



6th Road Technical Committee
October 8, 2021


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

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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.

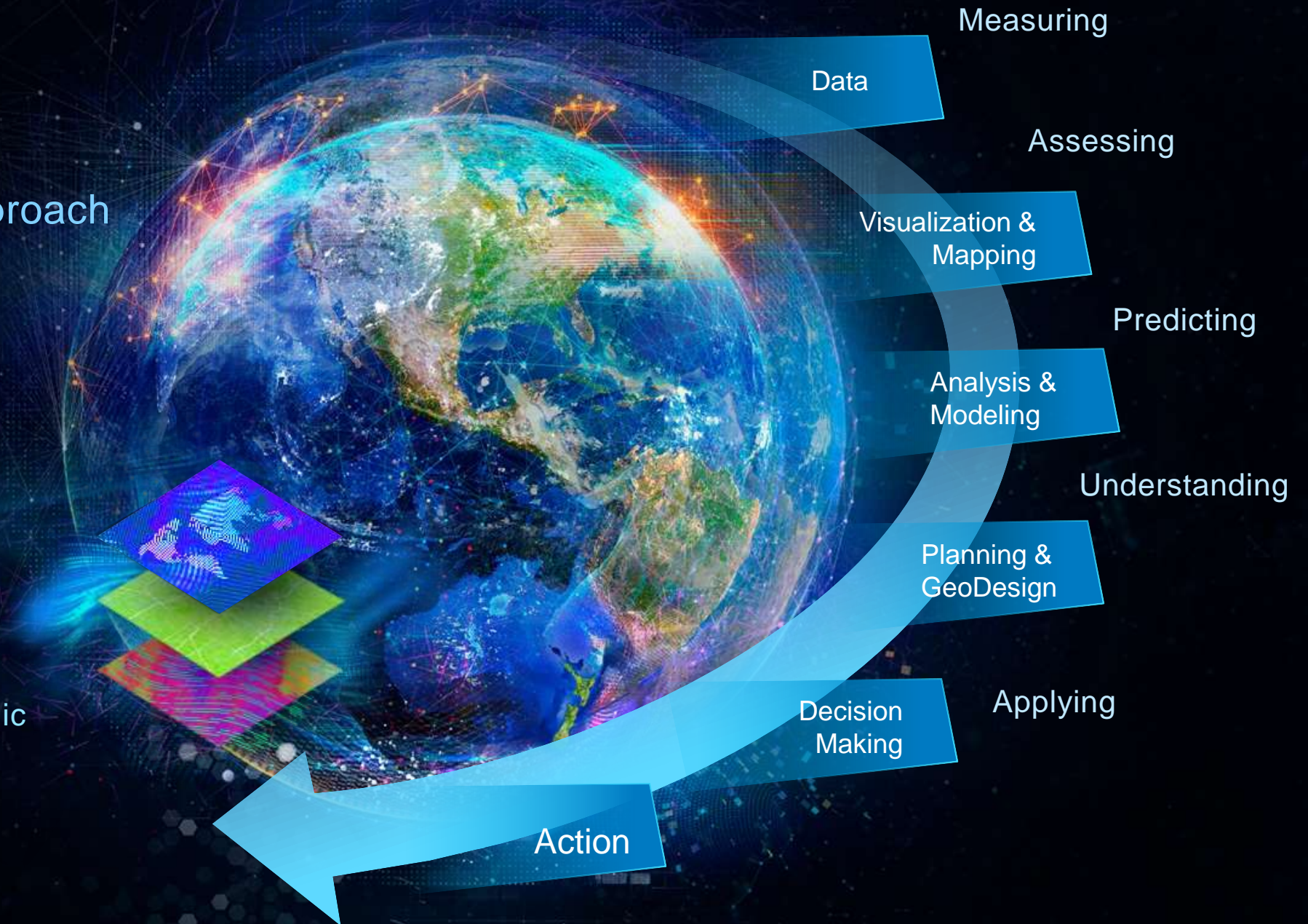


GIS

Enables The
Geographic Approach

Providing a Process
and Framework . . .

. . . For Applying Geographic
Knowledge Widely



Applying The Geographic Approach

Creating Solutions for a More Sustainable Future



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

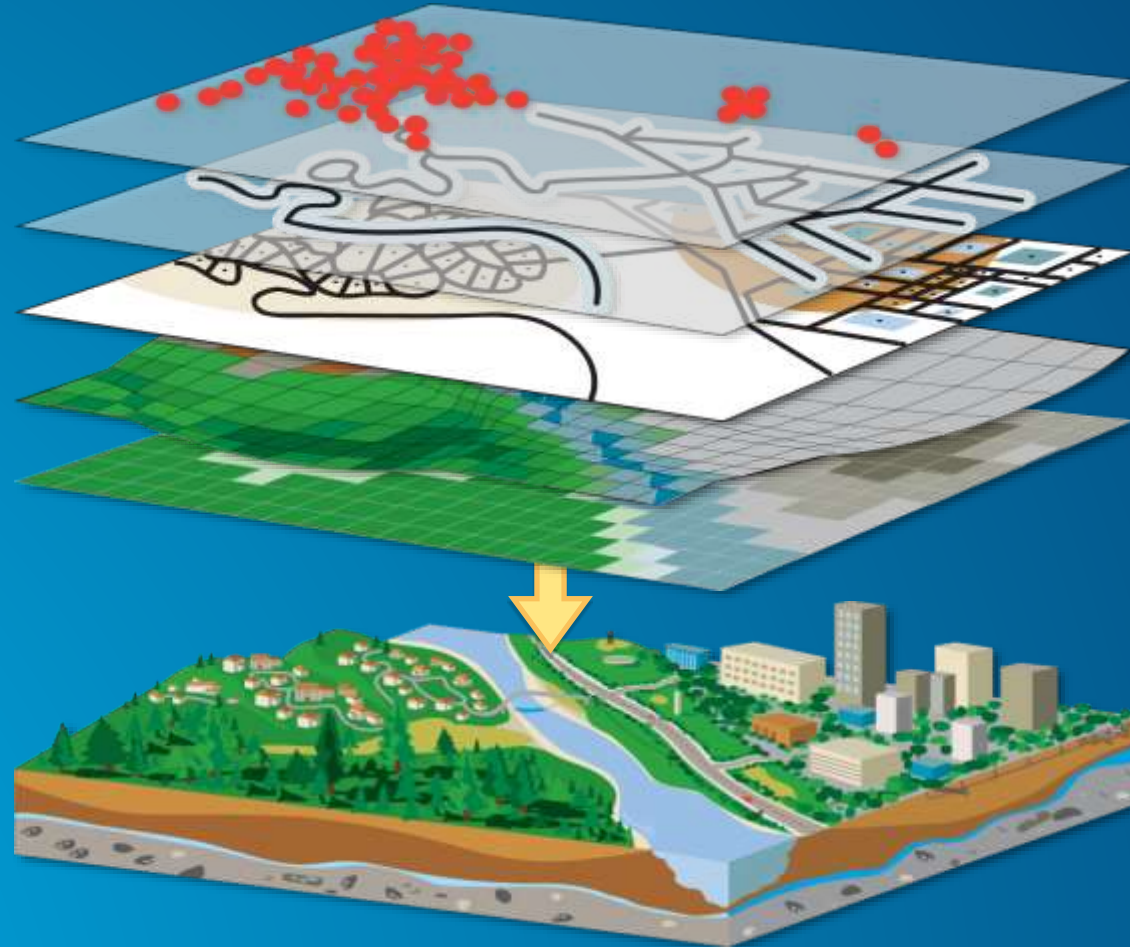
Roadway Infrastructure

Weather Conditions

Roadway Geometrics

Traffic Volume

Pavement Conditions



Spatial Information Provides the Context for Understanding

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



National Road Agencies in Europe using ArcGIS



Toll Road Operators in Europe using ArcGIS



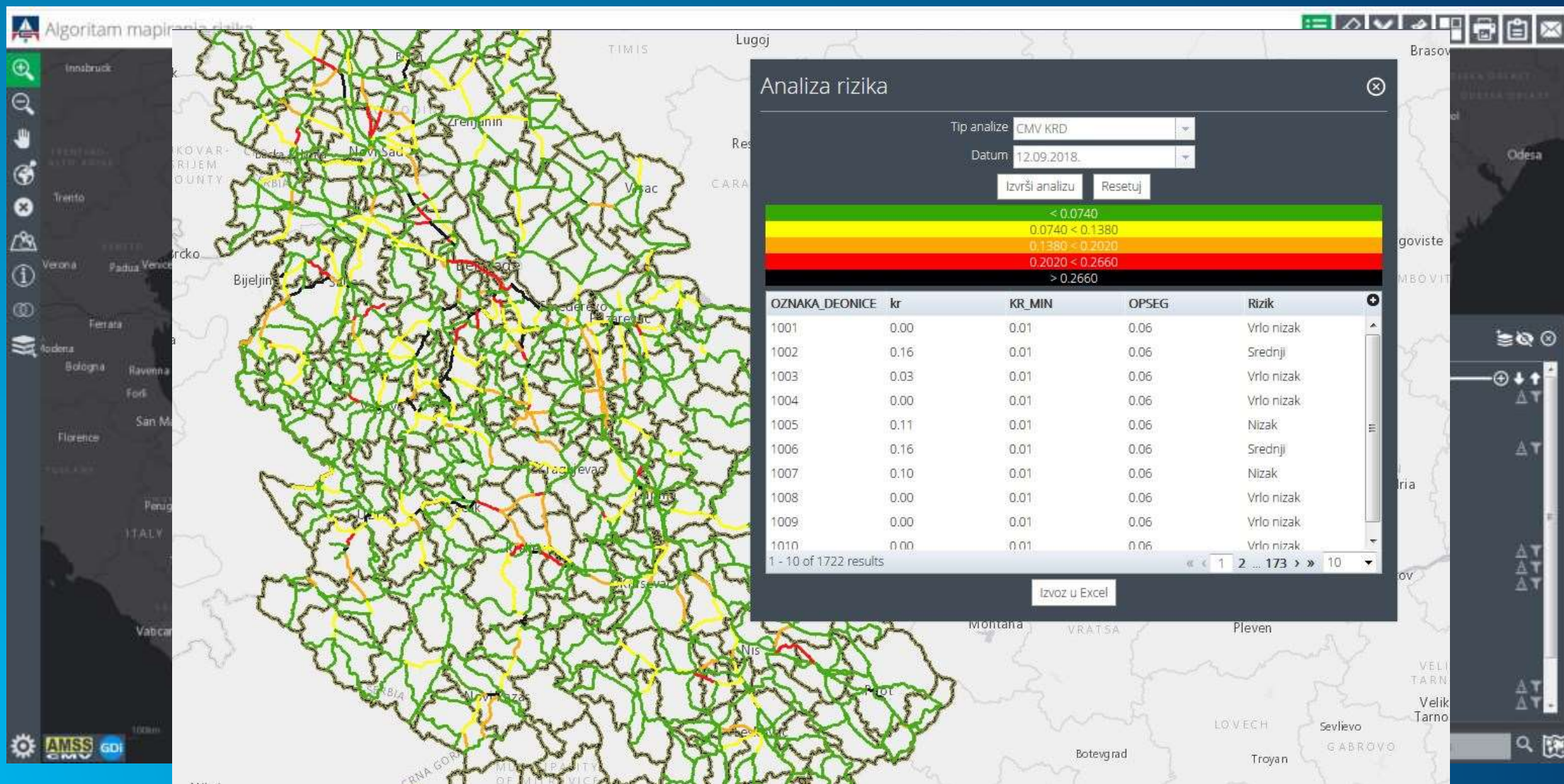
Geospatial Infrastructure Delivers Powerful Apps

Supporting Many Types of Workflows and Engagements



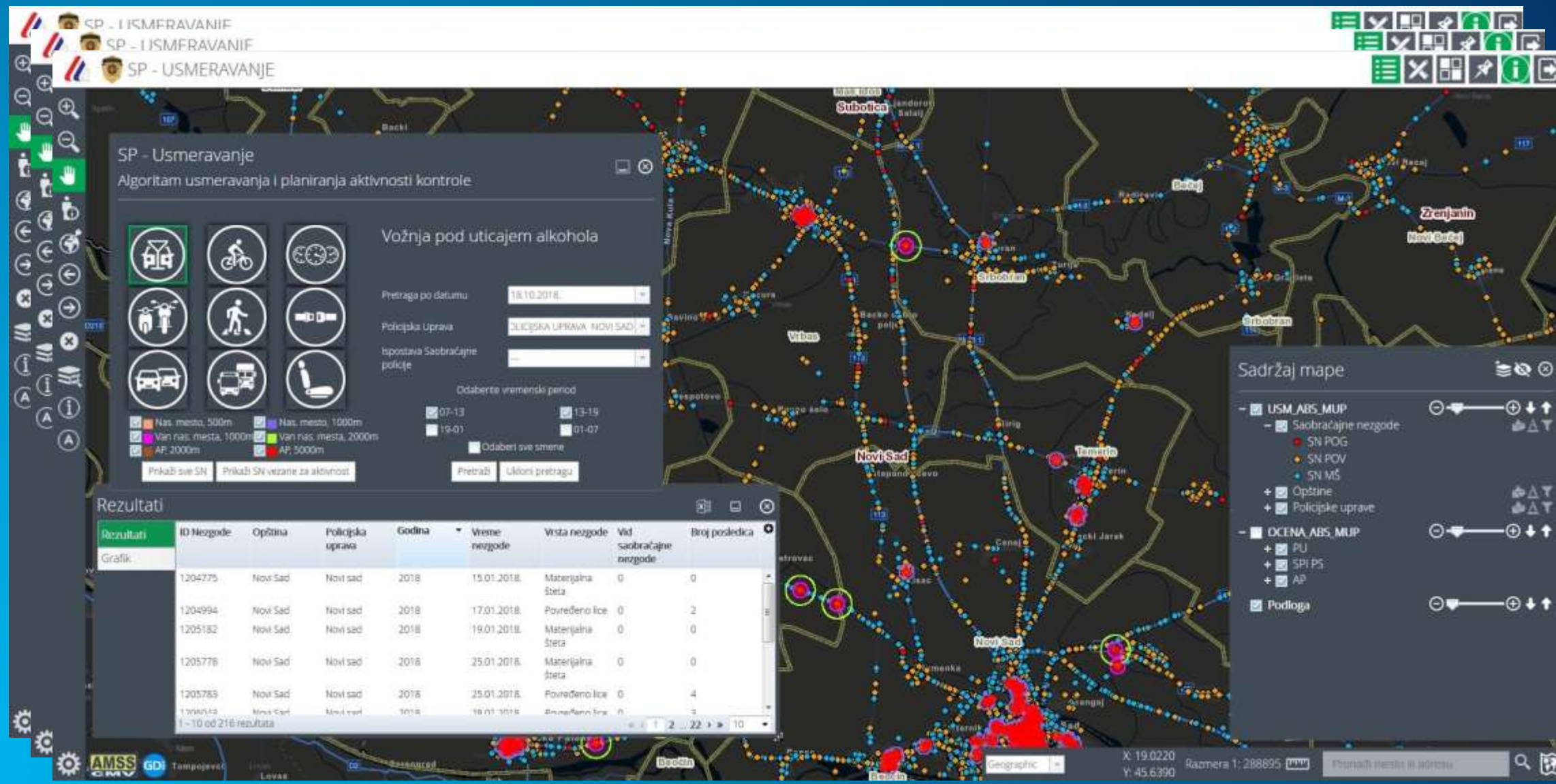
Public Enterprise Roads of Serbia

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

Resilience web page



About

Earthquake

Storm

Volcano

Tsunami

Earthquake

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](#)



LEGEND

OneNetworkRoadClassification

State Highway ONRC

- High Volume
- National
- Regional
- Arterial
- Primary Collector
- Secondary Collector
- Access
- Low Volume
- Unknown

Story Maps for Information Sharing

State Highway Resilience

- About
- Earthquake
- Storm
- Volcano
- Tsunami

Storm

1

Disruption

2

Availability

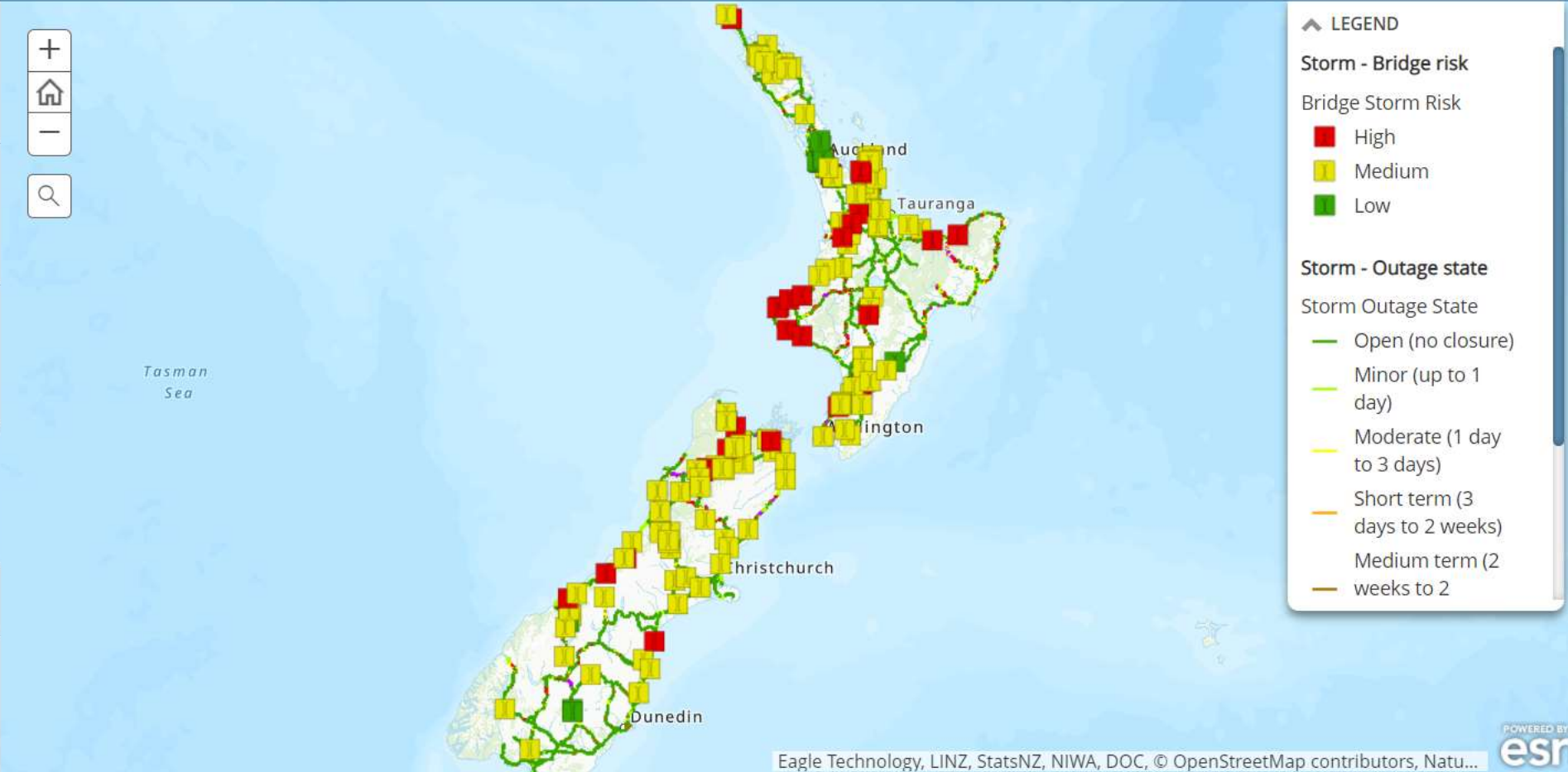
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Outage

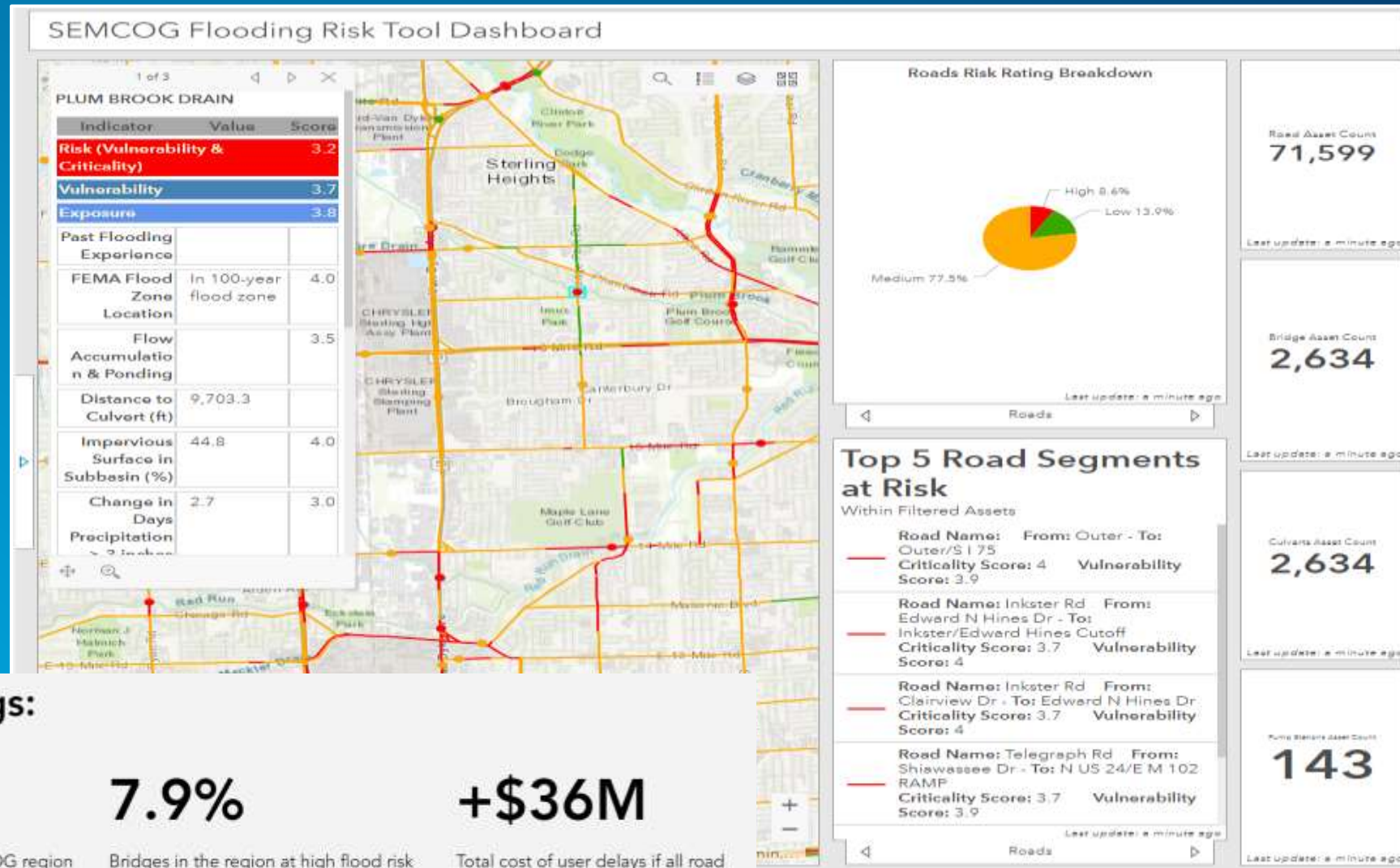
The “Outage State” indicates the duration over which the road will be in the Availability State above. This gives an indication of the duration of loss or reduced access in links along the road network.

4

State Highway One Network Road Classification



Flood Risk Calculation



Study findings:

>50%

Road segments in the SEMCOG region at at least moderate flood risk

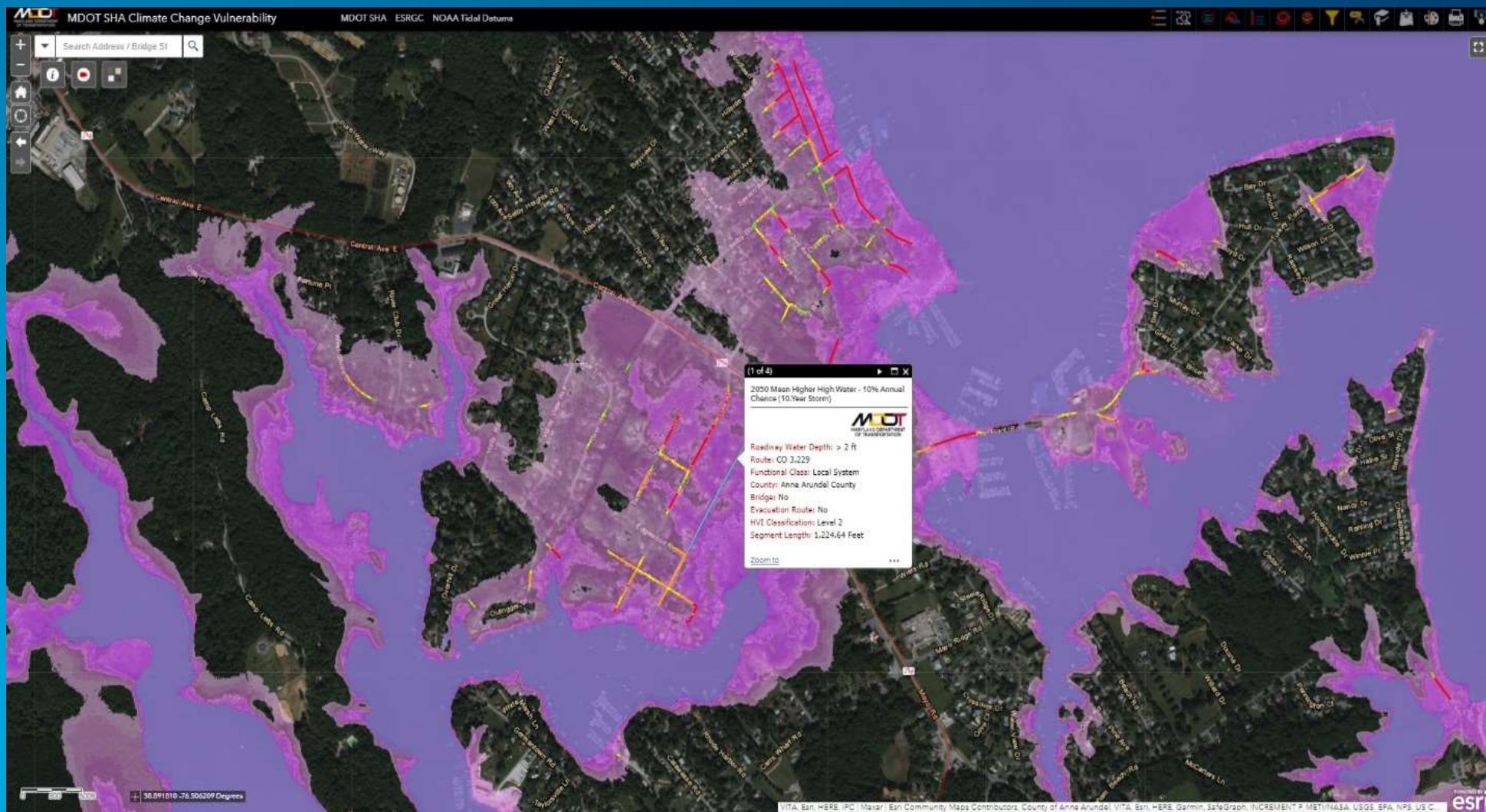
7.9%

Bridges in the region at high flood risk

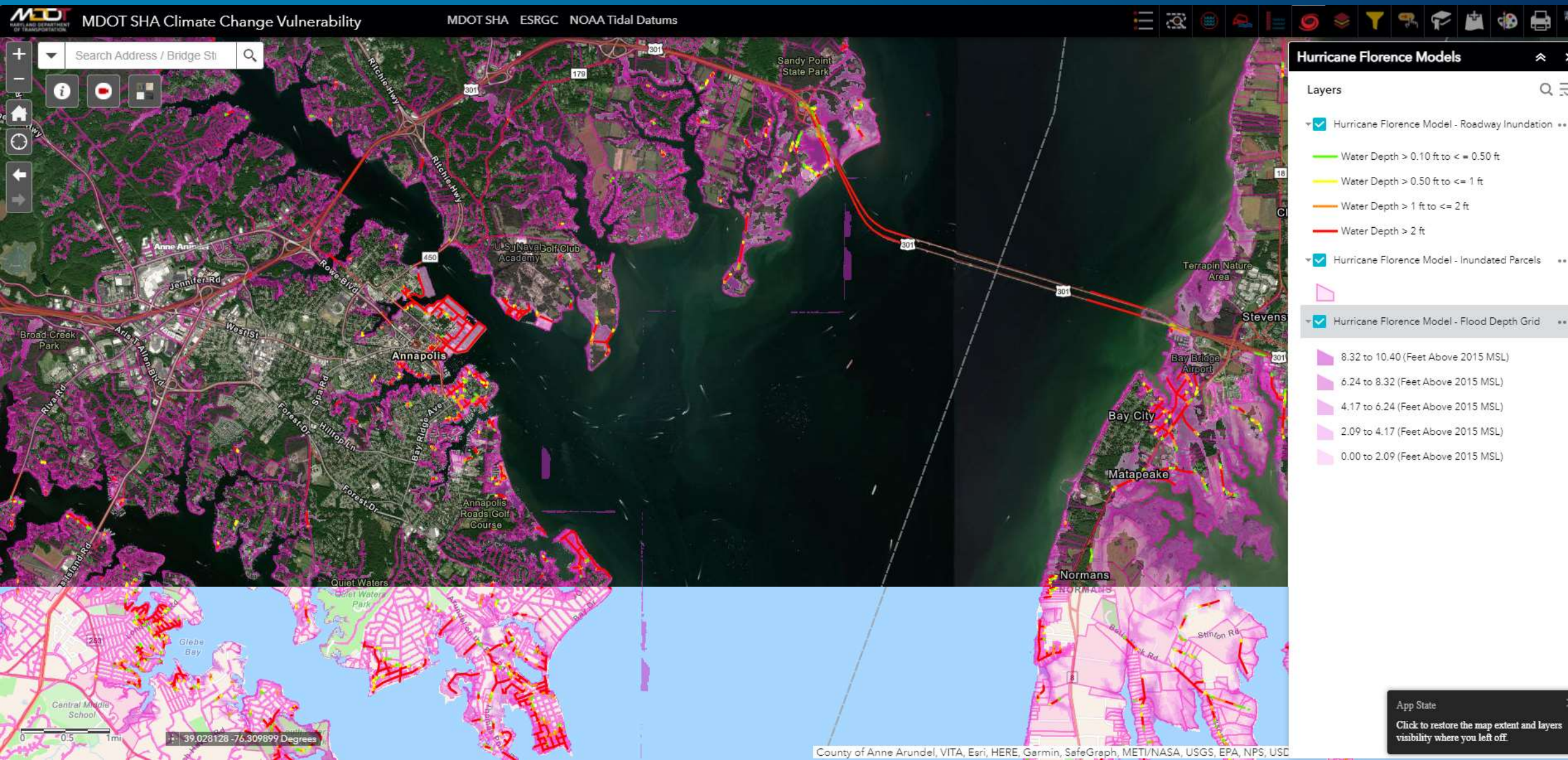
+\$36M

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



Climate Change Vulnerability WebApp



Case study

wood.

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



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

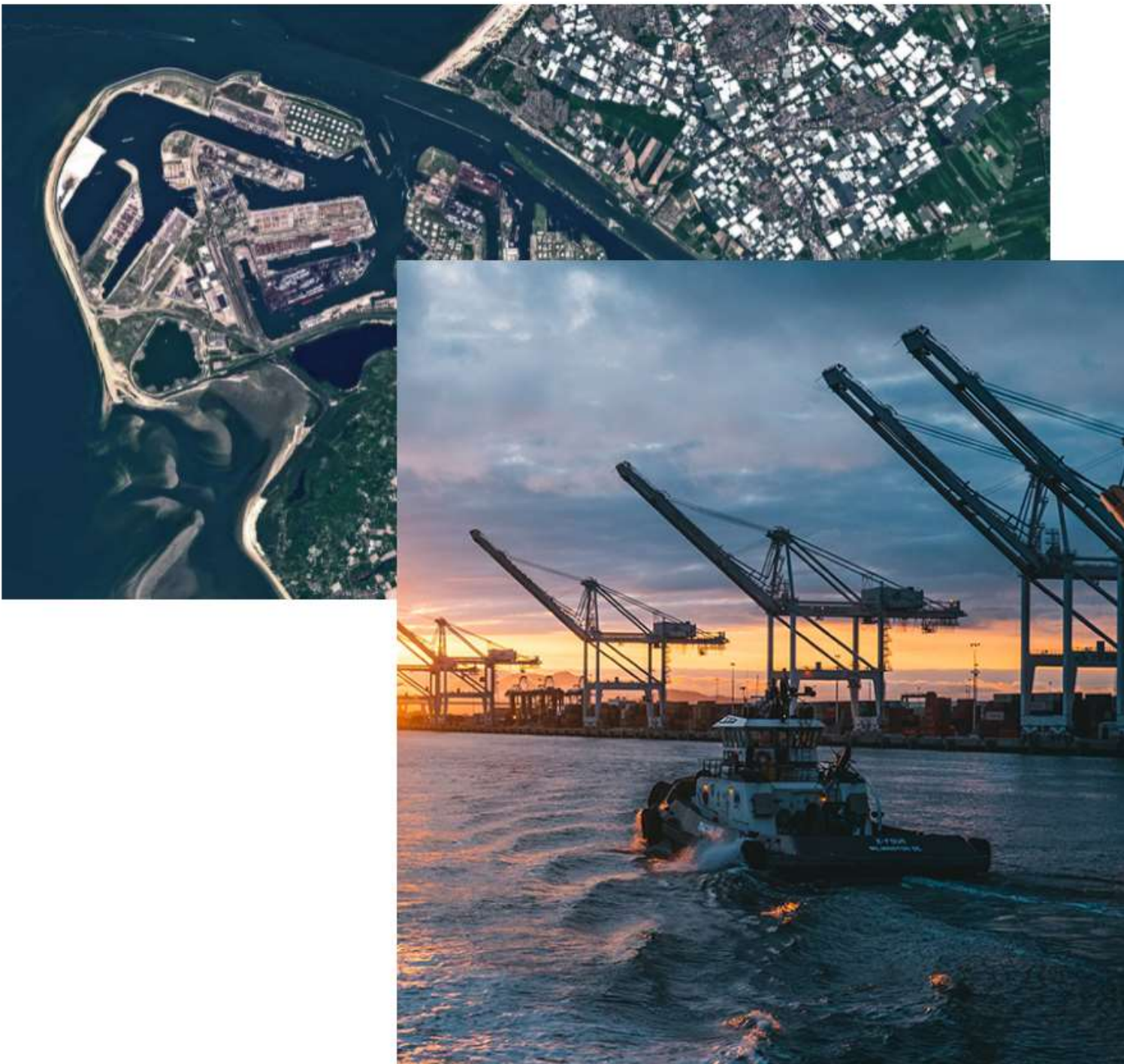
The simulator creates a digital twin of a port and quickly assesses the impact climate change will have on a specific operation in the future.

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 team
- Transparency & collaboration among stakeholders



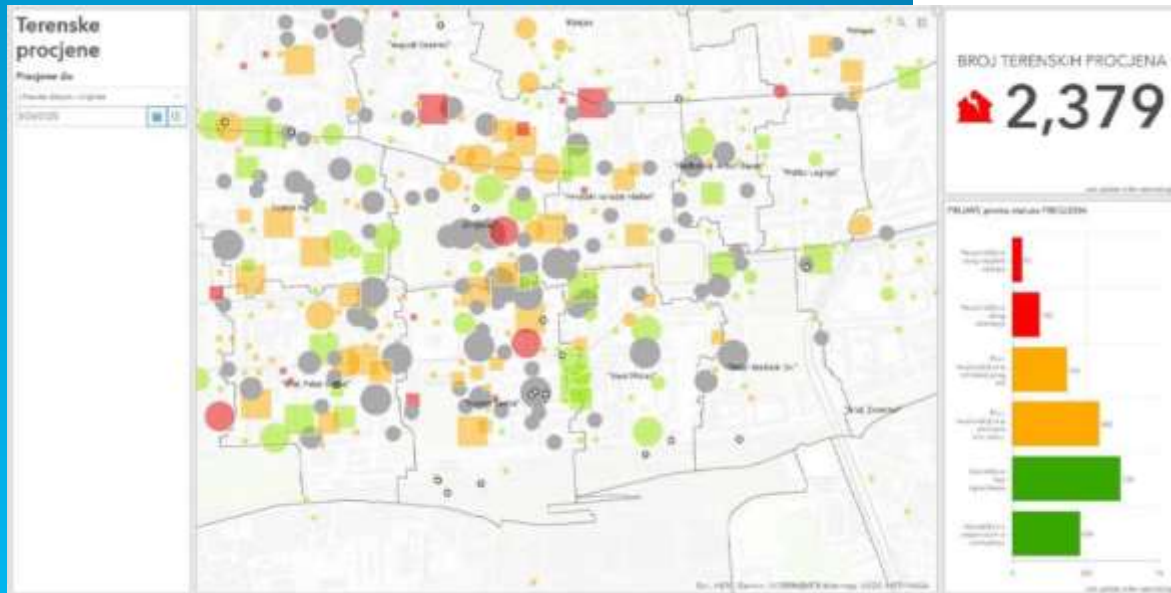
USER STORY

City of Zagreb Uses GIS for Earthquake Damage Assessment and Recovery

The 5.5-magnitude earthquake that struck Zagreb on March 22 found many public and private buildings unfit to withstand its force. Because the City of Zagreb is a longtime ArcGIS user, local Esri distributor GDi was called immediately to assist. With one expert permanently on-site and several helping remotely, GDi activated the Esri Disaster Response Program, with several hundred ArcGIS Online licenses.

Challenge

The first priority for the City of Zagreb was to enable residents to report the damages caused by the earthquake. A Survey123 form was created in less than a day, resulting in more than 20,000 citizen reports that were fed into several ArcGIS Dashboards. This enabled a common prioritization of activities like chimney removal and

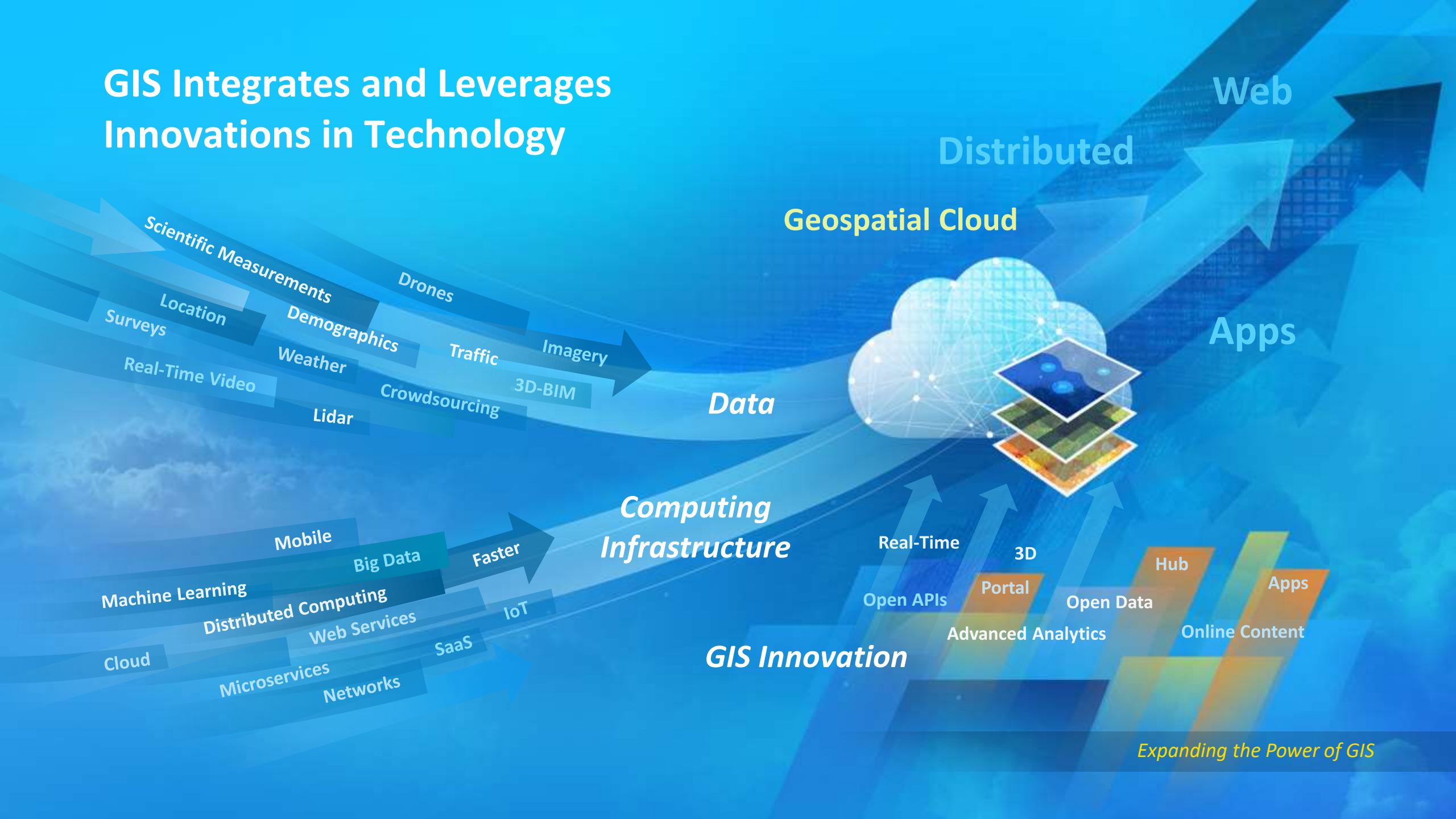


The Value of GIS for Resiliency of Road Infrastructure

- **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



THE SCIENCE OF WHERE

*A Framework
and Process*



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



esri

THE
SCIENCE
OF
WHERE

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