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Artificial Intelligence S&T for Emergency Management

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The threat landscape is changing—and so is technology.

Emergency managers face simultaneous and cascading events that call for **predictive, scalable, real-time** solutions.

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PNNL collaborates with **emergency managers, first responders,** and **industry** to address the needs of today and challenges of tomorrow.

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PNNL is delivering AI research, science, and technology to **enhance preparedness, response, recovery,** and **resilience**

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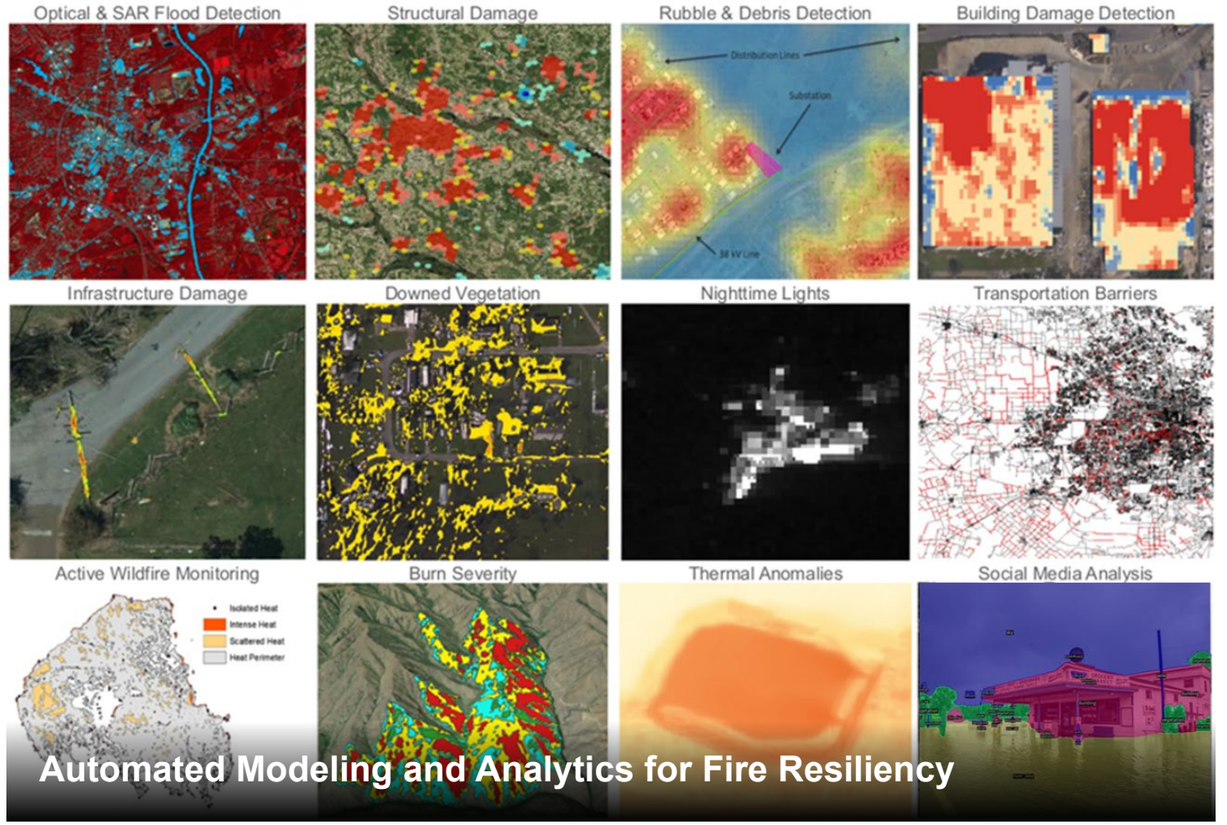
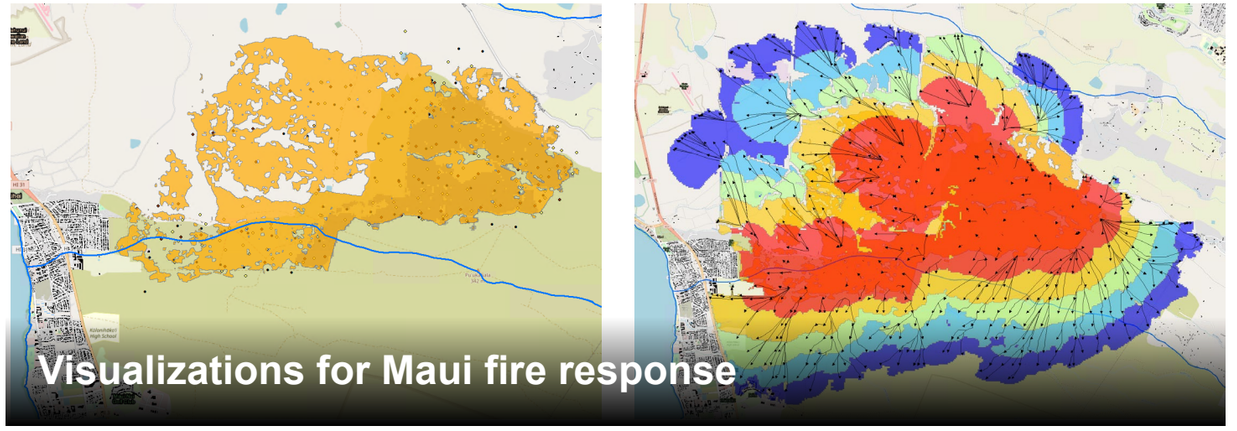
Rapid Analytics for Disaster Response

- All-hazards detection system combining multi-modal imagery, AI, and scalable cloud computing with infrastructure damage assessment tool to understand impact and risk to infrastructure





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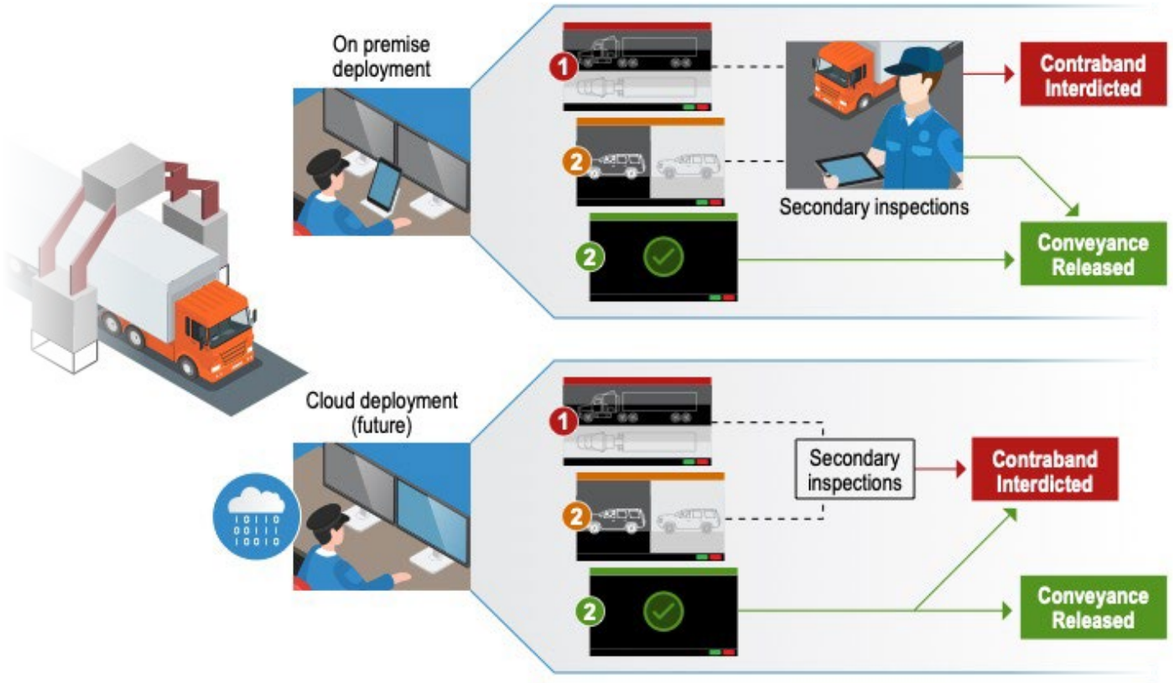
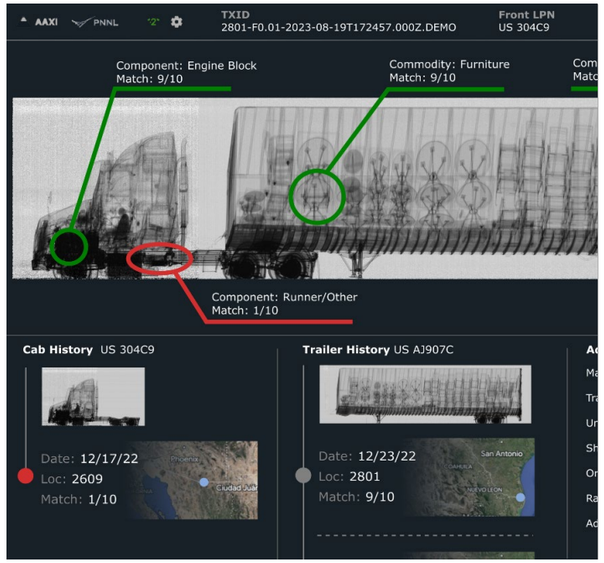
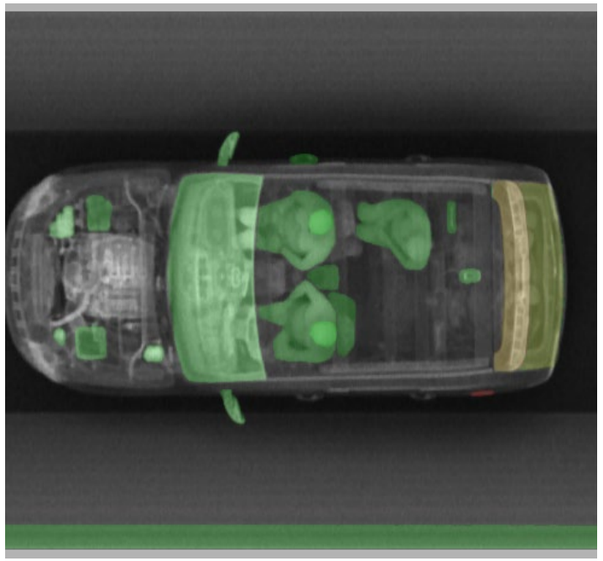
Advanced Analytics for X-Ray Images

- Cutting-edge computer vision algorithms for non-intrusive inspection systems
  - Rapid integration of new models
  - Segmentation to look for anomalous (structures, cargo)
  - Expansion to other ports, x-ray systems, types of conveyances







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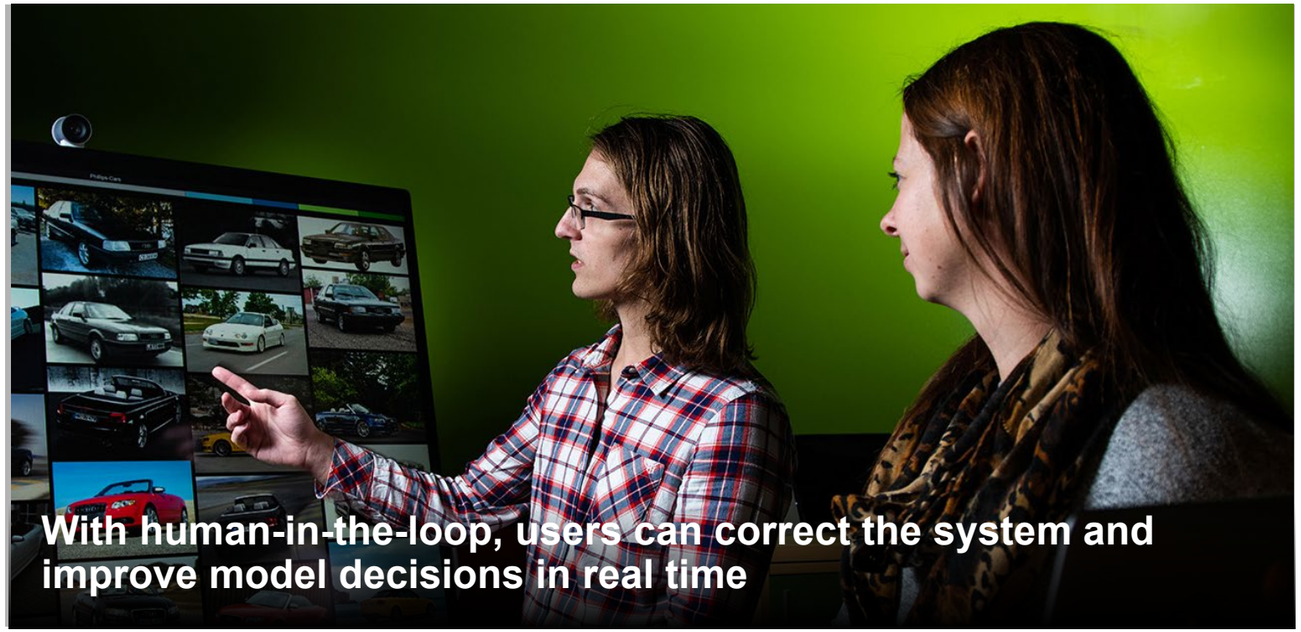
Few-Shot Learning

- Flexible methodology applicable to a range of data types (images, audio, video, text) and challenging modalities (X-ray scans, electron microscopy, and remote sensing)
  - Combining visualization and data engineering expertise (data architectures and pipelines, collection, validation) with AI/ML
  - Sharkzor tool combines humans and AI/ML techniques for classification using 5-10 images (far fewer than 100s needed for traditional deep learning)

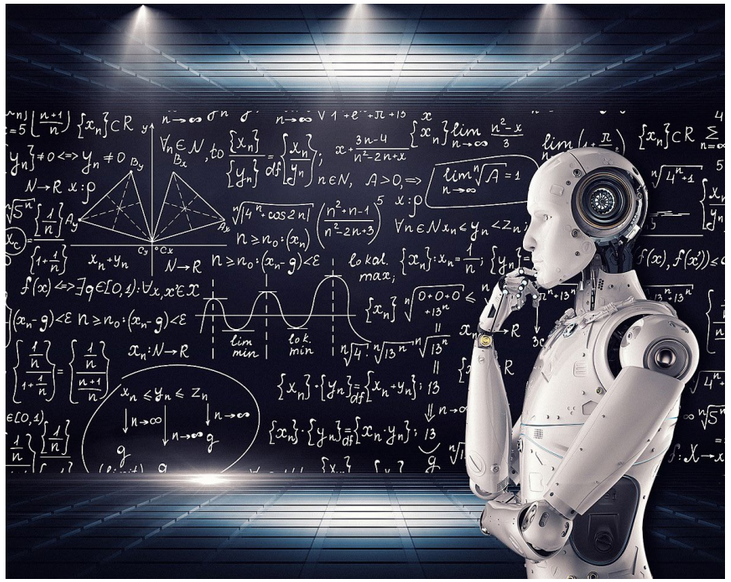


With human-in-the-loop, users can correct the system and improve model decisions in real time

Interactive Sharkzor user interface and a few-shot data library

AI Ethics and Policy: Defining the Future

- Engaging across the technical, industry, and policy communities to scale AI and harness the power of generative AI for national security
  - Emphasizing responsible research and deployment and viable policy interventions
  - Supporting development of international ethical standards development and implementation
  - Staff certified to formally lead assessments of AI and Autonomous Systems utilizing the IEEE CertifAIED certification process
  - Identifying practical challenges associated ethical AI development and evaluation and building tools and processes to overcome these challenges.



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Opportunities: Looking and Leaning Forward

- Connecting with emergency managers and first responders to better understand the AI and EM landscape and identify technology needs and opportunities

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Thank you