

# Optimizing vegetation management

Why data allows us to make better decisions than ever before

Patrick Eisenhauer, Engagement Manager, Data Science

Jonah Keim, Managing Director, Data Science

Jesse Woods, Vice President, Data Science



# Presentation outline

- Introductions
- Overview of vegetation risk analytics
- Insights and management applications

Please insert questions as comments during the presentation.

We'd love your feedback! We'll share a survey at the end of the presentation.

# Presenter introductions



**Patrick Eisenhauer**

Engagement Manager, Data Science  
E Source



**Jesse Woods**

Vice President, Data Science  
E Source



**Jonah Keim**

Managing Director, Data Science  
E Source

# Industry in transition

Decarbonization

Safety, reliability & resilience

Downward cost pressure

Customer equity

Data-driven paradigm shift

Speed  
to  
value



# How do you take action on risk-spend efficiency?

1. Create a data-driven risk score to demonstrate condition-based risk

***“Where is there risk on my system?”***

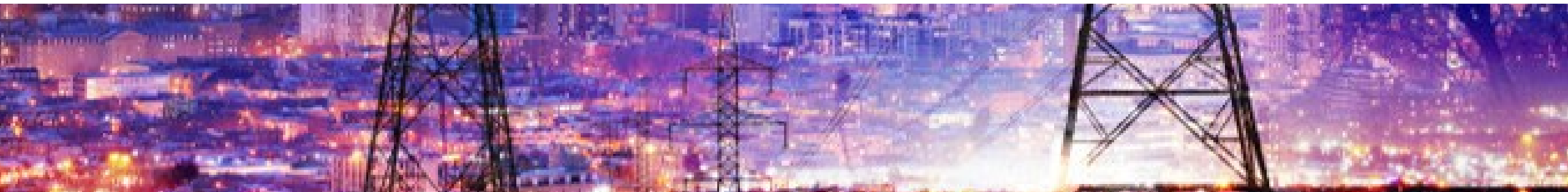
2. Leverage scenario planning to optimize reliability versus cost

***“How do I take action on the risk?”***

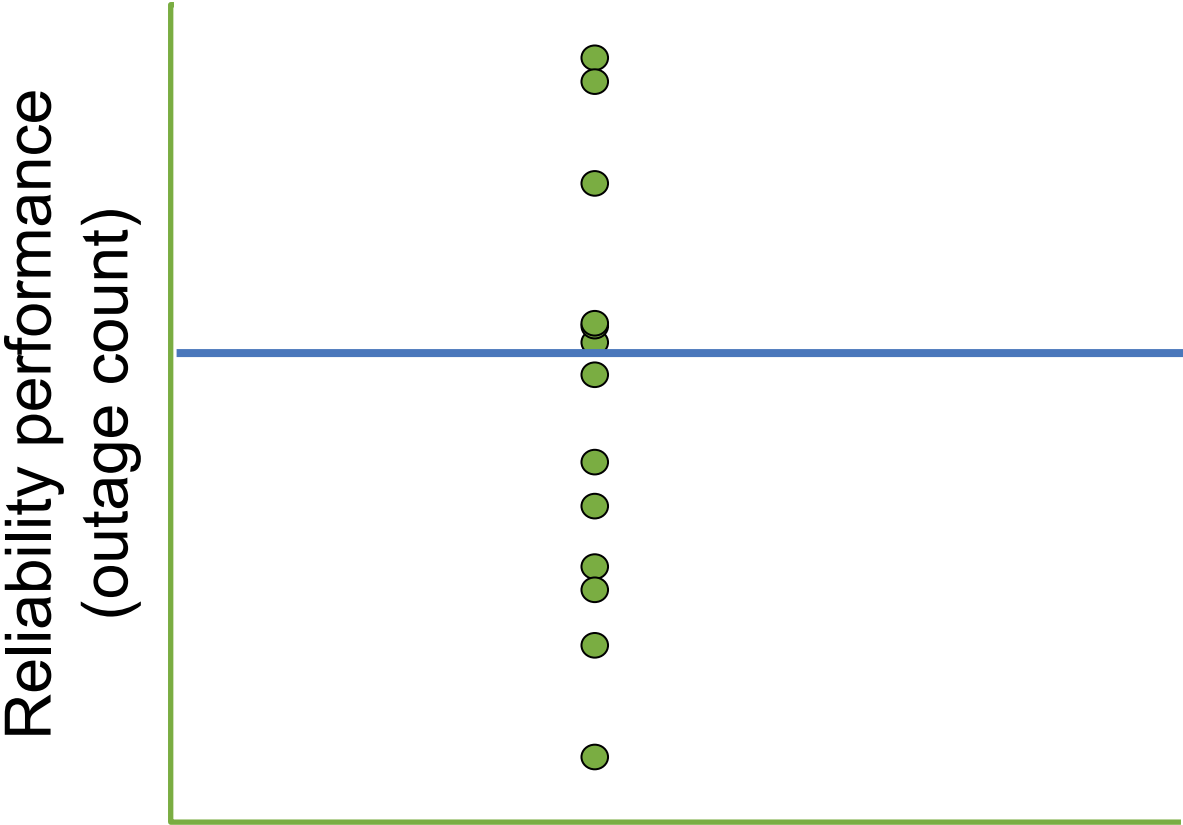


# Create a data-driven risk score to demonstrate condition-based risk

**“Where is there risk on my system?”**



# Outages, exposure, and risk

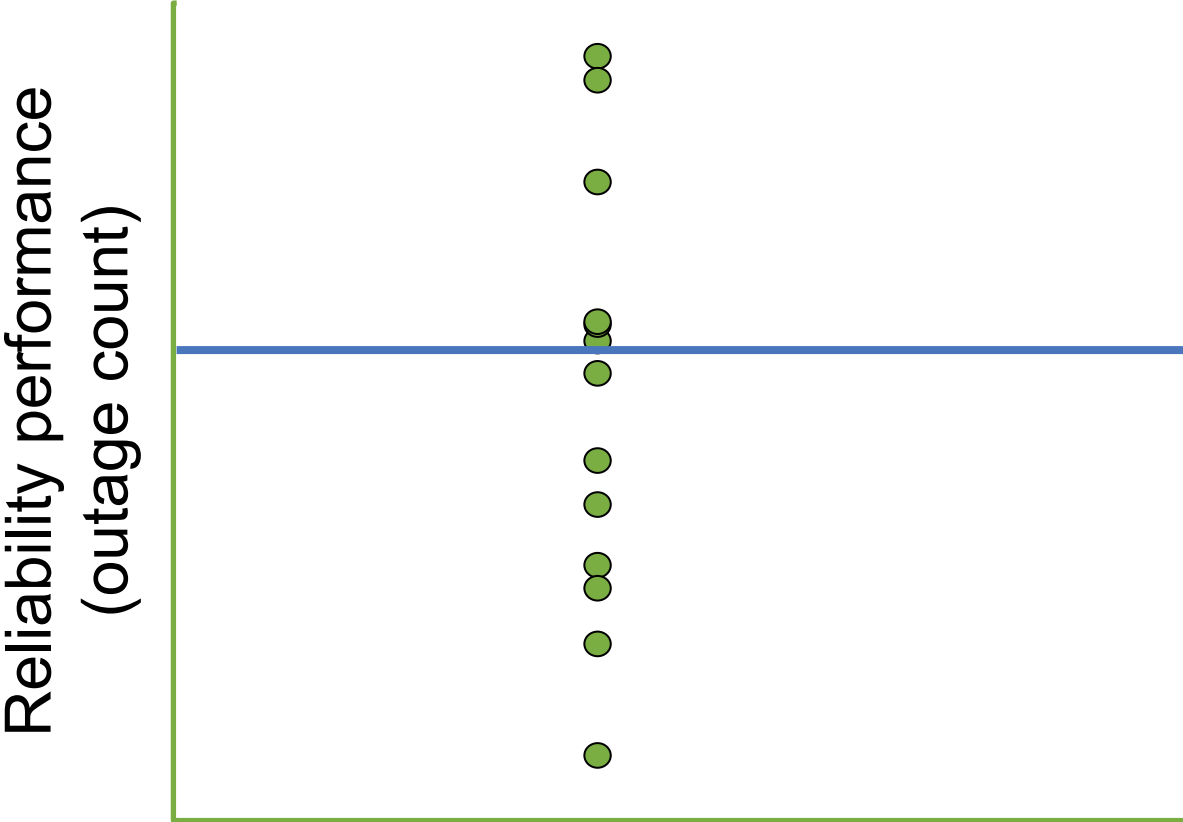


# Outages, exposure, and risk

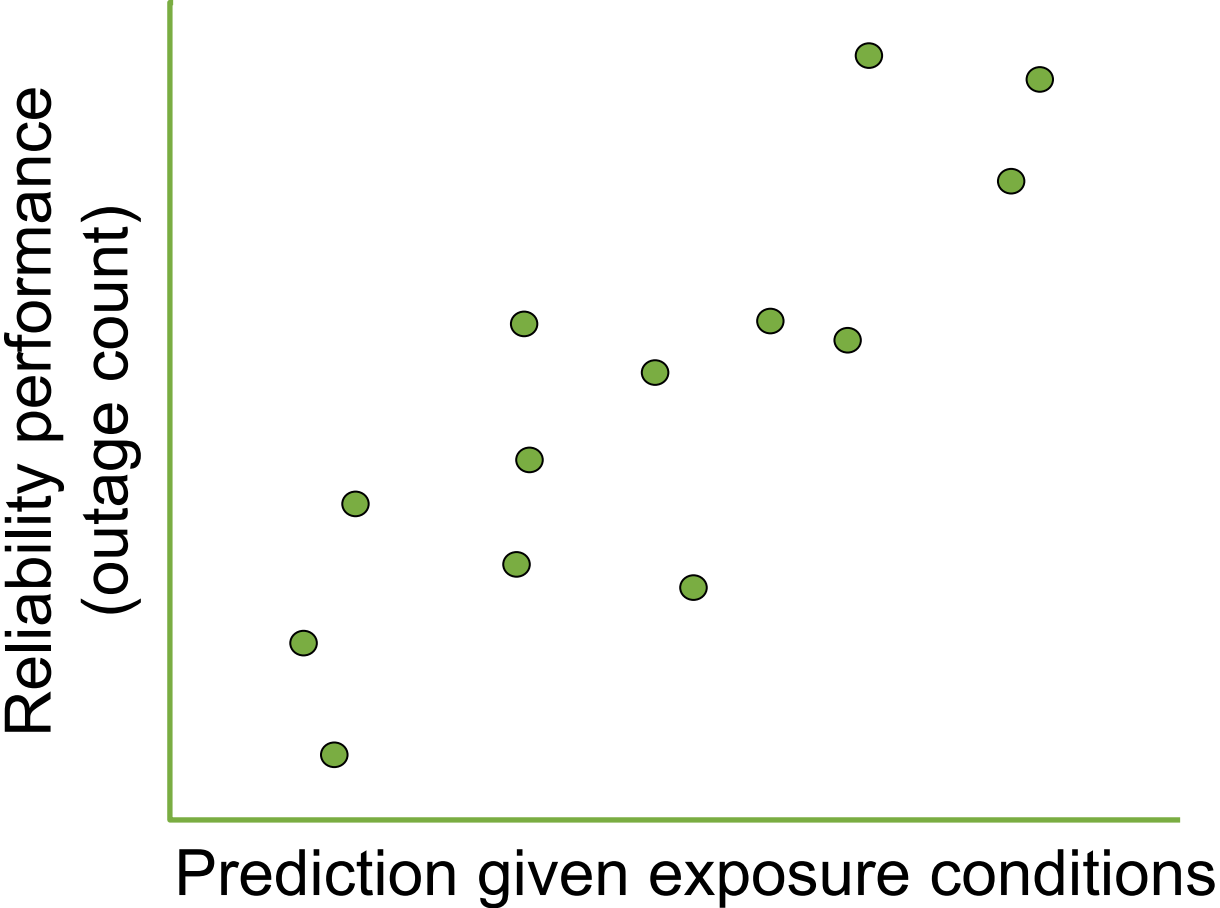
Worst-performing circuits	CAIDI
Circuit 1234	255
Circuit 2345	245
Circuit 3456	215
Circuit 4567	170
Circuit 5678	150
Circuit 6789	100
Circuit 7890	95



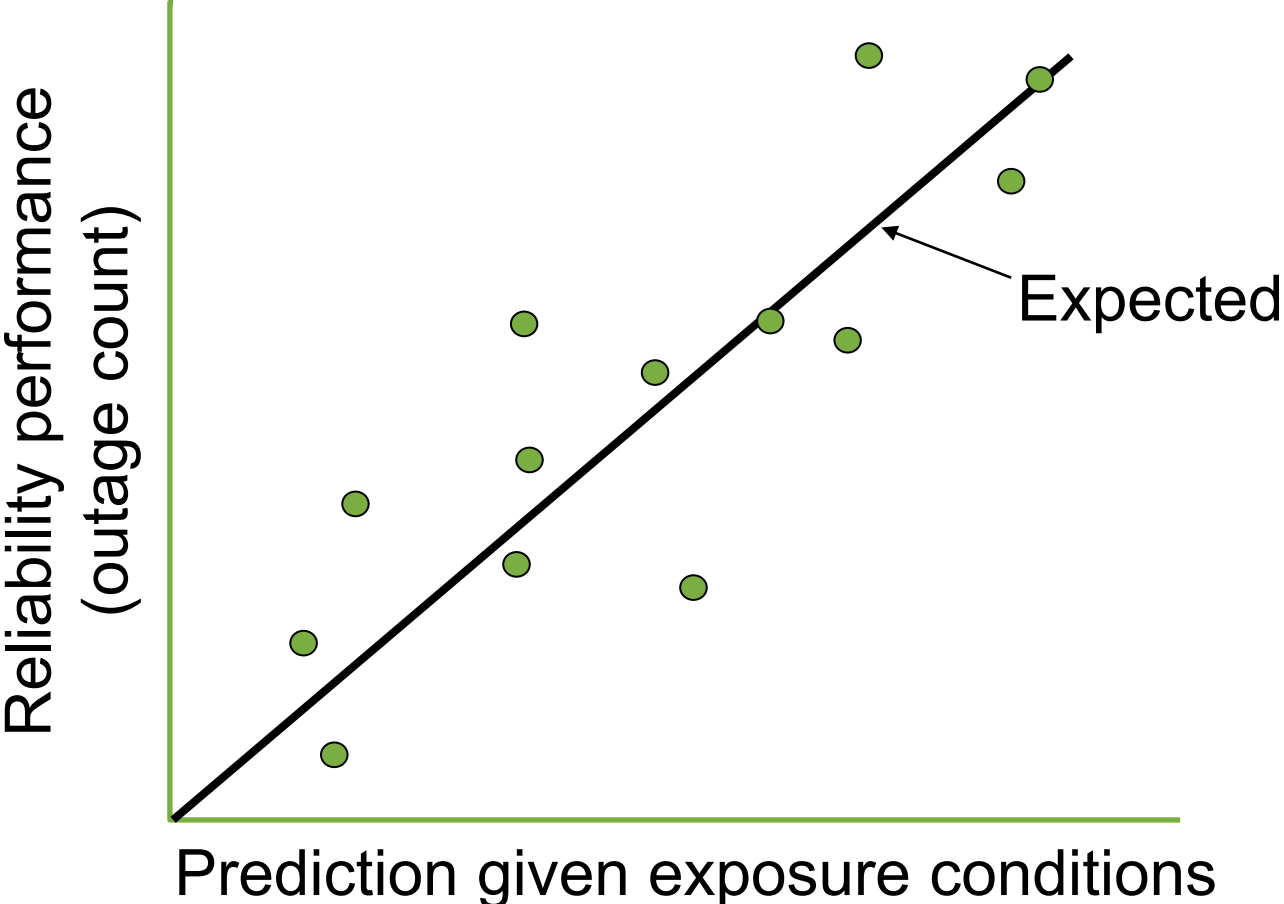
# Outages, exposure, and risk



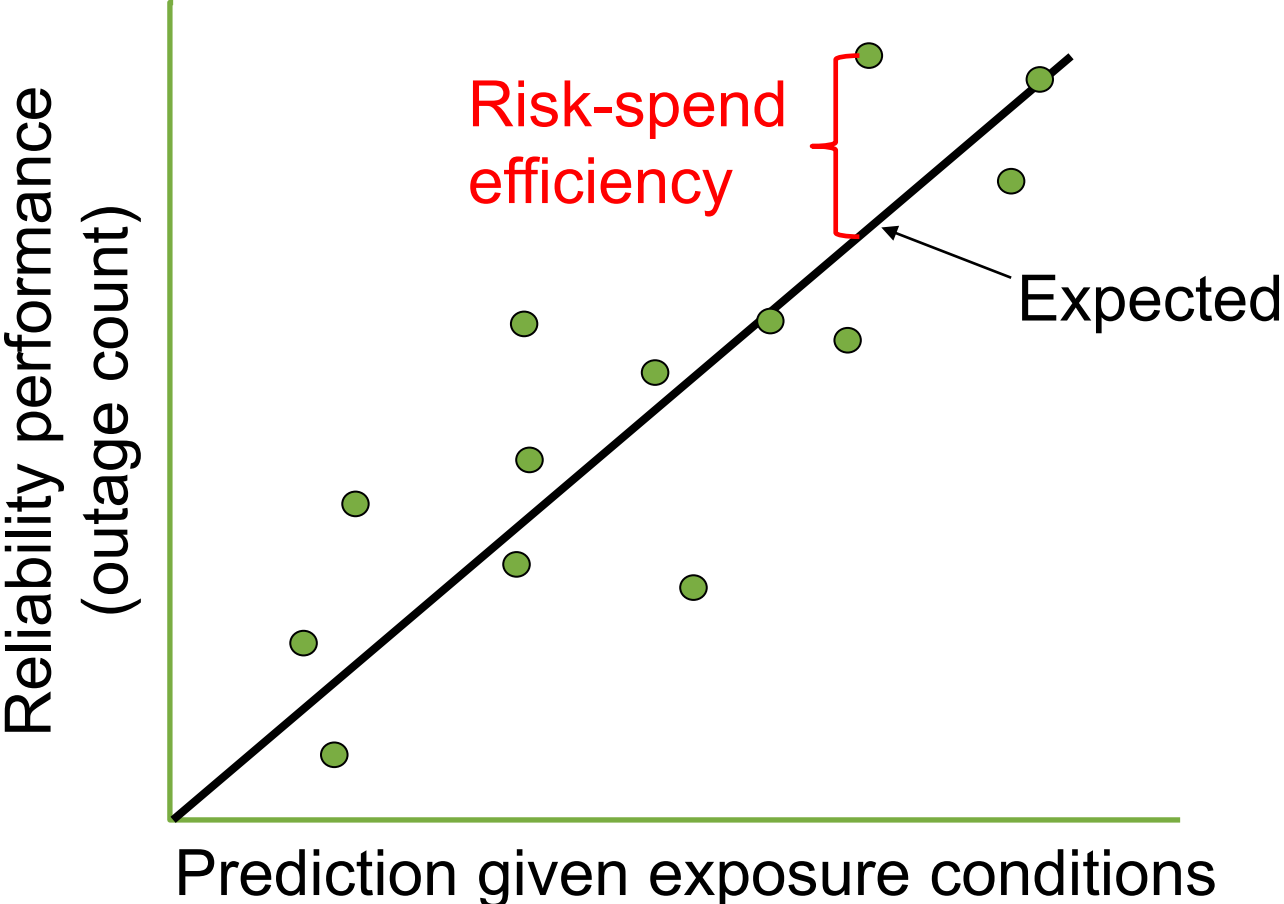
# Outages, exposure, and risk



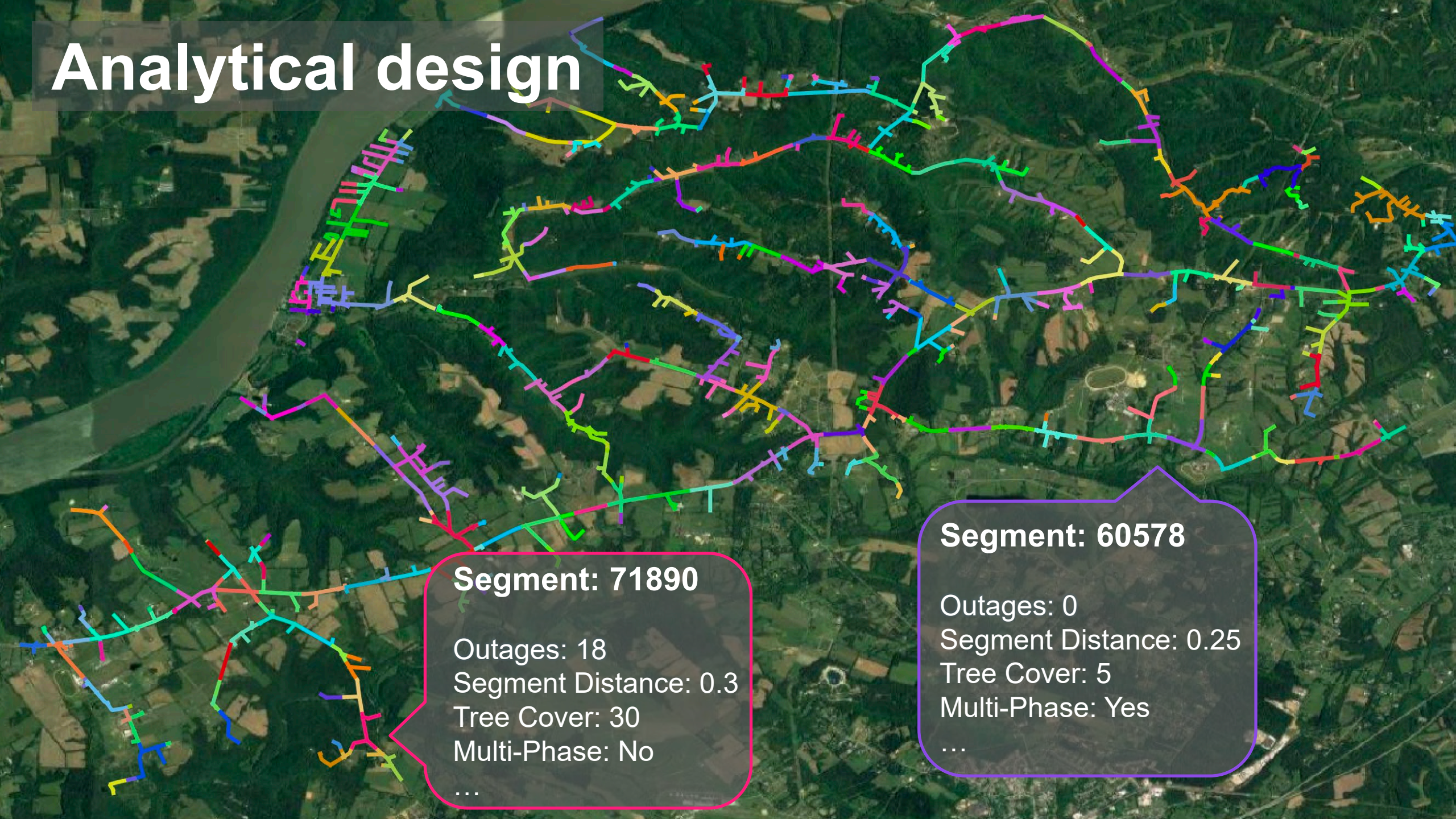
# Outages, exposure, and risk



# Outages, exposure, and risk



# Analytical design



**Segment: 71890**

Outages: 18  
Segment Distance: 0.3  
Tree Cover: 30  
Multi-Phase: No

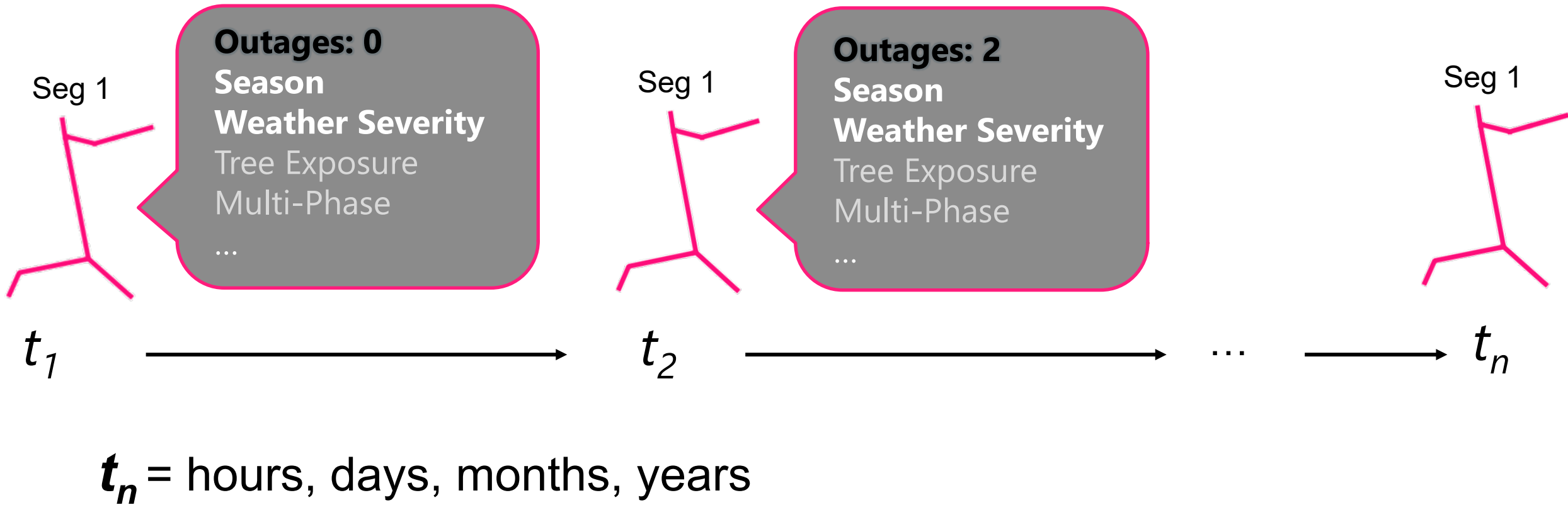
...

**Segment: 60578**

Outages: 0  
Segment Distance: 0.25  
Tree Cover: 5  
Multi-Phase: Yes

...

# Analytical design

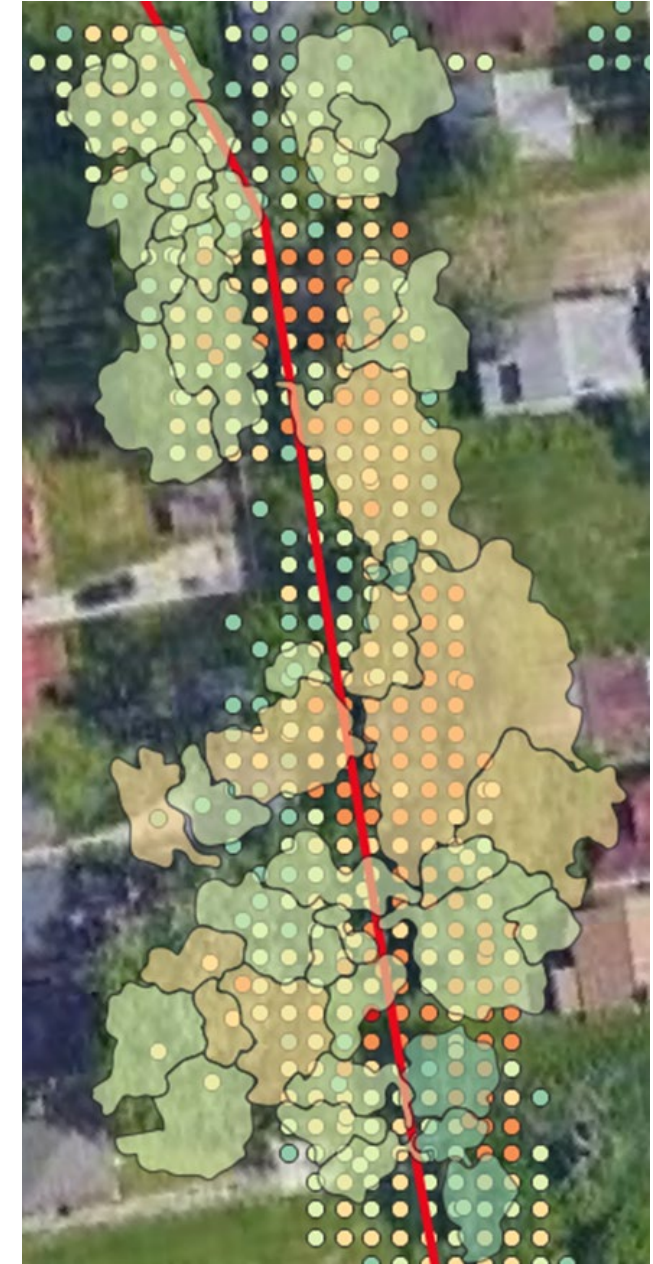


# Beyond a single data source

	Data source	Example variables	Count of variables
Utility data	Outage data	Outage location and time, duration, customers interrupted, cause types	20+
	Work management	Tree assessment and maintenance, tree removal and trimming works	25+
	Asset inventory and operations	Conductor lines and devices, line conditions, vegetation cycle, operational areas	60+
Third-party data	Satellite imagery	Multispectral imagery bands, vegetation indices, landcover	200+
	Geographic	Elevation, terrain, slope, hydrology	85+
	Weather	Wind speed and direction, precipitation, major events, severe weather	50+
	High-resolution remote sensing	Tree height and canopy, predictive ecosystem mapping	50+
<b>TOTAL</b>			<b>400+</b>

# Presence and height models

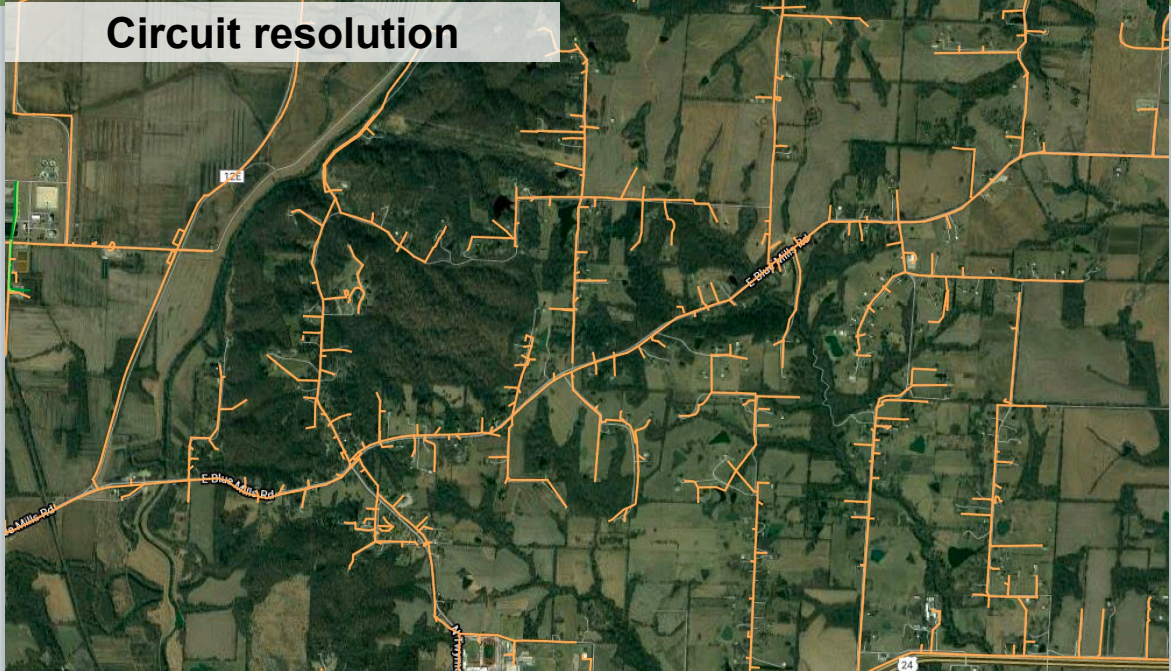
- Imagery-Based Tree Presence and Height Models
  - Correlated with LiDAR [0.99, 0.85]
- Remotely sensed imagery from multiple platforms
  - Publicly available or third-party data sources
  - Imagery resolution: 30 ft to <1 ft
  - Aerial imagery
  - Satellite imagery (multiple sources)
  - LiDAR (as available)



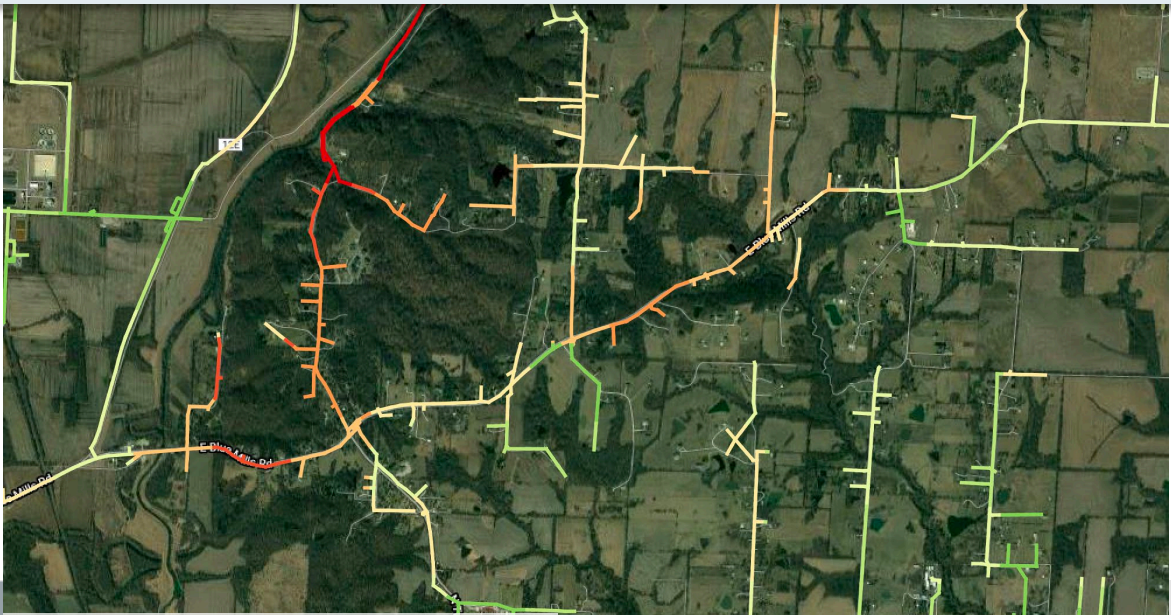


# Mitigate vegetation outages at sub-circuit resolutions

Sub-circuit risk (%)	Distribution Network (%)
0 – 0.8%	91%
80–90%	5%
90–95%	2%
95–100%	2%

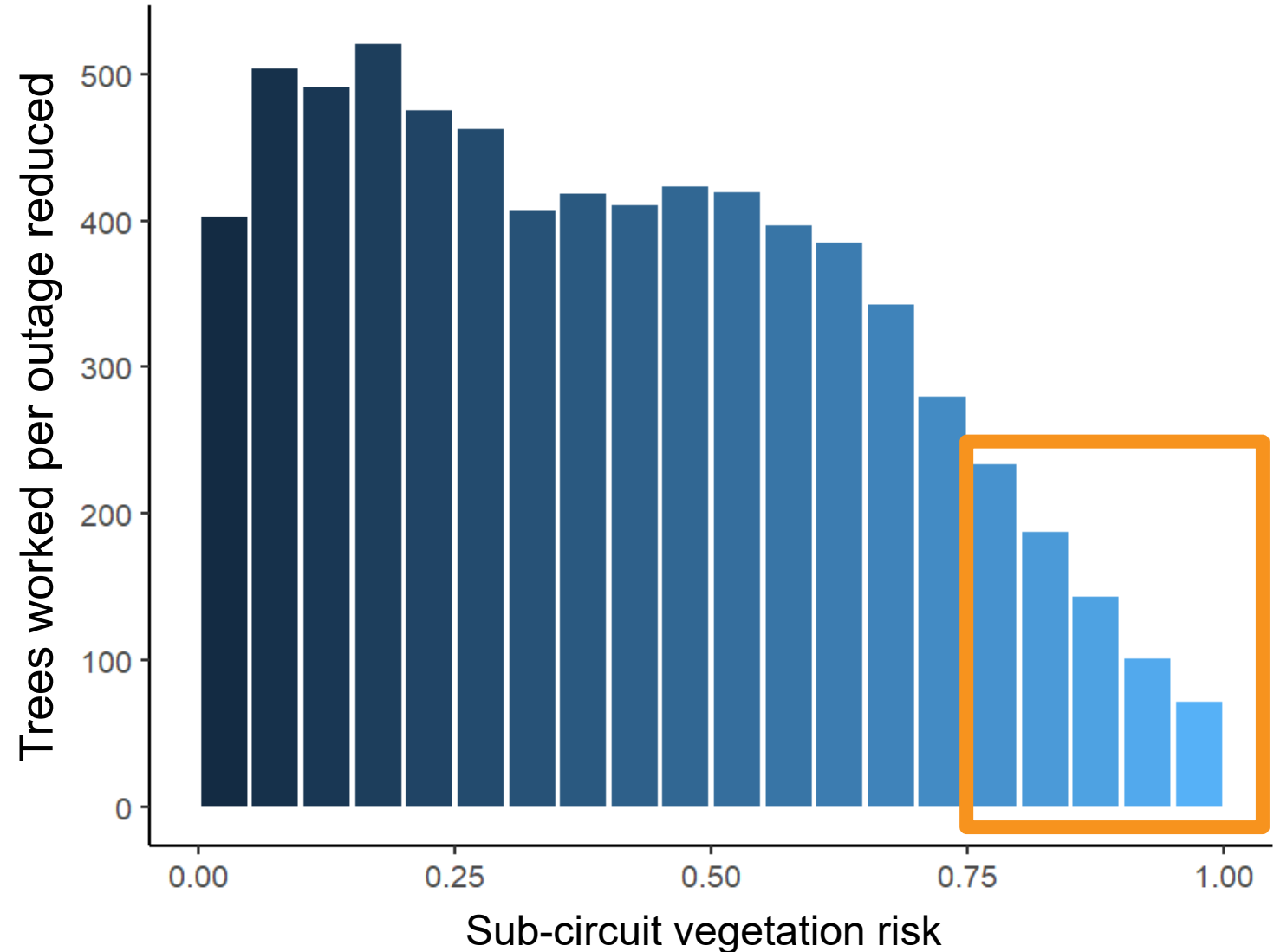


**Low risk**      **Moderate risk**      **High risk**



# Targeting management improves efficiency

- Move to sub-circuit resolutions
- Find the areas of your system that offer the best ROI
  - Improved safety
  - Improved reliability
  - Decreased cost



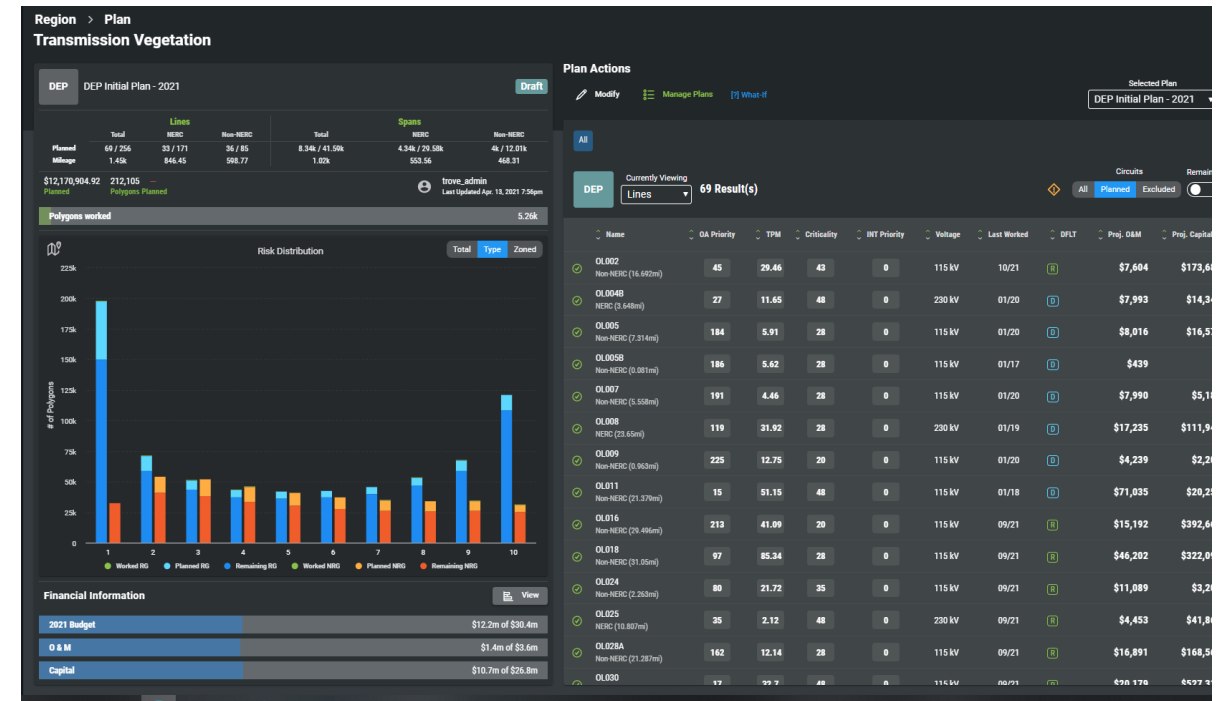
# So what?

- Why trim trees?
  - Maintenance of tree size and encroachment
  - Prevent outages
- How can we use the data science?
  - Prioritize order of circuits for systematic maintenance
  - Guide prework inspections and contract negotiation
  - Risk models to prioritize work aimed at outage prevention
  - Compare alternative VM programs given risk and budget



# Interactive Scenario Planner

- Access data and model outputs
  - Risk
  - Budget
  - Regulatory requirements
  - Business & program objectives
- Develop and compare work plans
  - Risk
  - Cost



# Want to dive deeper?

Let us know if you're interested in a personalized session for your executive team.

- Yes, I'm interested.  
Meet with my team to help optimize my vegetation management program
- No, I'm not interested at this time.

# Questions?



# Contact us



## **Patrick Eisenhauer**

Engagement Manager, Data Science  
E Source

[patrick\\_eisenhauer@esource.com](mailto:patrick_eisenhauer@esource.com)



## **Jesse Woods**

Vice President, Data Science  
E Source

[jesse\\_woods@esource.com](mailto:jesse_woods@esource.com)



## **Jonah Keim**

Managing Director, Data Science  
E Source

[jonah\\_keim@esource.com](mailto:jonah_keim@esource.com)

You're free to share this document inside your company. If you'd like to quote or use our material outside of your business, please contact us at [esource@esource.com](mailto:esource@esource.com) or 1-800-ESOURCE (1-800-376-8723).