MASTER CLASS. by EXPO FIRE & SAFETY MX 2025

Innovative Technologies in Risk & Emergency Management

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Organizado por: AMRACI INDUSTRIA CONTRA INCENDIO, CONAPCI

Presentation Outline.

- Risk Landscape
- Predictive Intelligence & 'Living Risk' Awareness
- Networked Response and Decision Support Systems
- Technology-Enabled, Human-Centered Resilience Building

Today's Global Risk Landscape.

The changing risk picture

- Climate volatility: more frequent, severe, and costly fires, floods, and heat events
- Cascading hazards: power, transport, and communications disruptions
- Urbanization and infrastructure complexity: more people and assets at risk
- Technological disruption: cyber, misinformation, and AI-driven vulnerabilities
- Evolving public expectations: demand for speed, accuracy, and transparency

Changing how we respond

- Focusing on resilience
- Building partnerships
- Leveraging technology

Predictive Intelligence & 'Living Risk' Awareness.

Increasing the ability to see the unseen.

- **Data Fusion and Predictive Analytics**
- **Digital Twins for Preparedness and Simulation**
- **Continuous Sensing and “Living Risk Models”**

Graphic credit: Valiance 2025

Data Fusion and Predictive Analytics.

Moving from information overload to integrated foresight.

- Combining data sets and model integration
- Satellite imagery utility and infrastructure data
- Predictive models to guide resource allocation and population protection

Graphic credit: Rosen

Digital Twins for Preparedness and Simulation.

Virtual replicas that learn, simulate, and predict real-world risk

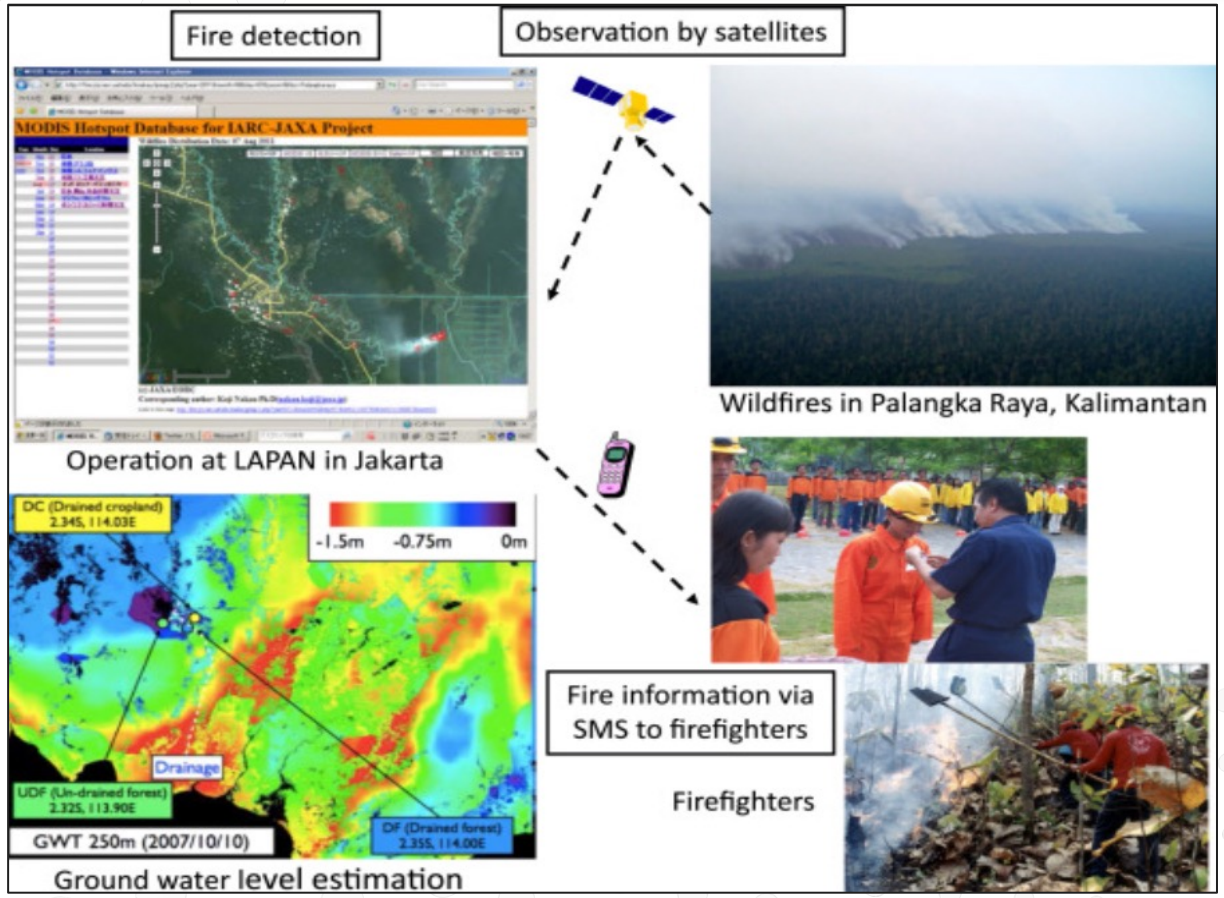
- Dynamic digital models (of cities, buildings, or landscapes)
- Emergency planning and training
- Support emergency simulations; highly efficient scenario development for exercising decision making
- Allows for integration of AI and broad data sources for real-time awareness and response modeling

Graphic credit: LinkedIn

Continuous Sensing and Living Risk Maps.

From static data to live, adaptive awareness

- Integrate real-time feeds from satellites, drones, and sensors for live situational data
- Detect early ignition, smoke, or heat anomalies using AI and networked cameras
- Maintain living risk dashboards that update as weather, infrastructure, and incident data change
- Enable faster confirmation, smarter deployment, and sustained readiness



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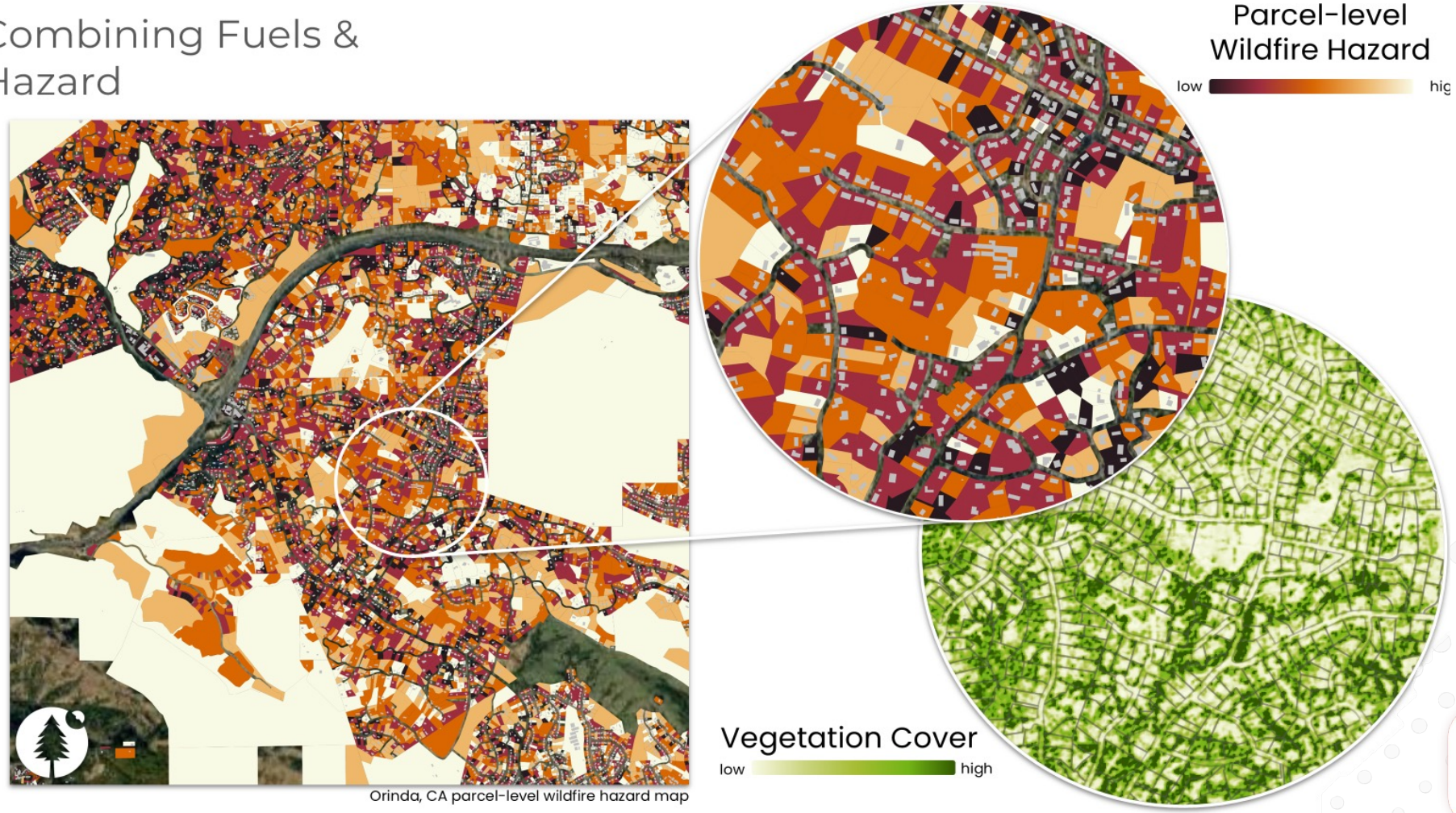
Continuous Sensing and Living Risk Maps (wildfire forecasting).

Combining Fuels & Hazard



Orinda, CA parcel-level wildfire hazard map

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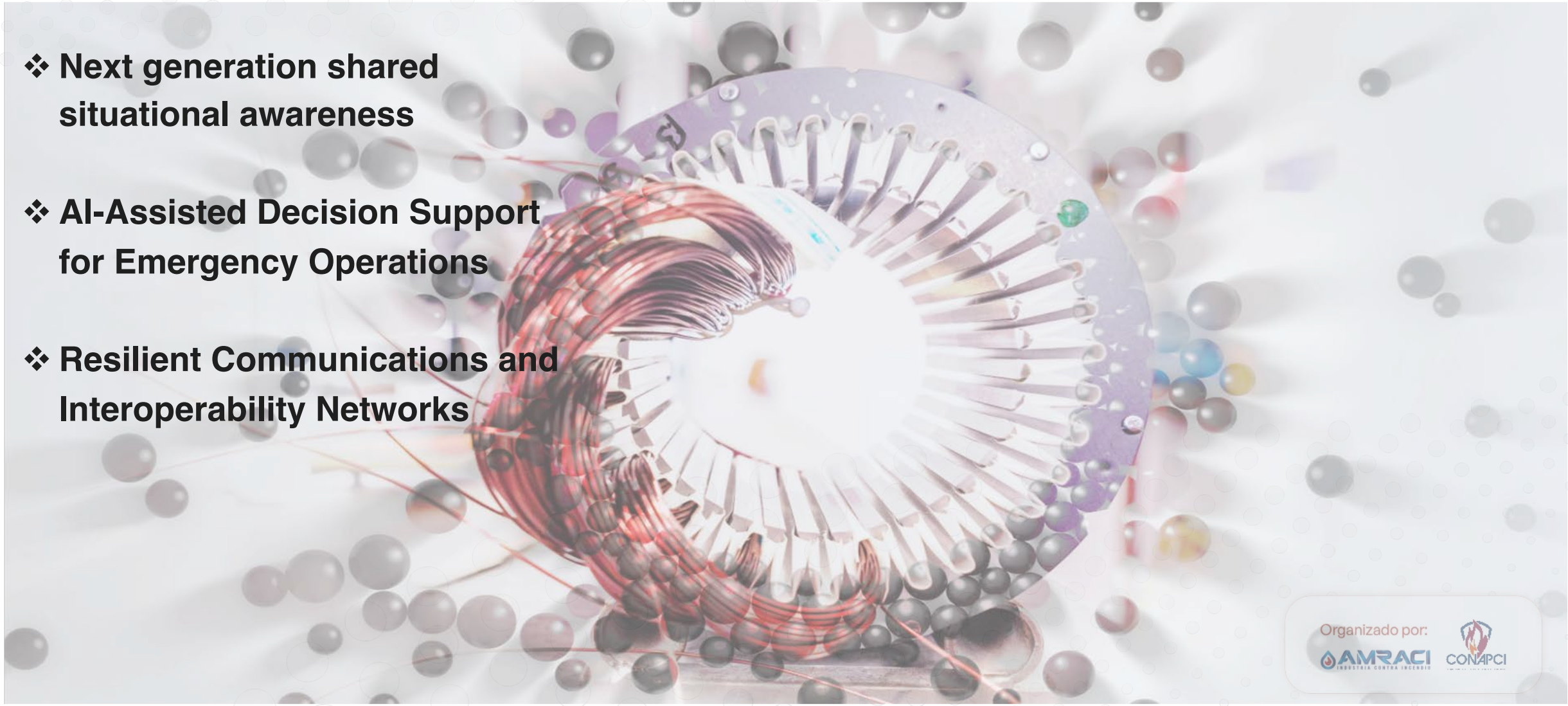
Networked Response and Decision Support Systems

From coordination to synchronization.

- **Next generation shared situational awareness**
- **AI-Assisted Decision Support for Emergency Operations**
- **Resilient Communications and Interoperability Networks**

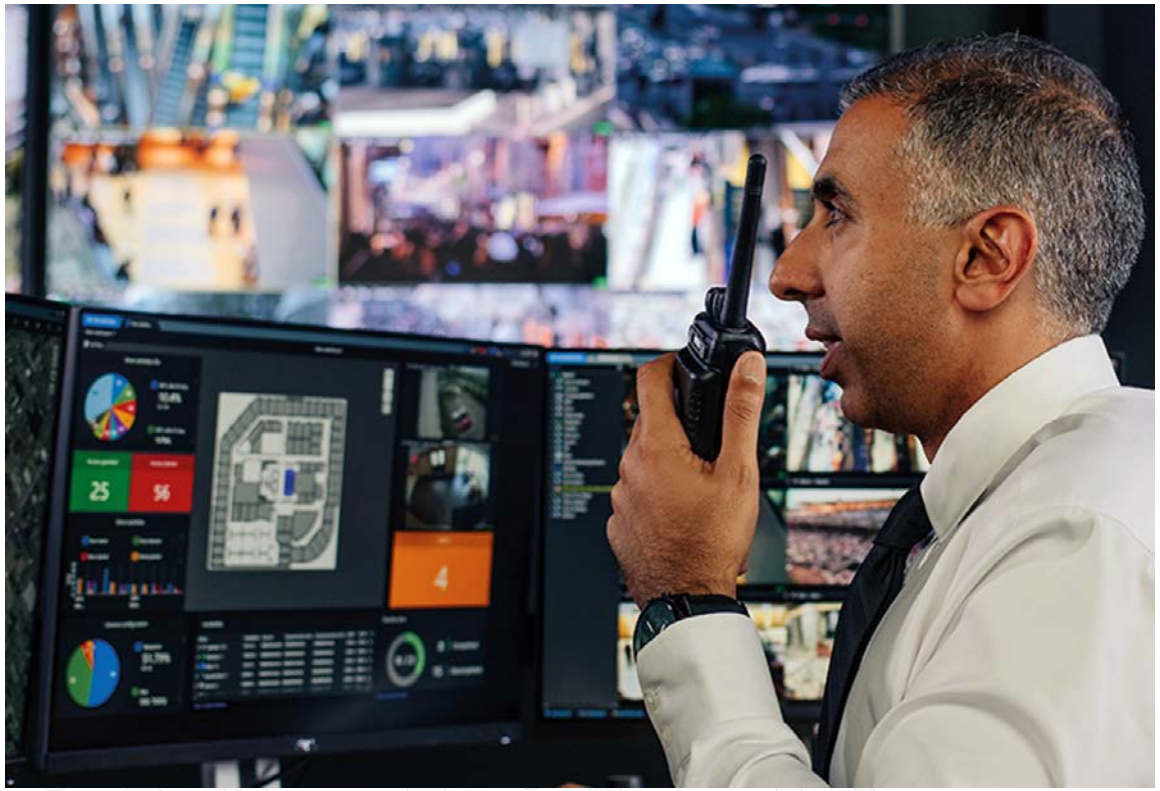


Graphic credit: Rosen

Next generation shared situational awareness.

From awareness to decision support

- Integrate live feeds from drones, sensors, vehicles, and dispatch into one shared platform
- Use AI-enhanced analytics to predict incident growth and resource needs
- Enable multi-agency visibility — everyone sees the same data, in real time
- Support faster, more confident decisions under pressure



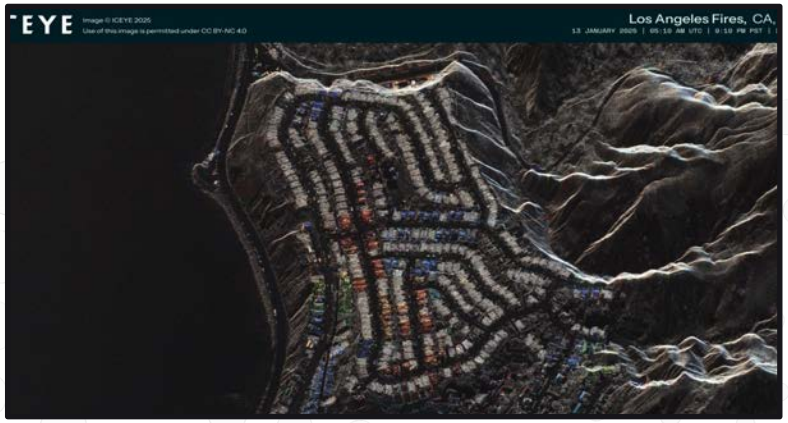
Graphic credit: Segurilatam/ Genetec

Situational Awareness Under Smoke & Complexity.

Typical imagery

Typical imagery

Satellite sensors “see through” the smoke



Synthetic Aperture Radar (SAR) can penetrate clouds/smoke to assess damage

AI-Assisted Decision Support for Emergency Operations.

From broad data to decision advantage

- Optimize deployment with AI-driven resource and dispatch models
- Predict fire or incident growth using real-time data and machine learning modeling
- Enable dynamic, data-rich command decisions via AI dashboards
- Support strategic planning through predictive risk analysis

Graphic credit: Astrikos AI

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AI-Assisted Decision Support for Emergency Operations.

Case Study – Kenya Flood Forecasting (2020–2023)

- Heavy rainfall across East Africa caused widespread devastation
- Funds and aid deployed before floods hit
- AI models and satellite data triggered anticipatory financing from Red Cross

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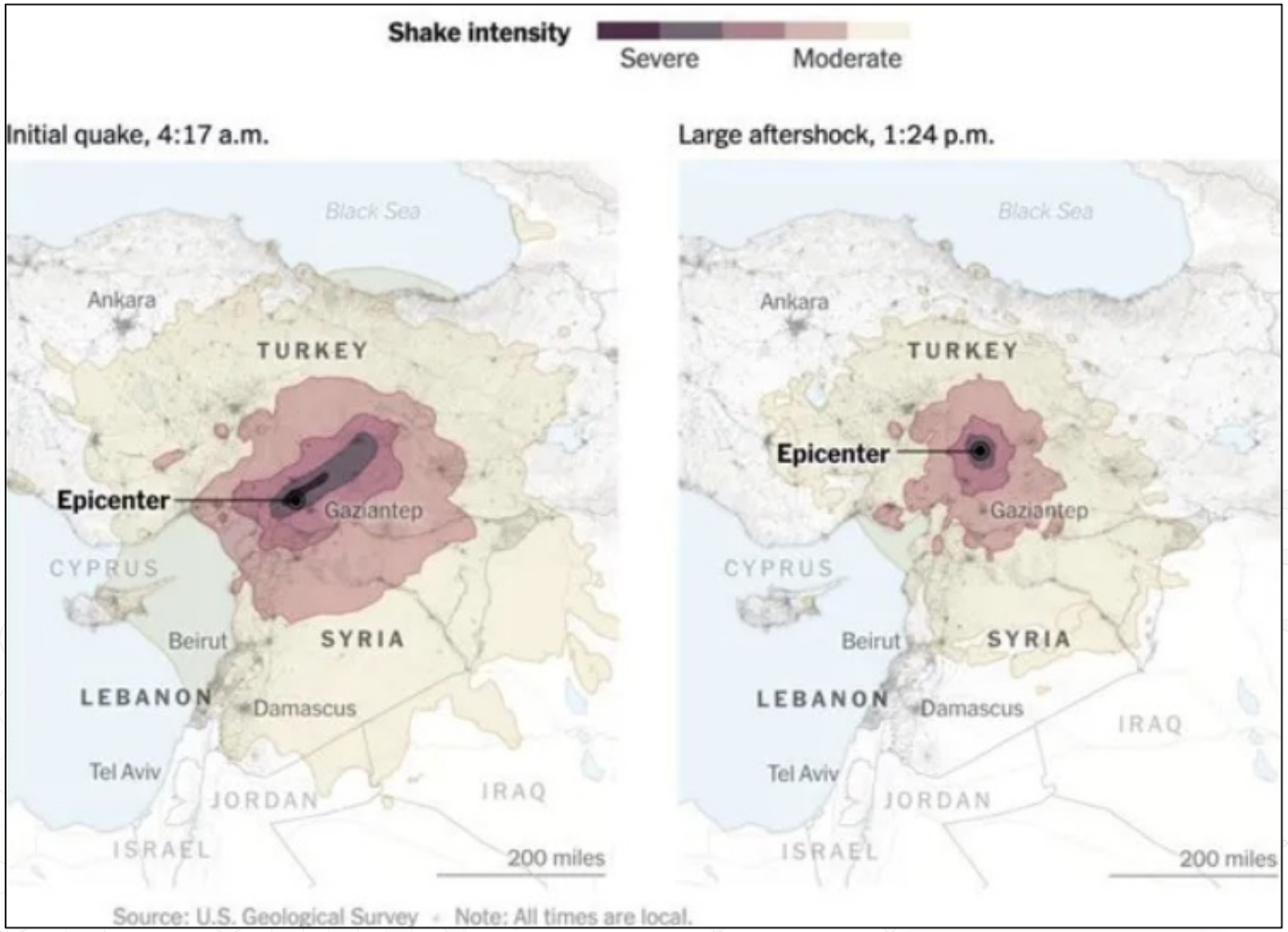
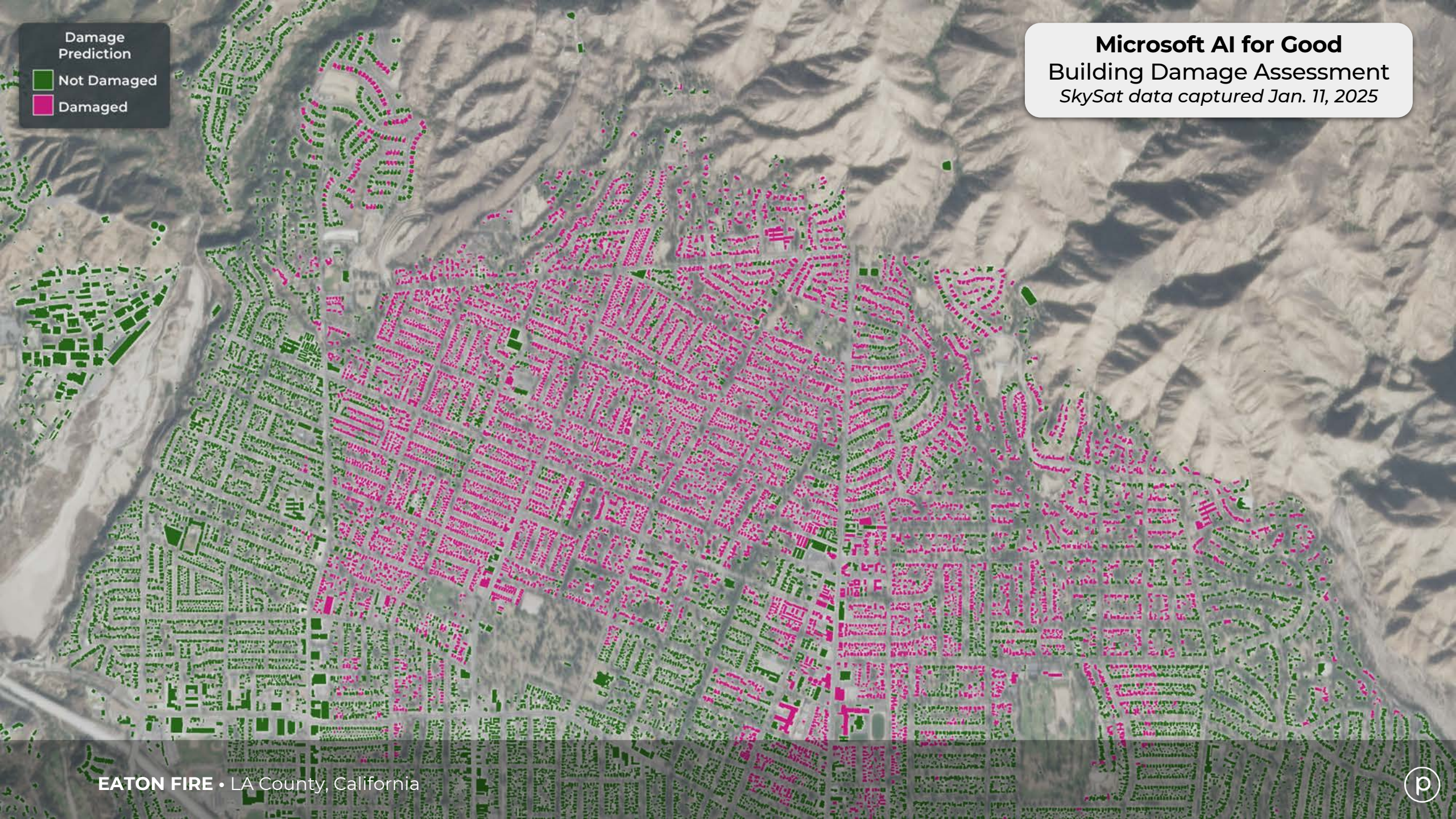
AI-Assisted Decision Support for Emergency Operations.

Case study – Türkiye/Syria Earthquakes (2023)

- Catastrophic M7.8 earthquake and subsequent aftershocks
- Over 55,000 fatalities, 5.9 million displaced individuals, and ~230,000 damaged or destroyed structures
- AI-supported analysis cut response time from days to hours




May 22, 2022
SkySat
Jan. 8, 2025
SkySat
Microsoft AI for Good
Building Damage Assessment*
Predicted Percent Damaged
80-100%
60-80%
40-60%
20-40%
0-20%
Unknown
PALISADES FIRE • LA County, California
*Building Footprints: Overture Maps


Damage Prediction
Not Damaged
Damaged
Microsoft AI for Good
Building Damage Assessment
SkySat data captured Jan. 11, 2025
EATON FIRE • LA County, California

Resilient Communications and Interoperability Networks.

Keeping data, responders, and decision-making synchronized under stress

- Mesh & edge networks ensure connectivity when infrastructure is damaged
- Satellite-backed communications extend reach into remote or disaster-affected areas
- Cross-agency interoperability enables shared understanding across jurisdictions
- Cyber-resilient design protects data integrity and operational continuity

Graphic credit: Firehouse/ FirstNet

Technology-Enabled, Human-Centered Resilience Building.

Secure, Controlled, and Shared Technology Environments.

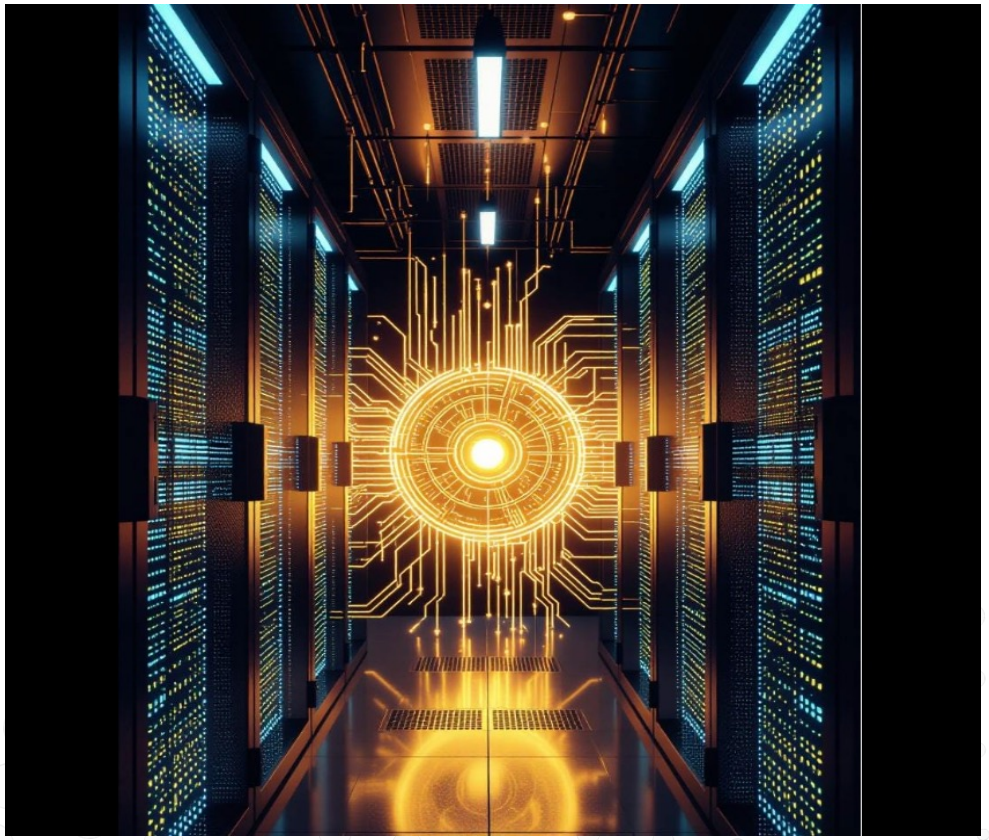
- **Secure AI Environments for Emergency Management & National Resilience**
- **Fractional and Shared Technology Services**
- **Human-Centered Resilience Systems**

Graphic credit: Dreamstime

Secure AI Environments for Emergency Management and National Resilience.

Secure Instances for Emergency Management

- Secure AI instances enable advanced integration within protected networks
- Maintain data sovereignty for national risk and emergency datasets
- Support inter-agency collaboration under unified security protocols
- Provide a sandbox for innovation in modeling, planning, and preparedness



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Fractional and Shared Services for National Resilience.

Scaling innovation through shared capabilities

- Shared GIS and analytics hubs deliver capability without duplication
- Fractional support models extend national capacity to local agencies
- Secure cloud environments maintain control while reducing costs
- Promotes equity, standardization, and real-time coordination

Graphic credit: LinkedIn

Human-Centered Design and Institutional Adaptation.

Empowering people and strengthening institutions

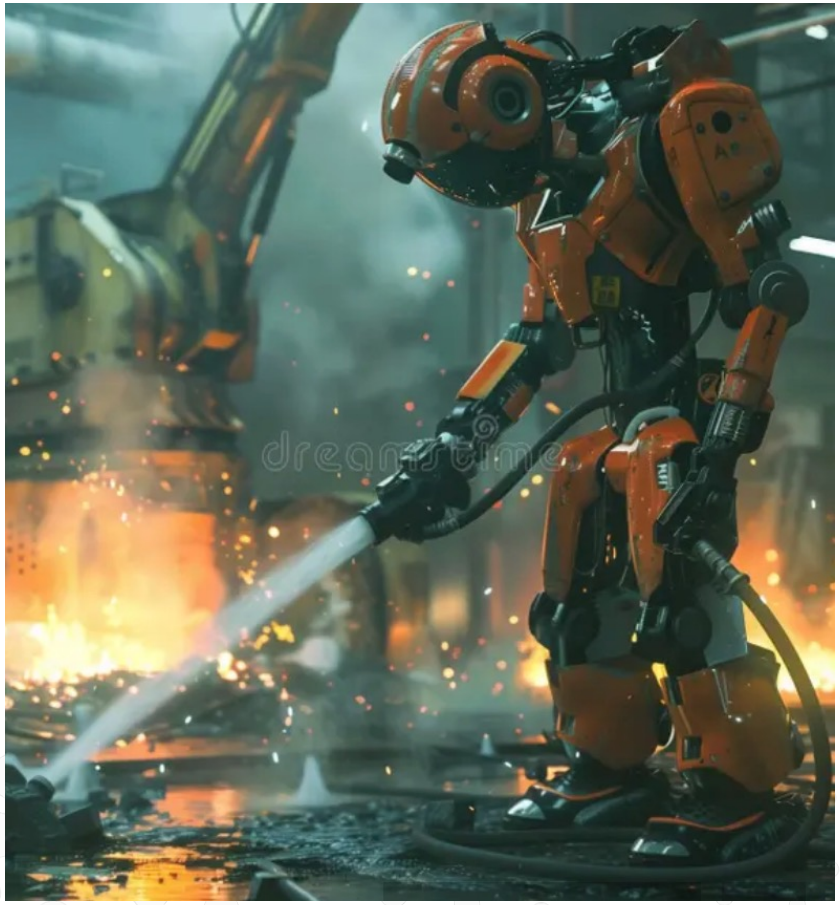
- Design systems *around* decision-makers and workflows
- Build trust and transparency into technology layers
- Invest in digital literacy, leadership, and ethics
- Embed continuous learning and adaptation in institutions

A More Resilient Future, By Design

Way ahead toward being more ready and resilient.

Creating a resilience-building ecosystem that learns, connects, and endures

- Predictive systems anticipate and model risk; enabling mitigation and reducing vulnerability
- Immersive and connected tools enhance shared awareness, coordination, training, and operations
- Secure and shared infrastructures make technology accessible to all levels
- Human-centered design ensures trust, adaptability, and institutional strength



Graphic credit: Dreamstime

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