Briefing to Policy & Decision Makers of Western Balkans Region on GIS for Resilient Road Networks
Agenda

- Introduce Esri
- Define Geographic Information System (GIS)
- How GIS improves resilience of road infrastructure
- Innovative use cases
- Summary of benefits of GIS
- Q&A
Esri is the global leader in geographic information systems (GIS). We build ArcGIS for mapping, visualization and spatial analytics, for clear insights to better inform decision-making.
GIS

Enables The Geographic Approach

Providing a Process and Framework . . .

. . . For Applying Geographic Knowledge Widely

Decision Making

Analysis & Modeling

Planning & GeoDesign

Visualization & Mapping

Applying

Understanding

Predicting

Assessing

Measuring

Data

Action
Applying The Geographic Approach

Creating Solutions for a More Sustainable Future

- Creating Sustainable Cities
- Improving Public Transit
- Preserving Natural Areas
- Reducing Pollution
- Responding to Pandemic
- Engaging Communities
- Developing Resilient Infrastructure
- Automating Processes
- Creating Efficiency
- Optimizing Logistics
- Improving Service Reliability
- Predictive Maintenance
- Building Resilient Networks
- Improving Decision Making
- Improving Diversity, Equity & Inclusion
- Assuring Safety
- Enhancing Collaboration
- Creating Efficiency
- Improving Service Reliability
- Building Resilient Networks
- Applying geospatial technology to solving the challenges of today & tomorrow
Spatial Information is Crucial for Infrastructure Management

Nearly all information gathered, analyzed and reported has a location

- Incidents
- Roadway Infrastructure
- Weather Conditions
- Roadway Geometrics
- Traffic Volume
- Pavement Conditions

Spatial Information Provides the Context for Understanding
ArcGIS | Common Patterns of Use

Mapping & Visualization
Understand locations and relationships with maps and visual representations

Data Management
Collect, organize, and maintain accurate locations and details about assets and resources

Field Mobility
Manage and enable a mobile workforce to collect and access information in the field

Monitoring
Track, manage, and monitor assets and resources in real-time

Analytics
Discover, quantify, and predict trends and patterns to improve outcomes

Design & Planning
Evaluate alternative solutions and create optimal designs

Decision Support
Gain situational awareness, and enable information-driven decision making

Constituent Engagement
Communicate and collaborate with citizens and external communities of interest

Sharing & Collaboration
Empower everyone to easily discover, use, make, and share geographic information
GIS Enables Smarter Transportation
Improving How We Manage and Make Decisions

- Monitoring
- Creating Insights
- Seeing Relationships
- Modeling
- Predicting
- Increasing Efficiency
- Measuring Everything
- Communicating Effectively
- Thinking Holistically
- Optimizing Performance
- Automating
- Visualizing

NGOs, Regions, Cities, Nations, Business
National Road Agencies in Europe using ArcGIS
Toll Road Operators in Europe using ArcGIS
Geospatial Infrastructure Delivers Powerful Apps
Supporting Many Types of Workflows and Engagements

Powerful Desktop Apps
- ModelBuilder
- Pro
- Insights
- 3D

Massive Mobile Deployments
- Work Management
- Data Collection
- Tracking

Pervasive Web Apps
- Dashboards
- Mapping
- Infographics
- Story Maps

Geospatial Infrastructure

Empowering Everyone . . .
. . . In the Organization and Beyond
Public Enterprise Roads of Serbia

Mapping the risk on public roads of Serbia
Ministry of Interior of Republic of Serbia

Directing the work of the Traffic Police
Story Maps for Information Sharing

State Highway Resilience

1. Disruption
2. Availability
3. Outage
4. State Highway One Network Road Classification

The One Network Road Classification (ONRC) is a classification system which divides New Zealand's roads into categories based on how busy they are, whether they connect to important destinations, or are the only route available.

For more information see the ONRC web page.
Story Maps for Information Sharing

State Highway Resilience

About  Earthquake  Storm  Volcano  Tsunami

Storm

1. Disruption

2. Availability

3. Outage

The “Outage State” indicates the duration over which the road will be in the Availability State above. This gives an indication of the duration of loss or reduced access in links along the road network.

4. State Highway One Network Road Classification

Eagle Technology, LINZ, StatsNZ, NIWA, DOC, © OpenStreetMap contributors.
Study findings:

- >50%: Road segments in the SEMCOG region at at least moderate flood risk
- 7.9%: Bridges in the region at high flood risk
- +$36M: Total cost of user delays if all road segments in the region identified as highly exposed were to be closed to flooding for just 1 hour
Climate Change Vulnerability WebApp
Case study

Western Balkans transportation network

Improving transport resilience in the Western Balkans region

Factors affecting strategic regional road network

- Aging infrastructure
- Population growth
- Impact of weather events
- Impending sea level rise
- Increasing volume of freight
Dashboards for Decision Support

- Improved data accessibility & analysis
- Streamlined processes
- Easily accessible info to decision-makers
- Better insights for a more informed strategy
Atkins

Forecasting climate change

Engineering and design firm Atkins leverages GIS to forecast climate trends next season or decades into the future. Atkins's innovative Seaport Simulator uses location-enabled simulation to assess the impacts that climate change will have on a specific seaport or trade area.

01. A global digital twin
   The simulator creates a digital twin of a port and quickly assesses the impact climate change will have on a specific operation in the future.

02. Simulating climate risks and opportunities
   Seeing climate projections mapped in GIS lets port planners and engineers understand the financial and operational effects of their decisions.

03. Beyond the global supply chain
   The predictive analytics behind the Seaport Simulator may also help executives meet other goals, like reaching net-zero carbon emissions.
GIS for Earthquake Damage Assessment & Recovery

- Fast deployment of flexible solution
- Efficient decision-making
- Real-time coordination of field teams
- Transparency & collaboration among stakeholders
The Value of GIS for Resiliency of Road Infrastructure

- Collect & manage inventory of infrastructure assets
  - Asset registry, condition, expected life span
- Determine importance of assets
  - Network & accessibility models to assess impacts of failure
- Input to models and spatial analysis to determine vulnerability to climate impacts
- Interactive maps for clear communication to policy/decision makers, stakeholders and the general public
GIS Integrates and Leverages Innovations in Technology

GIS Innovation

Expanding the Power of GIS
THE SCIENCE OF WHERE

A Framework and Process

Data Management & Integration
Visualization & Mapping
Analysis & Modeling
Planning & Design
Decision Making
Action

Understanding
Predicting
Collaborating
Informing

Transforming How We Think and Act . . . .
. . . Creating a More Sustainable Future