Implementing a Scalable GIS Solution Into a Resource Management System

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Presentation Overview

- Company Background
- Application Overview
- Evolving GIS Architecture
- Data issues
- Software Issues
- Development Environment
- Conclusion

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Who We Are

- **Founders (1987)**
  - Union Pacific
  - Alcatel Canada Telecommunications
  - Tandem Computers (Compaq)
- **Owners (1990)**
  - Union Pacific Corporation
- **15 Years Experience**
  - Wireless Data Communications
  - Location Services

fēnix
Software, hardware, telecommunications infrastructure

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Nexterna's Accomplishments

- **Nexterna Built One of the Nation's Largest Packet Data Networks**
  - 23 States
  - 12,000 Miles
  - 500,000 Wireless Messages Each Day

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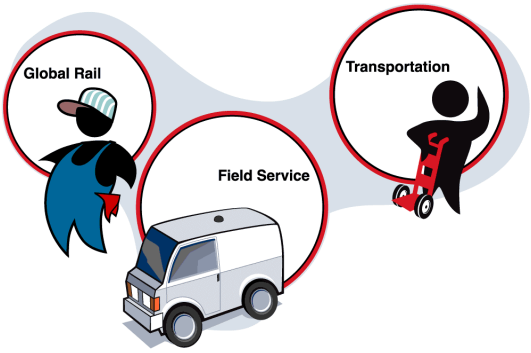
Business Highlights

- **Current Focus**
  - Global Rail
  - Transportation
  - Field Service



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OptiTrac

- **Advanced Location Tracking System**
  - Track Vehicle Location
  - Query Vehicles on Command
  - Gather Location and Usage Data
  - Get Address-Level Detail on Each Vehicle
  - Locate the Nearest Vehicle to a Specific Address
  - Access Vehicle Data via the Internet

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Application Components

- **GPS Service**
  - Hardware
  - Wireless Middleware
  - Database
- **GIS Service**
  - Industry-Specific Spatial Data
  - Internet Mapping Software
- **Application Server**
  - Resource Manager/Client GUI

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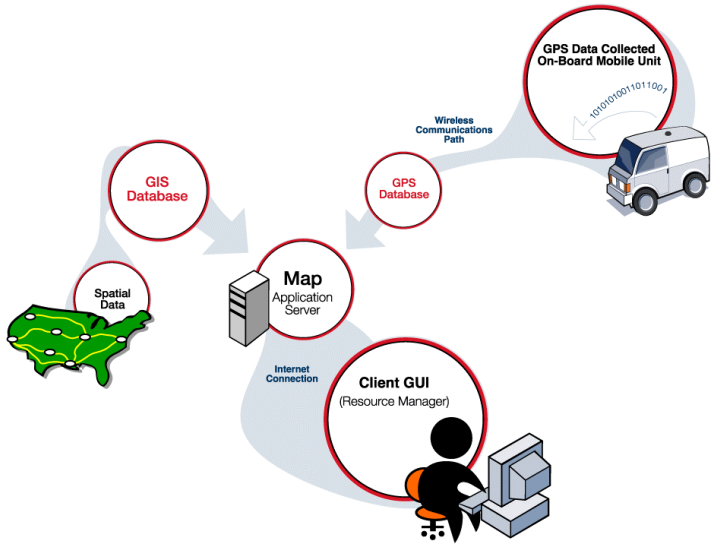
System Overview Diagram



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Initial Architecture

- **Simplistic Map Interface**
  - Only the Standard Zoom, Pan, Selection Tools
- **Railroad Maps**
  - Proprietary Customer Data
  - NTAD 2000 (Bureau of Transportation Statistics)
  - TIGER (Bureau of the Census)
- **Early IMS Software**
  - Map Objects IMS (1999)
  - ArcIMS Beta Program (1999-2000)
  - SpatialFX Suite From ObjectFX (Spring 2000)

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Our GIS "Evolution"

- **OptiTrac™ 2.0 Released 7/15/00**
  - **Simple Railroad Maps**
- **OptiTrac™ 2.1 Released 9/15/00**
- **OptiTrac™ 2.2 Released 12/15/00**
- **OptiTrac™ 3.0 Requirements Document 10/15/00**
  - 90-120 day implementation
  - "New" GIS
- **OptiTrac™ 3.0 released 2/15/01**
- **God Bless Sales & Marketing!!**

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New Product Requirements

- **Current Spatial Data**
  - Within One Year
  - Custom Requests for New Construction Areas
- **Accurate Spatial Data**
  - Minimum 95% Address-Matching
  - Comprehensive Attributes
    - Geocoding
    - Unit Detail Window
- **Additional Map Functionality**
  - Geocoding
  - Reverse-Geocoding
  - Spatial Queries (Nearest Unit)

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Data - Rail Industry

- **Many Customer-Supplied Datasets**
- **Attribute Data Most Important**
- **Government Data Meets Requirements**

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Data - Transportation Industry

- Comprehensive Interstate/Highway Networks
- TIGER streets
- Government Data Meets Requirements
- Future May Include Geocoding

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Data - Field Service Industry

- Highly-Detailed Street Data
- Geocoding Attributes
- Government Data not Sufficient
- Commercial Vendors: GDT, Etak, Navtech

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Data Vendor Evaluation

- **Technical Feasibility**
  - Nationwide Coverage
  - Plans to Add Canada & Mexico
  - Data Formats
- **Data Updates**
  - Update Availability and Schedule
  - Update Request Mechanism
- **Final Selection: GDT**

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Internet Mapping Software

- **Enhanced Functionality**
  - Geocoding Engine
    - Address-Level Detail
  - Reverse Geocoding Engine
  - Spatial Queries
    - Nearest Unit to a Point
- **Vendor/Product Research**
  - Products Compared with ObjectFX
  - ESRI, MapInfo, Autodesk, XMarc, Maptuit, Delorme
  - Product Matrix

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Software Product Evaluations

- **Technical Feasibility**
  - JAVA
  - Supported Data Formats
  - SDK/Custom Development Tools
  - Scope of Development Effort
- **"Open" Architecture**
  - Add-On Components (Routing, User-Editing, etc.)
  - Spatially-Enabled Database Support
- **Pricing**
  - Can't Avoid the "Pay As You Grow" ASP Model
- **Final Decision: Go with What You Know**

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Internal GIS Efforts

- **"Back-End" Mapping**
  - ESRI Software (Arcview & Arcinfo)
- **Web "Optimization"**
- **Data Conversion**
- **Projections**
- **Cartographic Issues**
  - Legible Labels
  - Web Safe Colors
  - Consistent Symbology

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Development Environment

- **Server-side**
  - OptiTrac™ Application Components (Java)
  - GPS Database (Oracle)
    - UNIX-based C++ App Populates the Database (Converting to Java)
  - Application Server Software (WebLogic)
- **Client-side (Thin)**
  - Web Browser
    - Internet Explorer
    - Netscape Navigator
  - Java Plug-In

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Personnel

- **1 GIS Engineer**
- **2 Java Developers**
- **Supporting Staff**
  - Oracle DBA
  - Development Manager
  - Product Manager
  - Internet/Infrastructure Manager
  - OptiTrac™ Java Developers

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Hardware

- **Existing Application Server**
  - Stores Application Software, Mapping Software, and Spatial Data
  - Hewlett-Packard NT Server
    - Dual 600 MHz Xeon Processors
    - 1024 MB RAM
    - 30 GB Hard Drive
  - Recently Upgraded
- **Network Configurations**
  - Internet Bandwidth Issues
  - Firewalls
  - Proxy Restrictions
  - Slow Client PC's
  - Java Overhead

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Hardware

- **Internal Resources**
  - GIS Engineer PC
    - Pentium III
    - 800 MHz Processor
    - 512 MB RAM
    - 30 GB Hard Drive

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Conclusion

- "On-the-Fly" Implementation
- Scalable, Robust Mapping Application
- Dynamic Technology
- Countless Potential Wireless/GIS Applications in Transportation

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Thank You

- Questions
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