

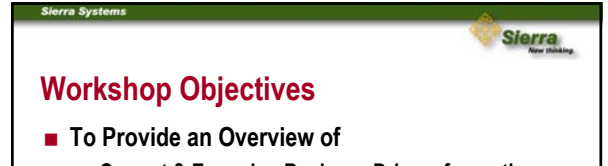


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**GeoNOVA Initiative - 5 Year Strategy
Trends & Technology Workshop I**

Business Drivers & Technology Options

(February 11th, 2002)



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Workshop Objectives

- To Provide an Overview of
 - Current & Emerging Business Drivers from other Sierra System Projects
 - Geo-Spatial Industry Trends & Emerging Technology
- To Stimulate Thought & Discussion on the Implication of these Trends & New Technology on the GeoNOVA Initiative
- To Set the Stage for Remaining Workshops



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Agenda

- Current & Emerging Business Drivers
- Common Problems with Geo-Spatial Data & Systems
- Technology Trends & Implications for GeoNOVA
- Technology Options for Managing Geo-Spatial Data
- Wrap Up



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Current & Emerging Business Drivers



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Current & Emerging Business Drivers

- “Do More with Less” - Mantra of Government
- Increase Demand for Data Sharing & Exchange
- Recognition of Geo-Spatial Data as Valuable Corporate Asset that Must be Managed Properly
- Increased Demand to Integrate Geo-Spatial Data with other Information & Make it Available Enterprise-wide



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Current & Emerging Business Drivers

- Increased Demand to “Spatially Enable” Business Applications
- Increased Demand for Geo-Spatial Data from Health, Justice, Asset Management, Emergency Services, etc.
- Expectation that Geo-Spatial Data will be Accurate, Current & Readily Available (free) via the Internet

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Demand from 3 Broad Sectors....

Resource & Land Management

- ✓ Parks & Recreation
- ✓ Environmental Management
- ✓ Land Development
- ✓ Land Registry
- ✓ Land Use Planning
- ✓ Agriculture
- ✓ Forestry
- ✓ Fish & Wildlife
- ✓ Exploration




Spatial Data Backbone

Infrastructure Management

- ✓ Sewer & Water
- ✓ Transportation
- ✓ Telephone
- ✓ Oil & Gas Pipeline
- ✓ Power
- ✓ TV & Internet Cable
- ✓ Real Property / Asset Management


Community Info & Services

- ✓ Virtual City Hall
- ✓ Hospitality Services
- ✓ Health Services
- ✓ Justice
- ✓ Emer Services (911)
- ✓ Social Services (211)
- ✓ Town Planning

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Group Discussion 1

- **Business Drivers**
 - Which of These Business Drivers Apply to GeoNOVA?
 - Are there other Business Drivers?
 - If so, what are they?

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Group Discussion 1 (cont.)

- **Demand from Industry Sectors**
 - Which of the Business Areas will Require GeoNOVA Data?
 - Are there Demands from other Business Areas / Sectors?
 - If so, which ones?

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Common Problems

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Common Problems – Geo-Spatial Data

- Proprietary Formats
- Project / Program Specific Data
- Different Map Projections & Datum's
- Not GIS Ready
- Spatial & Attribute Data Not Linked
- Insufficient (or No) Metadata
- Inconsistent Data Quality (Currency & Accuracy)
- No Enterprise-Wide Data Standards

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Common Problems – Geo-Spatial Data

- **Resulting in:**
 - Multiple Copies of Data to be Managed
 - Additional Effort to Process & Manage Data
 - Barriers to Info Exchange & Interoperability (Silos)
 - Poor Understanding of Data
 - Additional Cost to Manage Data
 - Inconsistent Data
 - Higher Risk for Error
 - Poorer Quality Decisions

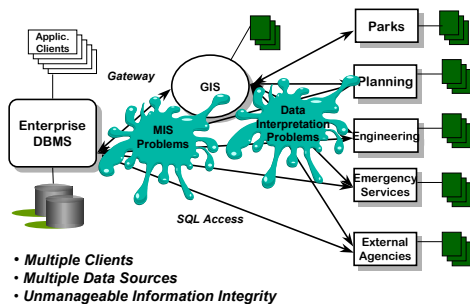
Common Problems – Technology

- Vendor “Camps” within Organization
- Incompatible Systems between Programs / Projects
- Inability to Exchange Data (No Interoperability Standards)
- Resulting in:
 - Technology “Ghettos” within Organization
 - Increased Cost for Training, Support & Maintenance

Common Problems – Information Management

- Poor or Nonexistent Access & Security Tools
- Multiple “Back Doors” to Geo-Spatial Data
- Poor or Nonexistent Version Management, Backup & Recovery Tools
- Wasted Effort & Resources Managing Multiple Copies of Data
- Increased Band Width on Intra / Internet
- Overall Increased Cost of Information Management

The Net Result



Group Discussion 2

- Common Problems – Geo-Spatial Data
 - Which of These Problems Apply to GeoNOVA?
 - Are there other Data Problems?
 - If so, what are they?

Common Problems – Geo-Spatial Data

- Proprietary Formats
- Project / Program Specific Data
- Different Map Projections & Datum's
- Not GIS Ready
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Group Discussion 2

- Common Problems - Technology
 - Which of These Problems Apply to GeoNOVA?
 - Are there other Technology Problems?
 - If so, what are they?

Common Problems – Technology

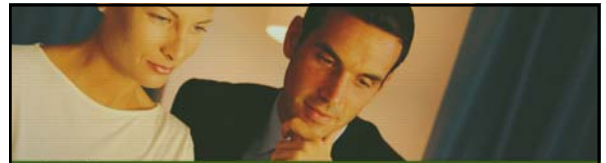
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Group Discussion 2 (cont.)

- Common Problems – Information Management
 - Which of These Problems Apply to GeoNOVA?
 - Are there other Info Management Problems?
 - If so, what are they?

Common Problems – Information Management

- Poor or Nonexistent Access & Security Tools
- Multiple “Back Doors” to Geo-Spatial Data
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Technology Trends

Technology Trends

- GIS Technology Maturing – Merging with IT
- New Spatial Technology from GIS & Database Vendors (SDE, Oracle Spatial, Informix, etc.)
- New Internet Map Server Products Enabling “Geo-Portals”
 - ESRI ArcIMS
 - Intergraph GeoMedia Web Map Enterprise
 - AutoDesk MapGuide
 - Mapinfo MapExtreme

More on Spatial Database Technology

- ESRI & Oracle Spatial Largest Market
- Informix is Advanced, but Lacks Market Share (Purchased by IBM Recently – May Revive)
- MicroSoft SQL Server has Spatial Extenders



Oracle Spatial – The Good!

- Now Called Oracle 9i Locator – Free with Standard Oracle (don't have to buy Enterprise @ \$400K +)
- Allows Spatial & Non-Spatial to be Fully Integrated (Single Row)
- Can Use Standard Oracle Management Tools for Back-up & Recovery, Versioning, etc.
- OGC Interoperability Compliant
- Fast Indexing and Access (Quad Tree)
- Spatial Filters & Query on the Server (not free)



Oracle Spatial – The Bad!

- No Data Cleaning or Error Checking Tools
- Limited Data Loading / Capture Tools Built-In
- Spatial Query Tools Extra \$ – Limited Function

Based on:

- “First get clean geo-spatial data and load it in a database....”



Oracle Spatial – The Ugly!

- No Edit / Update Tools for Spatial Data – Rely on GIS Vendors for this.
- Transaction Manager not There Yet – Rely on GIS Vendors for this.



ESRI SDE – The Good!

- Full Spatial Data Management, Query & Analysis Capability (Integrated with ESRI Suite of Products)
- Fast Indexing & Access
- Will Allow Spatial Data to be Stored In Oracle Spatial (SDE becomes API)
- OGC Interoperability Compliant



ESRI – The Bad!

- “Wrapper” Around Oracle
- Separate Edit Update Tools for Spatial & Attribute Data – not Fully Integrated
- Can be Expensive
- Non-Standard XML (ArcXML)



ESRI SDE – The Ugly!

- Restrictive Middle Ware may Constrain other Enterprise Applications
- Cannot Take Full Advantage of Standard Oracle Management Tools for Back-up & Recovery, Versioning, etc.
- Spatial Data Stored as Proprietary BLOB in Oracle – Not Easily Accessed by Other Vendor Products



Technology Trends (cont.)

- Emerging National & International Standards
 - ISO TC211
 - OGC
 - FGDC
 - GeoConnections
- Emerging Wireless / Location Based Technology
- New GPS Services (Real Time Corrections)



Technology Trends – Wireless GIS & GPS

- Anywhere, Anytime Mobile Computing
- Real Time Positioning in Vehicles and PDAs
 - GM On-Star in over 1 M Vehicles
- Microbrowser (wireless) Access to Web & Back Office
- Cellular Infrastructure for Locating Mobile Users
 - Ericson, Alcatel, US Wireless, Cell-Loc, Cambridge & Cell-Loc



Technology Trends – Wireless GIS & GPS

- 3G Cellular Standards in Europe – Coming to NA
 - Support Wider Bandwidth – Faster, More Data
 - Needs 4 X more Towers
- Satellite Links for LBS Getting Cheaper & Faster
- Mid-Air Messaging Coming to the Internet
 - Will be able to leave a message “at a location” (Virtually)
 - HP has Prototype Running in Bristol Lab in UK



More on New Location Based GIS

- ArcPad from ESRI
- On-Site from AutoDesk
- IntelliWhere / OnDemand from Intergraph



Location Based GIS – Connected Modes

- Direct Wireless Connection to Web / Enterprise Database
- Require Wireless “Signal in the Air” & Card
- Problem in Remote Areas where no Cell or other Wireless Coverage



Location Based GIS – Disconnected Modes

- Data / Application is Cached on PDA
- Does not Require Continued Wireless Connection to Web / Database
- Field Captured Info & Updates re-synced when Connected
- Or Red Line Info Integrated after QA



More on New GPS Technology

- Canadian Differential GPS (\$3 M)
 - Accuracy: 1 –2 Metres (Claimed)
 - Cost: \$1,200 per Receiver
 - Comm. Link: M-Sat
 - Operational: Trial Tests in April, 2002
 - Problem In Treed or Built Up Areas (Loses Signal)
 - Designed for Coverage in Canada
 - Connection to GPS Unit (Provides real time Corrections)



More on New GPS Technology

- US FAA Wide Area Augmentation System \$3 B)
 - Accuracy: 7 Metres (Claimed)
 - Cost: Free (Standard with most New GPS Units)
 - Comm. Link: GPS Channel (Don't Need Comm. Antenna)
 - Operational:
 - 1999 "Signal in the Air" for Marine etc.
 - FAA Certification for Flight Approaches etc.2003
 - Problem in Treed Areas (Designed for Aircraft)
 - Coverage not as Good in Canada



6 Main LBS Application Areas

- Finding Things (E911, Travel Directions, etc.)
- CRM (Sales, etc.)
- Asset Management (Outage Management, Work Permits, Inspections)
- Field Force Automation (Meter Reading, Delivery Services, Fleet Management)
- Location Based Billing (Parking, Theatre, Restaurant)
- Entertainment (Golf, Car Rallies, New Games)



Example 1 – Tree Inventory (Connected Mode)

- Client – City of Edmonton
- Application – Field Update of Tree Inventory (Prototype)
- COTS – IntelliWhere from Intergraph
- Infostructure –, Enterprise GIS (Oracle 8i Spatial & GeoMedia)



Tree Inventory – Connected Mode



Example 2 – Wireless Work Order / Pole Inspection (Disconnected Mode)

- Application – Work Permit / Hydro Application
- COTS – OnDemand from Intergraph
- Infostructure – *Disconnected* Mode Data Cached from GeoMedia / Access RDBM.

“Reality – What A Concept”

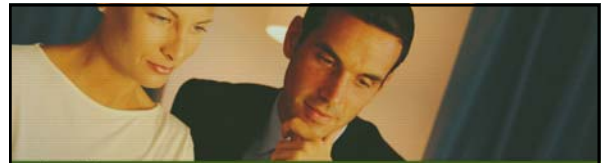
- **Challenges & Limitations**
 - Staying Connected (Urban & Rural)
 - Wireless Coverage
 - Need Corrected GPS to Capture Location of New Facilities in Real Time
 - Re-sync to Database is a Challenge (Long Transaction)

Group Discussion 3

- **Wireless GIS & GPS Technology**
 - Consider the 6 LBS Application Areas
 - Suggest Applications Relevant to GeoNOVA
 - Discuss the Impact of These Application in Terms of Data Availability, Accuracy, Currency, etc.

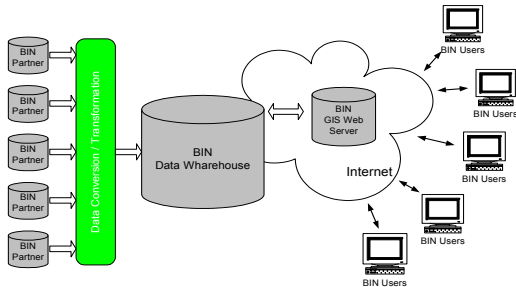
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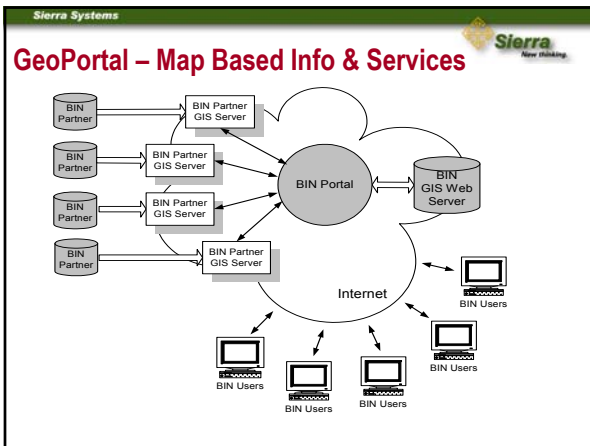
2 Technology Options to Consider


Centralized Warehouse





Centralized Warehouse

- **Pros**
 - Data in Single Format
 - Good Security
 - User View of the Data
- **Cons**
 - Relies on “push” from each Partner
 - Sub-set of data only
 - Duplicate Data to Manage



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- ## GeoPortal
- **Pros**
 - Immediate Currency of Data
 - Support Multiple Projections etc. via OGC
 - One stop Shopping
 - **Cons**
 - All Partners must have OGC compliant systems
 - Each Partner Needs a Server
 - Les / More Complicated Security

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- ## Group Discussion 4
- **Centralized Warehouse**
 - Discuss how this option could work for GeoNOVA
 - Do the Pros and Cons Noted Apply?
 - Are there any other Pros & Cons?

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- ## Group Discussion 4
- **GeoPortal**
 - Discuss how this option could work for GeoNOVA
 - Do the Pros and Cons Noted Apply?
 - Are there any other Pros & Cons?

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- ## Wrap Up
- Did we Meet the Workshop Objectives?
 - Questions & Answers
 - Action Items and Follow-up