Current Project Status

- + As of 6/22/11, 10 of the 14 projects are complete.
- + 1474 additional points have been established.
- + 605 additional miles of border are complete.
- + 150 border miles and 250 points remain.
- + Snapping for completed project areas by the 29 participating Cities and Counties is in progress.
- + ~2166 points were identified and agreed upon
- + Point density averages <3 per border mile. 😊



Additional Future Efforts

- + Internal County-City or City-City border edge-matching will be at local option.
- + A Regional and State Stakeholder Group is being formed to provide sponsorship.
- + Completing the NCR-supported phase will provide momentum and experience for continuation.
- + The NCR Repository will host the results of all such efforts.
- + We are considering Jurisdictional Boundaries for the next reconciled layer.



Lessons Learned

- + Building collaborative partnerships takes focus and sustained commitment.
- + Technical issues can be fixed with technical solutions. Political issues are not so simple...
- + Confidence-building measures are the foundation for future success. Start small, succeed, and then take on larger challenges.
- + Collaboration on data can be a springboard for closer working relationships in other domains.
- + Select contractors carefully. We could not have accomplished what we did without ours.



Questions/Discussion



