

Rethinking Geospatial Data: the Need for a Global Mentality

David Loukes, P. Eng.
Geoplan Consultants Inc.
Concurrent Session 4.1
March 18, 2003
Colorado Springs, CO



Presentation Overview

- **Background**
- **Thinking globally – focus on standards:**
 - ▶ **Spatial constructs**
 - ▶ **Data dictionaries**
 - ▶ **Linkage mechanisms**
- **Rethinking Intellectual Property**
- **Case studies**



Geospatial Trends

- **Move toward web enabled data and applications interoperability**
- **NSDI / GSDI initiatives**
- **More consideration for cooperative data maintenance approaches**
- **Concern over IP issues**



Interoperability

- **Interoperability is one of the new “buzzwords” within the IT industry**
- **In simple terms, means the ability to share data and processes transparently across application / system boundaries**
- **Most efforts in the GIS industry to date have focused on data exchange, not interoperability**
 - ▶ **OGC is starting to change this, but some specific GIS-T issues (such as LRS integration) have not yet been adequately addressed**



National / Global SDI Initiatives

- There is a growing interest in national and international Spatial Data Infrastructure (SDI) initiatives
- National:
 - ▶ NSDI (US)
 - ▶ CGDI (Canada)
 - ▶ Others ... 27 nations in 1998 (U. of Maine)
- Growing international commitment for a Global Spatial Data Infrastructure (GSDI)



The DOT Role in NSDI / GDSI

- **NSDI / GDSI initiatives moving toward interoperability – access to geospatial data across organizational boundaries**
- **DOTs and other transportation agencies have a considerable amount of data that should be contributed to these initiatives**
 - ▶ **CGDI studies have clearly identified transportation network data as the number 1 priority among users**
- **Result: “enterprise GIS-T” now extends far beyond the boundaries of any one transportation agency**
 - ▶ **A need to think about collaborative data sharing and data maintenance responsibilities**



Geospatial Data Standards

- **The key to thinking globally with respect to geospatial data is to promote the use of data standards**
- **These standards can be divided into three broad categories:**
 - ▶ **Spatial data**
 - ▶ **Attribute data**
 - ▶ **Data linkage mechanisms**



Spatial Data Standards

- **Feature definitions:**
 - ▶ **Road network linear features based upon agreed topological junctions and boundaries (example: Canadian NRN)**
- **Feature keys:**
 - ▶ **Based upon agreed standards**
 - ▶ **Need approach to guarantee uniqueness**
- **Boundary definitions – to define extent of seamless databases**
- **Topology – including linear network connectivity**



Attribute Data Standards

- **Data dictionaries based on recognized international standards such as ISO TC204 GDF 4.0**
- **Concept of “core” national international attribute set and expanded regional / state / provincial / municipal attribute sets**
- **Requires associated attribute linkage standards**
- **Should include metadata standards also**



Attribute Linkage Standards

- **For GIS-T, two types:**
 - ▶ **Feature key linkages**
 - ▶ **LRS linkages**
- **Example: Canadian NRN**
 - ▶ **Includes both segmented and LRS data “views”**
 - ▶ **Includes unique ID (NID) for each feature**
 - ▶ **Includes link-node LRS**



Rethinking Intellectual Property

- In the IT community, it's never the technology that's the primary barrier to data integration / interoperability
 - ▶ **CGDI framework and NGTN studies: the main barriers are associated with intellectual property (IP) issues: cost, licensing, copyright**
- In Canada, cost recovery programs have seriously impeded data sharing
 - ▶ **Now trying to overcome these barriers**
- **Don't repeat our mistakes!**



Canadian Case Studies

- **National Road Network (NRN)**
- **Ontario Road Network (ORN)**
- **Nova Scotia GIS Data Warehouse (GIS-DW)**



National Road Network (NRN)

- Being developed by Natural Resources Canada as part of the GeoBase program
 - ▶ **Data will be accessed through a common web portal**
- Objectives:
 - ▶ **Develop transportation network “core” data in support of the CGDI**
 - ▶ **Provide a framework upon which “value added” data can be overlaid**
- **Concept: collect data once, as close to the source as possible, and share across jurisdictional boundaries**
- **The NRN will incorporate a LRS data model in support of provincial and municipal road network data requirements**



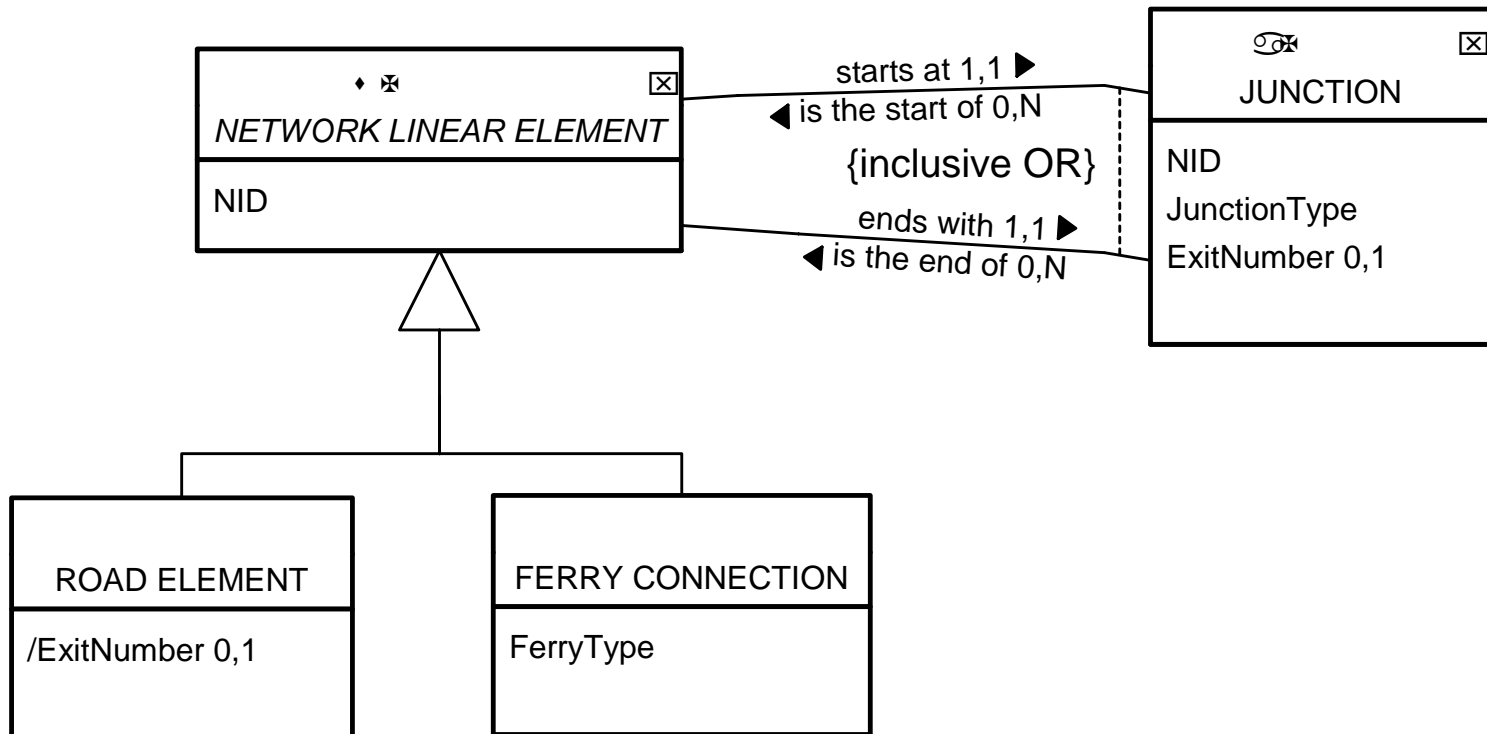
NRN LRS Data Model

- **Three spatial features:**
 - ▶ **Road Element (linear)**
 - ▶ **Ferry Connection (linear)**
 - ▶ **Junction (point)**
- **LRS Event Features:**
 - ▶ ***Point Events:* Toll Point, Blocked Passage, External Point Event**
 - ▶ ***Linear Events:* Road Name, Route Number, Road Class, Structure, Surface Type, Number of Lanes, External Linear Event**
- **Attribute data dictionary based on GDF**
- **Includes feature and event metadata**



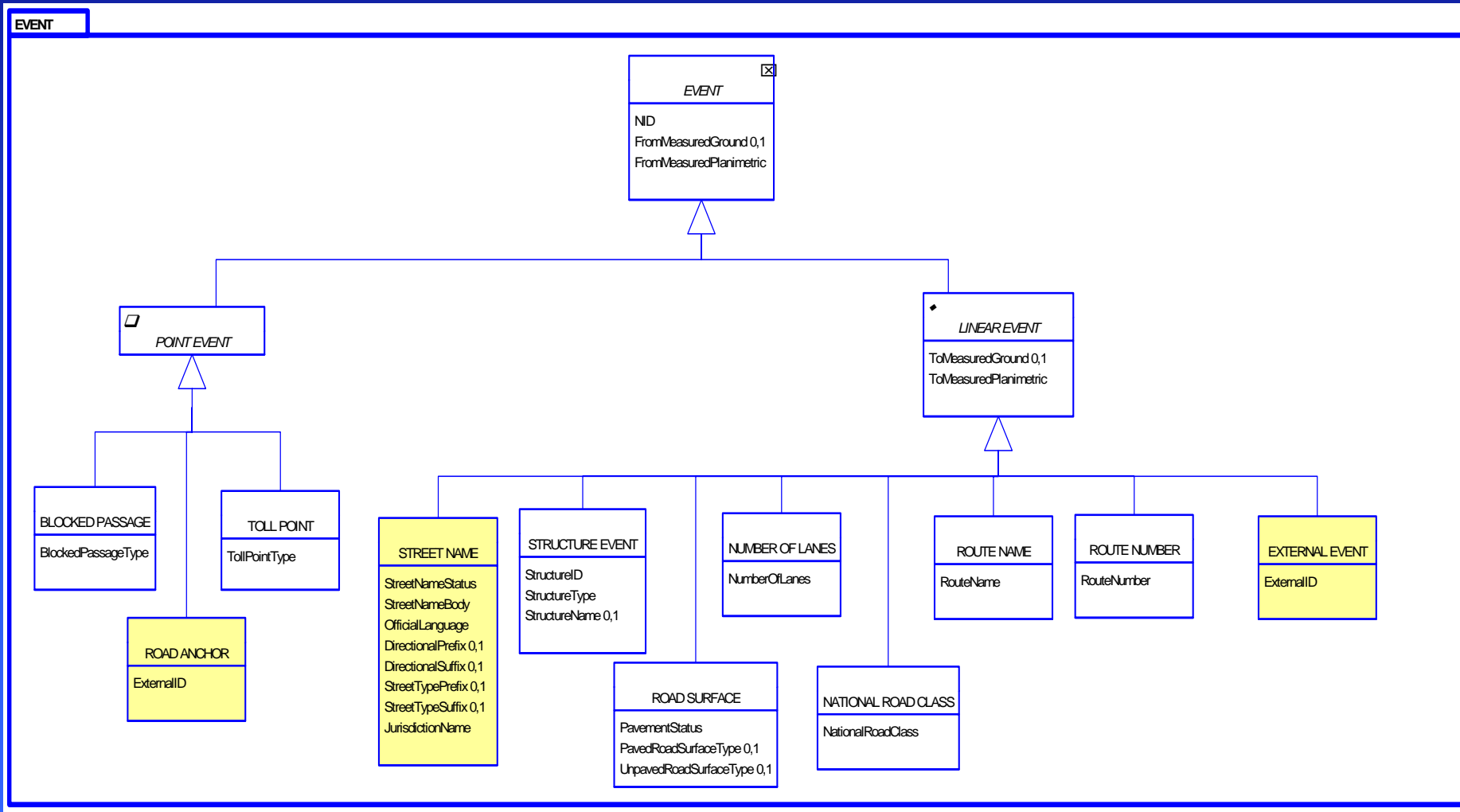
NRN Feature Data Model

NETWORK





NRN Event Data Model





Ontario Road Network (ORN)

- **Based on NRN core data model and extended provincial / municipal attribute set**
- **One common set of spatial geometry**
- **A three-level cooperative initiative involving NRCan, the Province of Ontario and Ontario municipalities**
- **Will use a LRS data model that includes civic addressing**



Nova Scotia GIS Data Warehouse

- **Will provide a common repository of Nova Scotia geospatial data and standard web access tools**
- **Context includes base topographic layers, property parcel data and civic addressing**
- **Road network layer will be based upon NRN data model:**
 - ▶ **Will provide a common LRS datum for DOT (NSTPW) and other users**
 - ▶ **NSTPW will build their LRMs on top of the NRN datum**

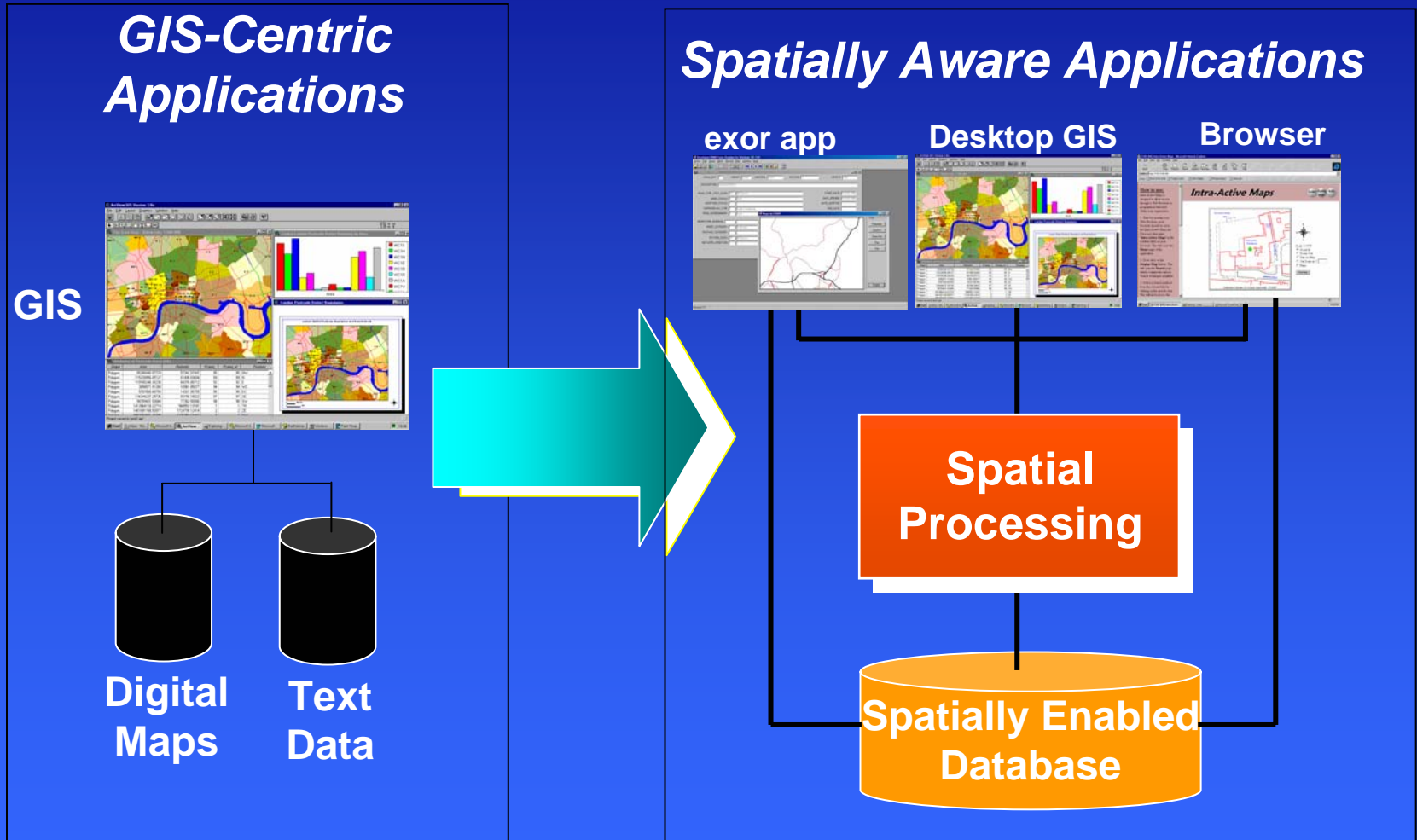


Final Thoughts ...

- **General GIS interoperability is achievable in the near term**
- **Specific GIS-T interoperability (ie, LRS) is farther out but is being worked on**
- **Neither is possible without some convergence on data model and data content specifications for the spatial database**
- **Geospatial data is a corporate resource**
 - ▶ **The enterprise extends far beyond DOTs**
 - ▶ **Think about cooperative data maintenance**
- **Don't let IP issues drag you down**



Changing Face of GIS



Source: Graham Stickler, Exor Corporation



Questions?

