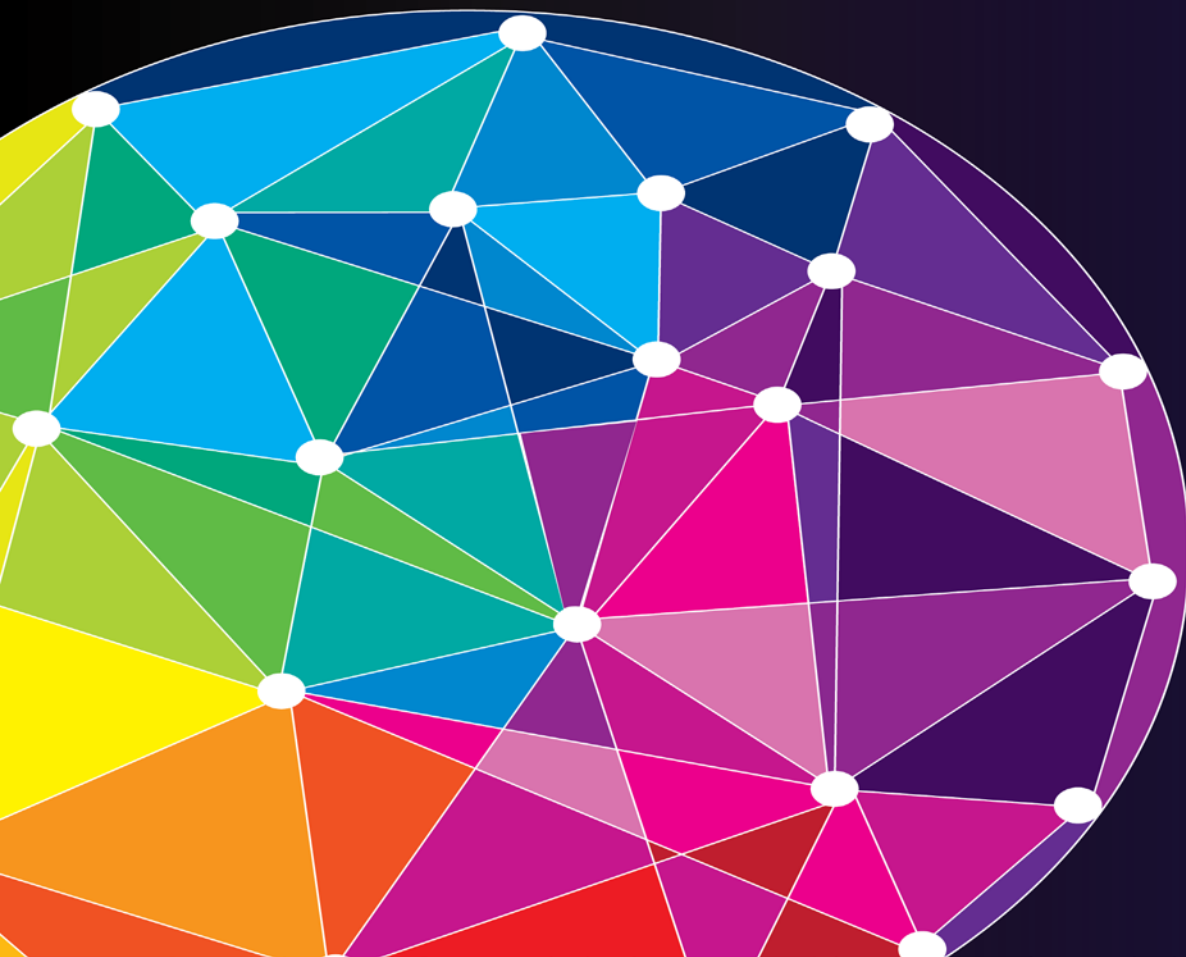


M2M and the Internet of Things (IoT)

The impact on Public Safety

Christian Militeau
Director, Technical Standards
Intrado, Inc.

- IoT/M2M Overview
- IoT/M2M Impact on Public Safety
- Sensors & Devices
- Emergency Aware Services
- IoT/M2M Use Cases
- Data Analytics
- Q&A

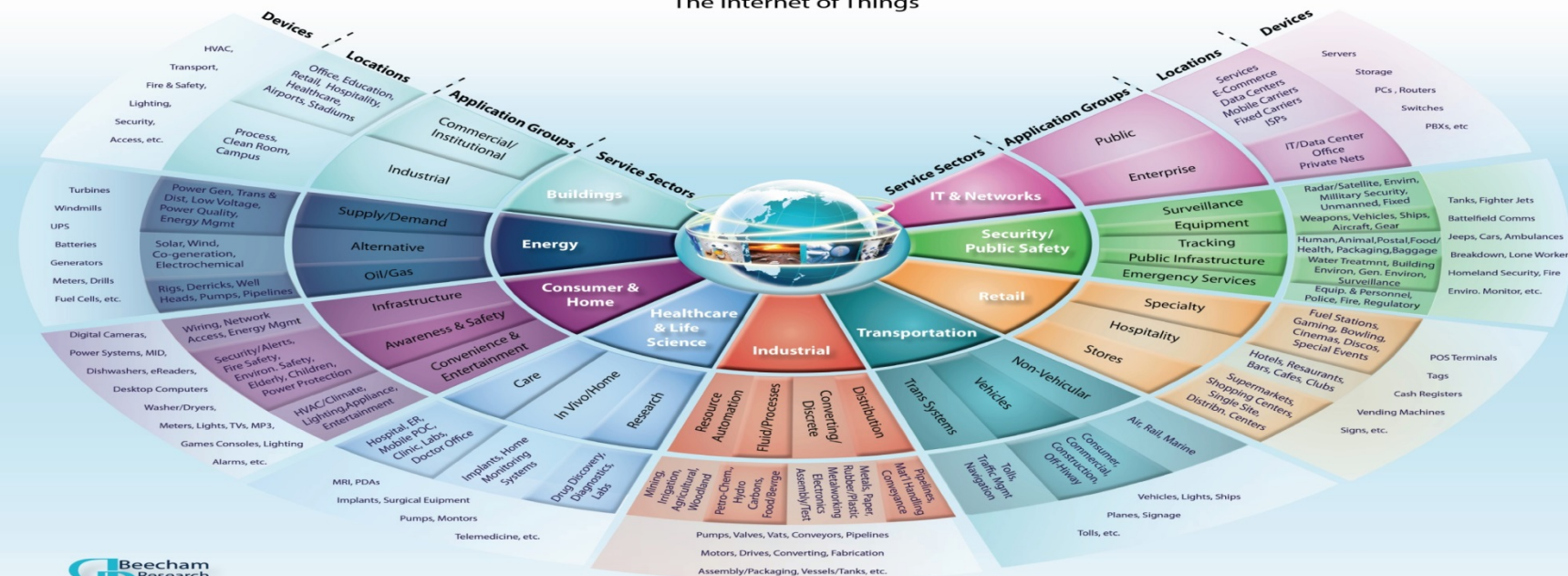


What is the Internet of Things?

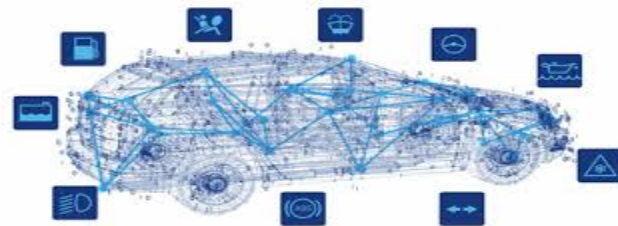
The network of physical objects or "things" embedded with electronics, software, sensors and connectivity to enable it to achieve greater value and service by exchanging data with the manufacturer, operator and/or other connected devices.

IoT/M2M Market

M2M World of Connected Services The Internet of Things



How smart can we get? Very Smart



IOT/M2M for Public Safety

Connected Homes

- Smart Thermostat
- Smart Appliances
- HVAC Systems
- Security
- Smart Lighting
- Entertainment Systems

Wearables

- Fitness Bands
- Smart Watches
- Smart Glasses
- Action Cameras

Industrial Internet

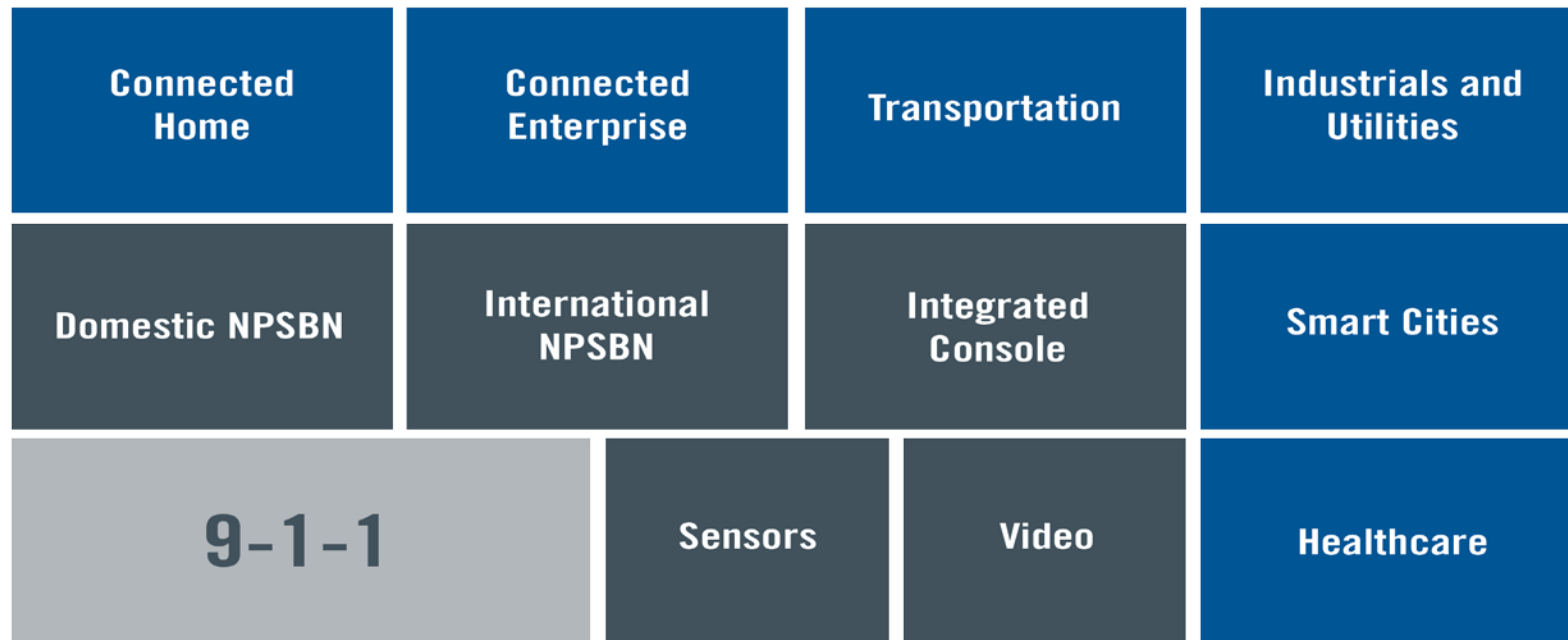
- Real-Time Analytics
- Factory Automation
- Robotics
- Supply Chain Efficiency

Connected Cities

- Smart Meter Technology
- Smart Traffic Lights
- Smart Parking Meters
- Electric Vehicle Charging

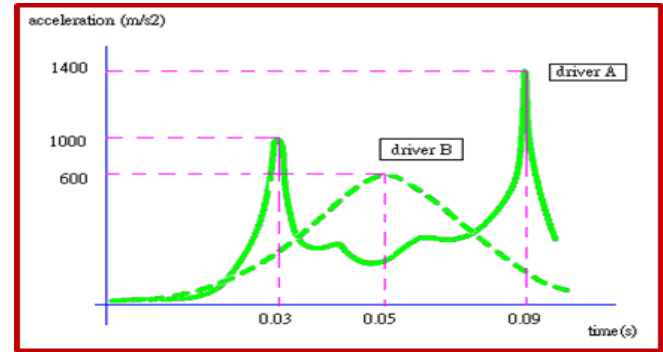
Connected Cars

- Safety
- Vehicle Diagnostics
- Infotainment and Navigation
- Fleet Management



Locating the Emergency

- Location data from third parties and telematics systems
 - Automatic Crash Notification (ACN) data



Locating The Emergency

- Smart buildings will be sharing telemetry data from building automated systems and sensors
 - Chemical sensor alarm indicating the release of a toxic gas in an industrial facility
 - Exact location data for these devices/sensors is critical





Sensor and Device Tracking

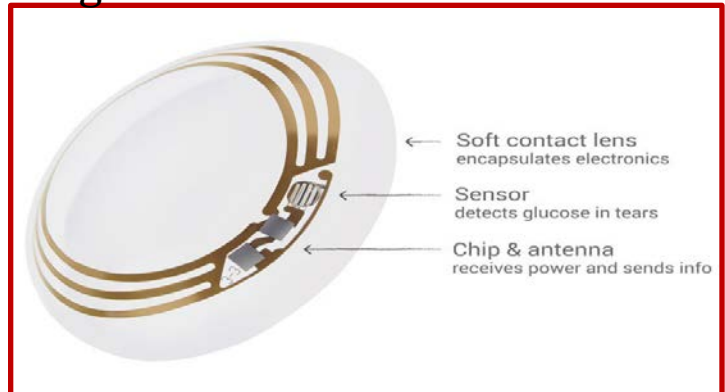
- Video systems can share data with first responders
 - Location information of fixed devices/sensors is critical
 - Example: Fire alarm activation on the 12th floor of the hotel will automatically open a video link at the location of the alarm.





Sensor and Device Tracking

- Medical Devices and Sensors
- Google Contact Lens
 - Measures blood glucose levels via embedded sensor.
 - Will report results to the patients smart phone which can alert a physician.
 - A life threatening blood sugar reading could generate a data alert to the 9-1-1 system.



Sensor and Device Tracking

- Various medical sensors have been developed which can interface with smartphones and could trigger a 911 call:
 - A special wrist band can detect a heart attack before the person has any symptoms; and automatically call for help.
 - A watch can detect a cardiac arrest and send an alert to the 911 system.



Sensor and Device Tracking

- Identifying the location of a patient with a sensor requires an extremely accurate fix because there is no “caller on the phone” to provide additional information and emergency context.





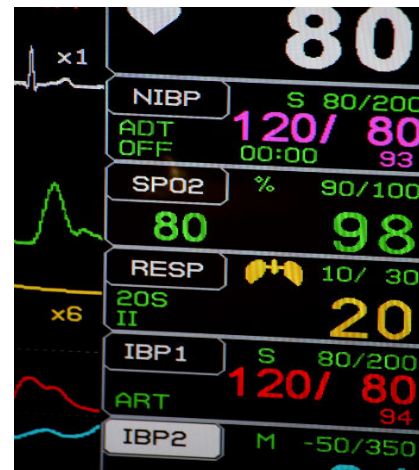
Sensor and Device Tracking

- Sensor data will also be used to enhance the safety of first responders.
 - DHS S&T has a new NGFR Program
 - *“Protected, Connected, Aware”*
 - Situational awareness, wearable sensors, enhanced analytical capabilities and visualization.



Sensor and Device Tracking

- Biometric sensors for first responder health tracking (heart rate, respirations, EKG, body temperature)
 - Additional sensors that will track the amount of air in a firefighters SCBA tank; hazardous atmosphere, etc.
 - Integrated location data is essential



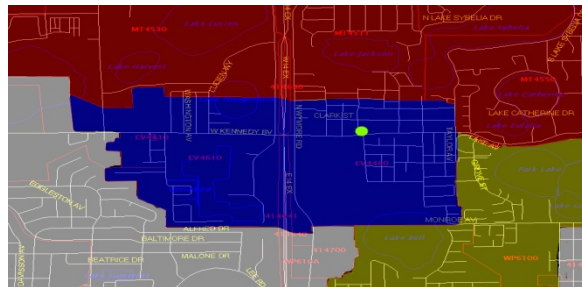


- Additional Body Worn Sensors
 - Will detect a bullet impacting an officer's vest;
 - Will detect the absence of movement that might indicate a crisis condition
 - Integrated location data is essential



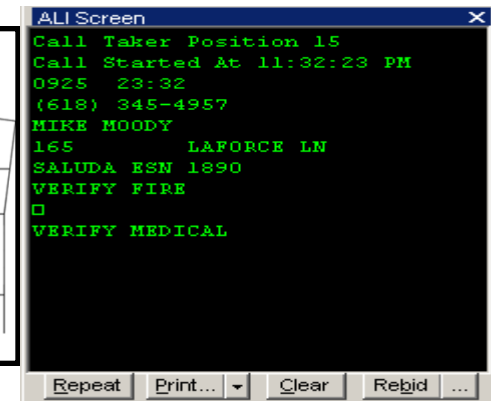
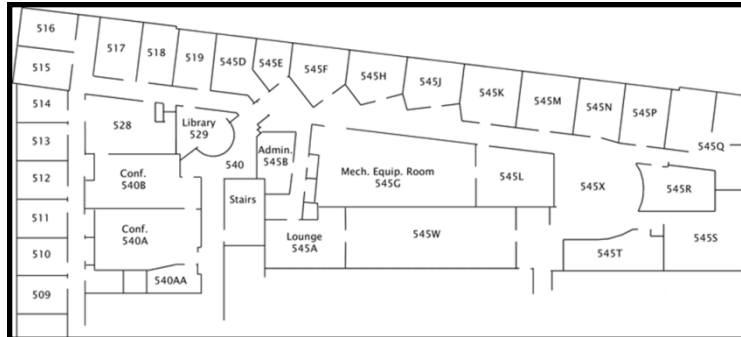
Sensor and Device Tracking

- Firearm sensors for law enforcement
 - Under development by Taser International
 - A GPS data burst is sent to the PSAP at the time:
 - An officer removes their firearm from the holster.
 - An officers' weapon is fired.



Sensor and Device Tracking

- Fixed sensors must transmit additional geographic parameters to help locate them beyond the street address.
- The location information should include geographic reference points in order to provide an exact fix on the location of the sensor.





- Public safety services platform to enable systems interoperability and the seamless exchange of life critical information in a highly secure manner.
- Sensors Integration
- Situational and Contextual Awareness
- Data Analytics
- Open Architecture (OneM2M Standards) & Open Standard Interfaces





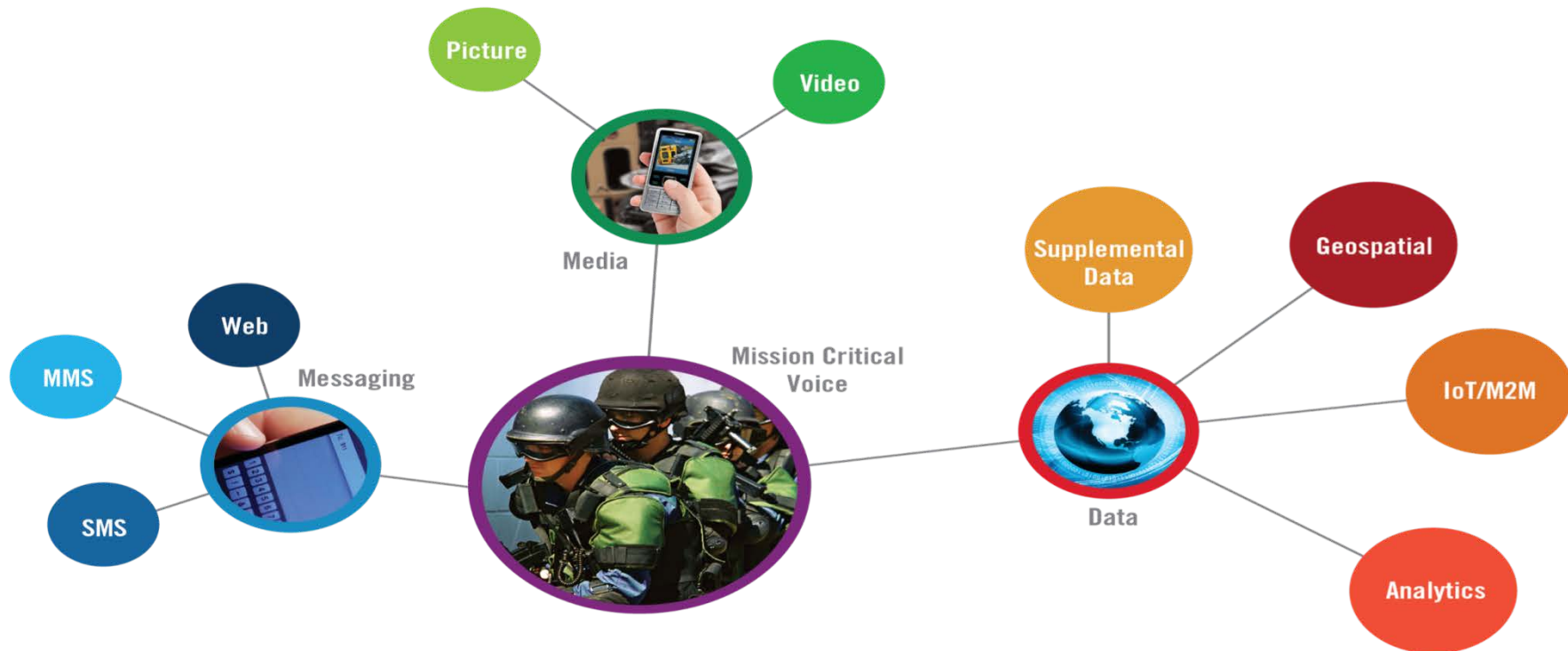
- Build using Open Standards
 - IEEE, oneM2M, OASIS OData, Open Geospatial Consortium Sensor Things, CAP (Common Alerting Protocol)
- Sensor layer independence to support new and evolving sensor technologies
- Security based on OAuth specification (NIST and OWASP recommendation)
- REST/API services
- Cloud-based services
- Supported with big data analytics and contextual awareness components to address unique solutions and requirements



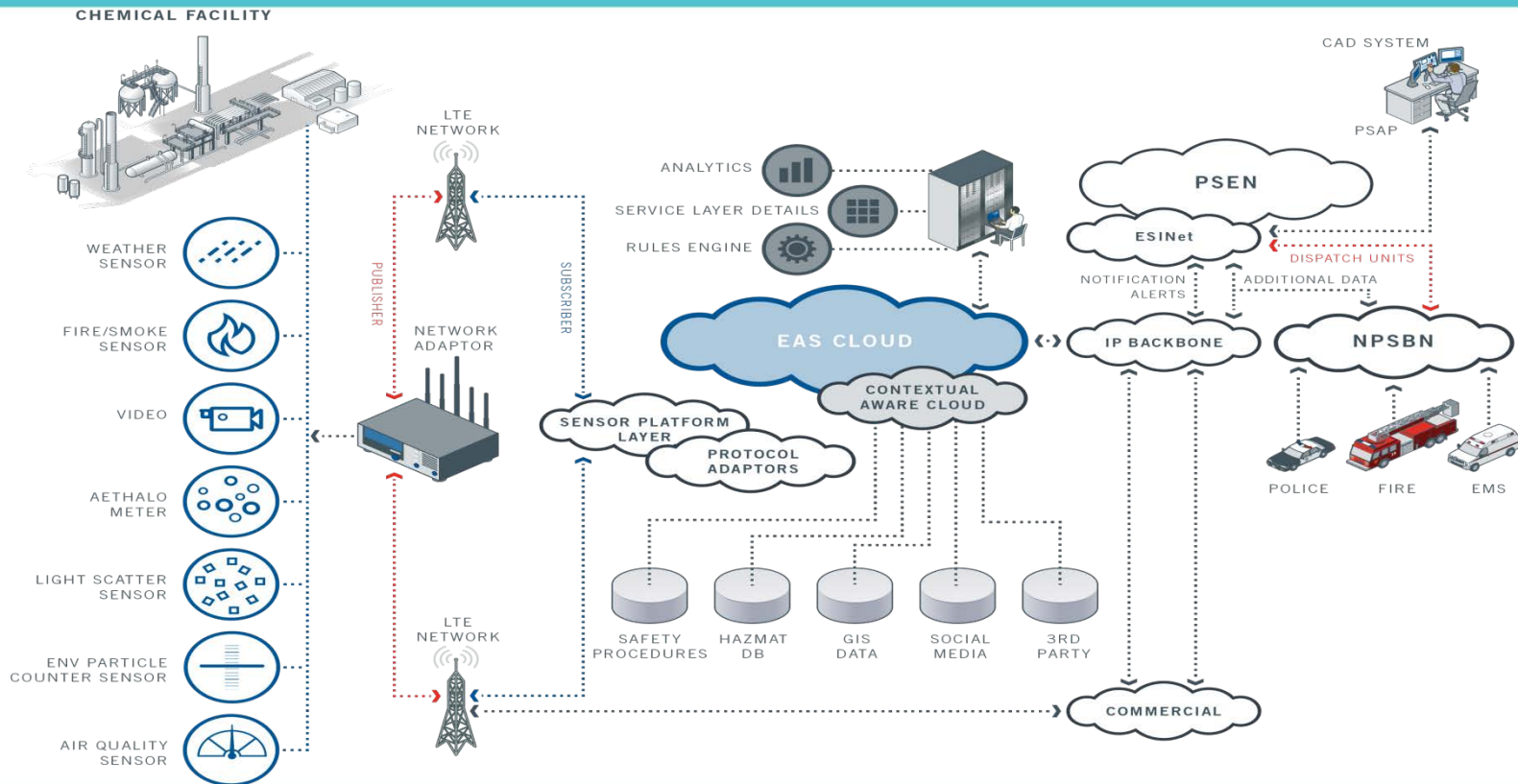
- Property (Subset of potential data elements)
 - Location
 - Occupants
 - Structure size
 - Number of floors (including floor maps)
 - Construction material
 - Local water supply
 - Power lines, gas lines, propane tanks, other risk factors
 - Condition of infrastructure
 - Presence of flammable material (including hazmat, decks, etc.)
 - Proximity to high risk locations



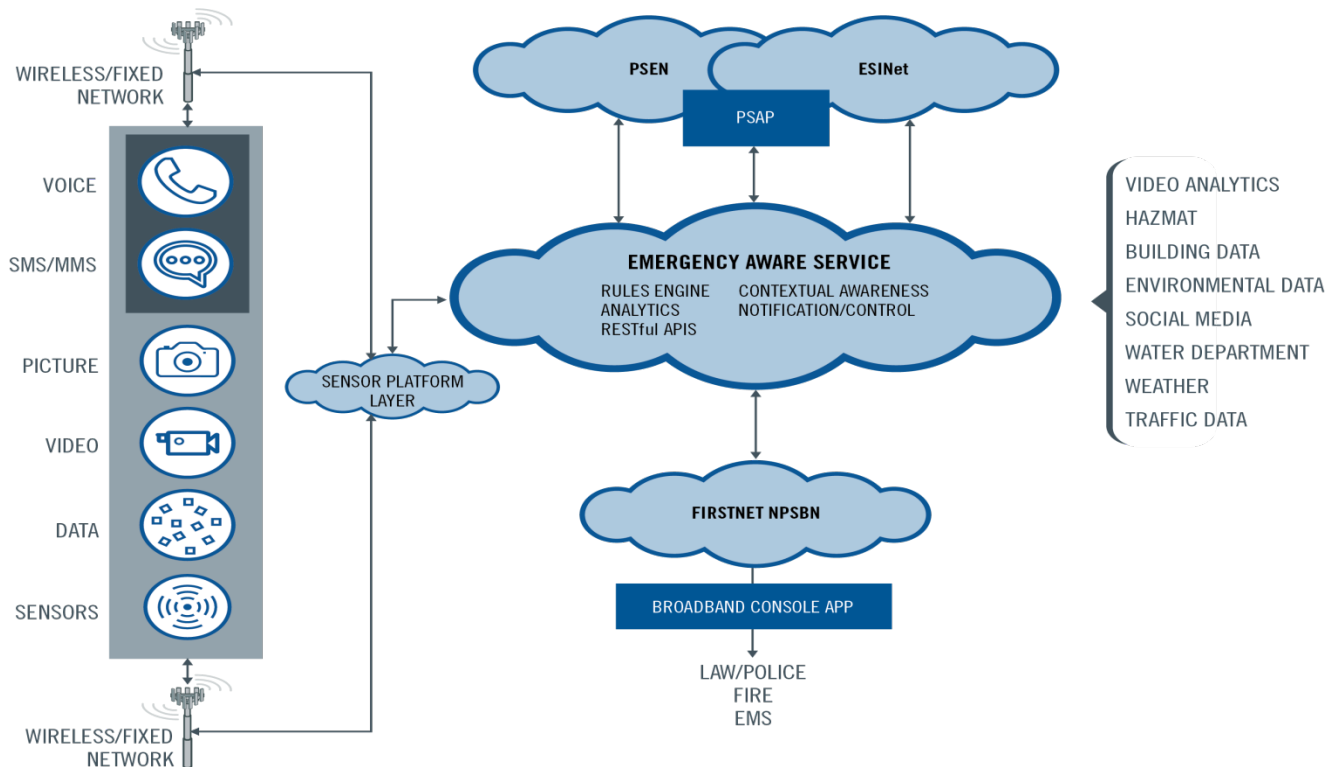
Next Generation Public Safety Services



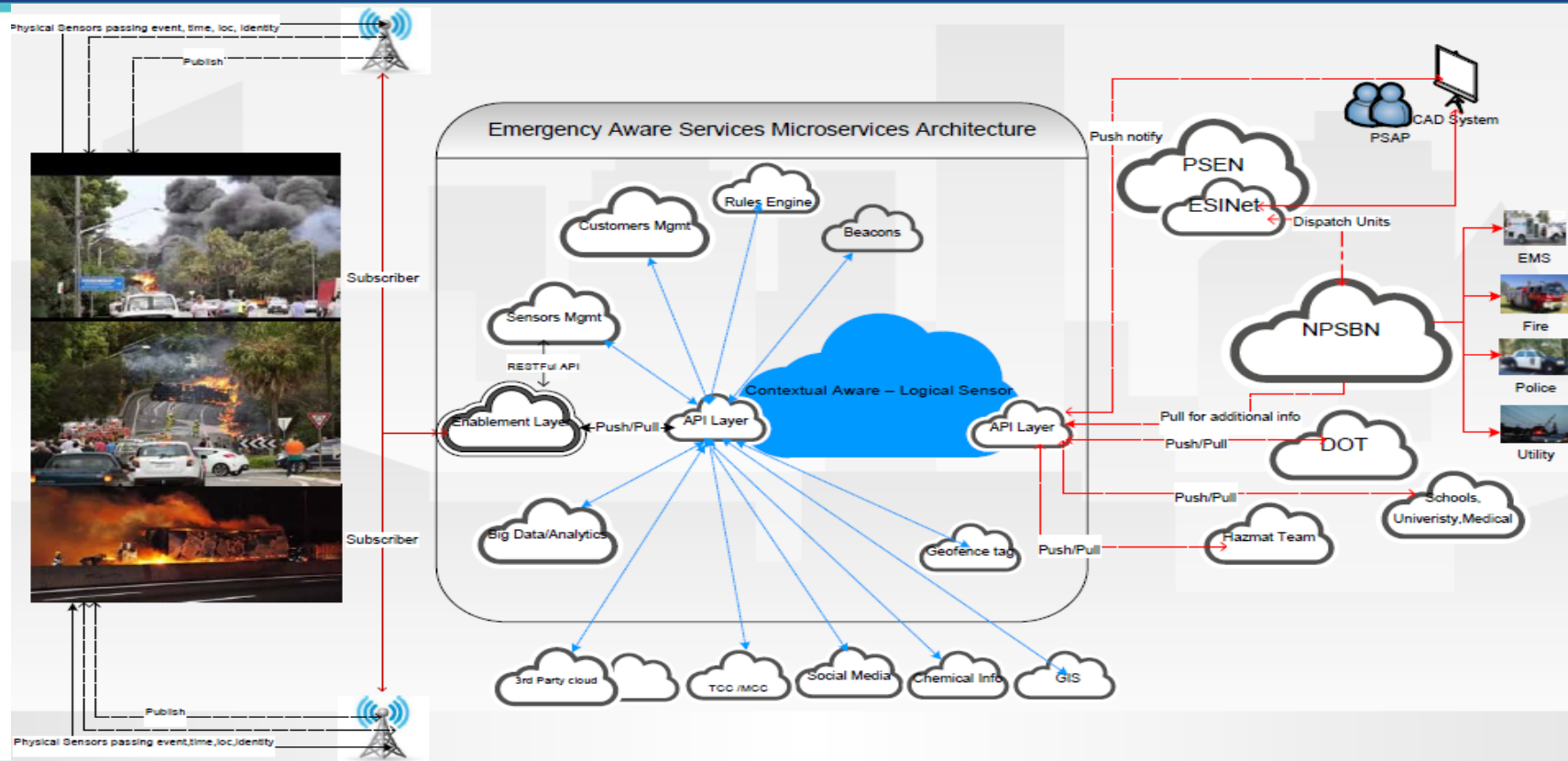
High Level Architecture



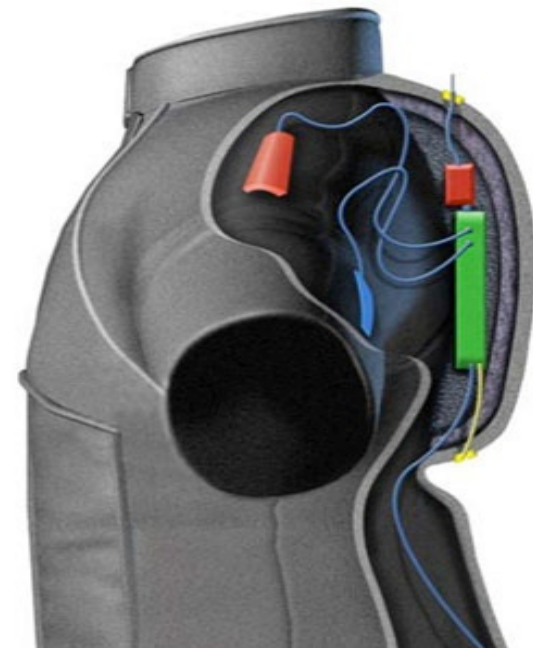
High Level Architecture

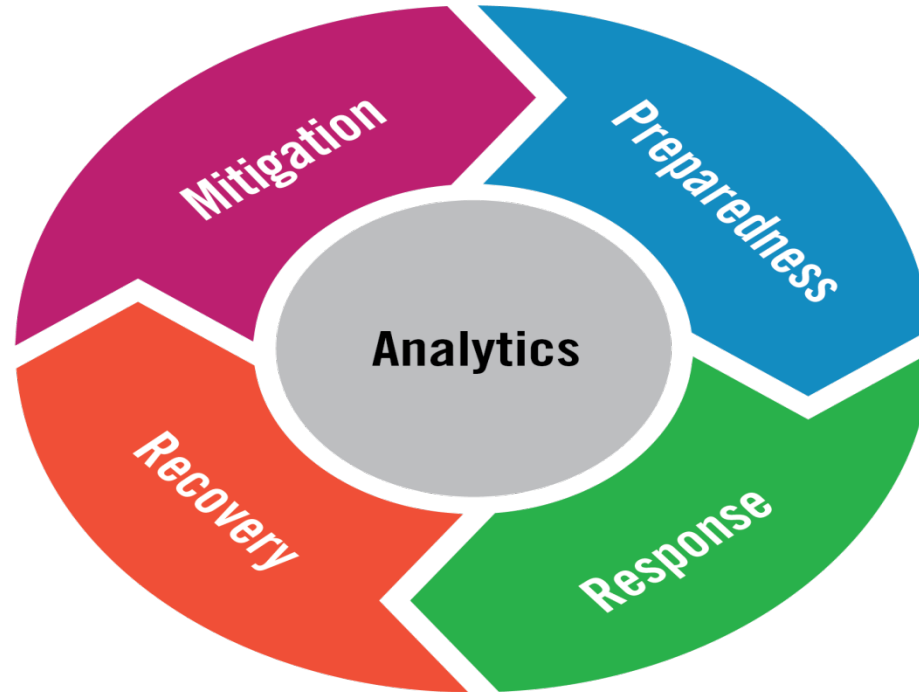


FirstNet Emergency Aware Services

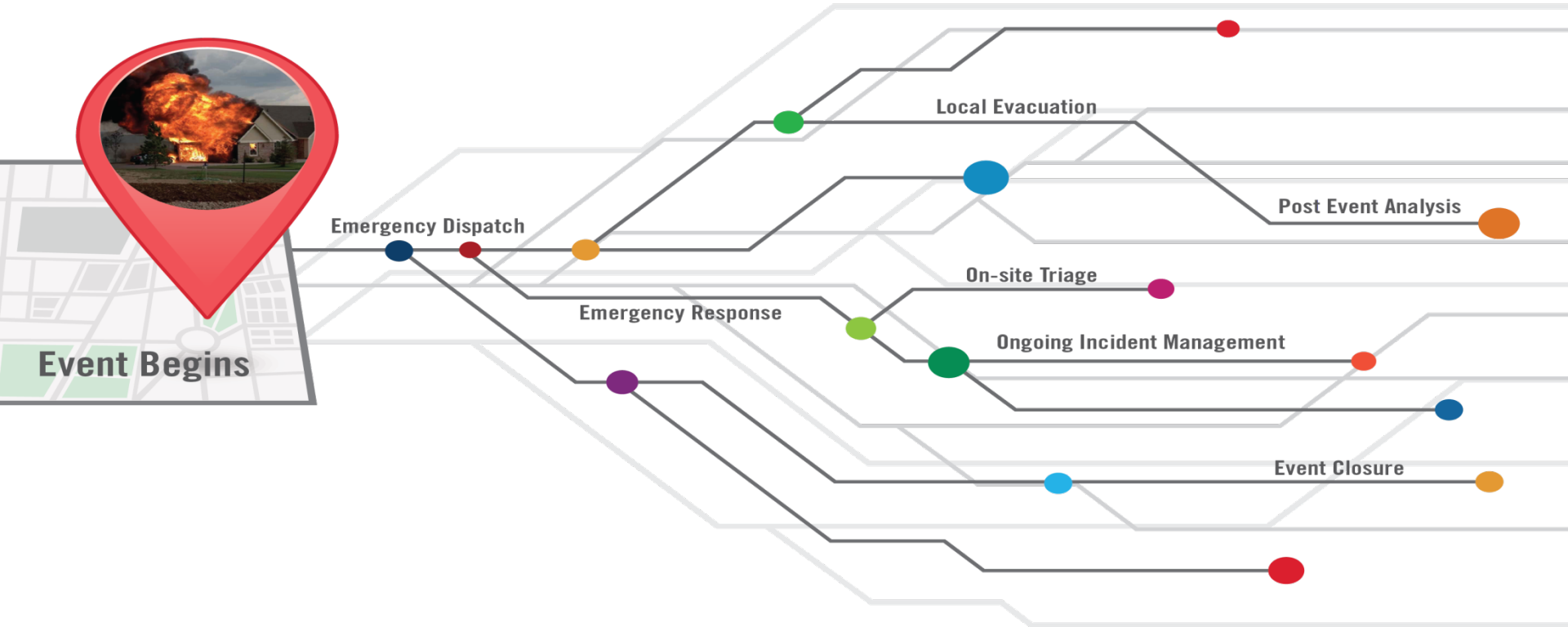


Technological Transformation



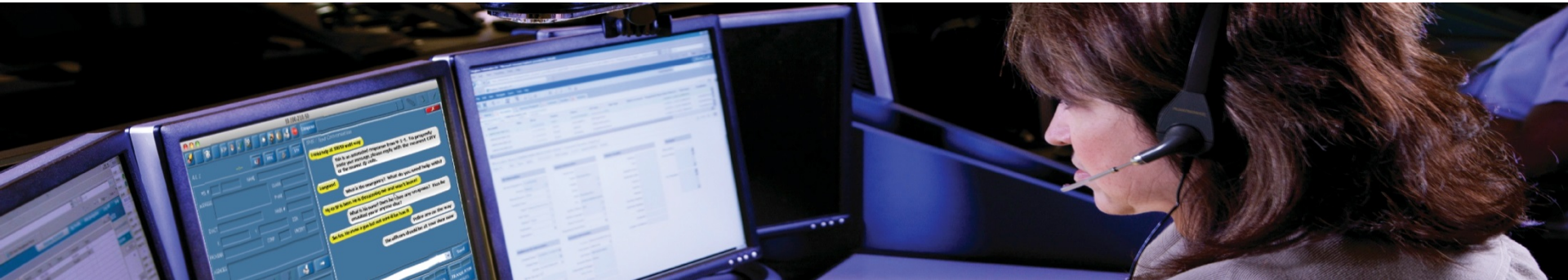


Situational Awareness Use Case



Use Case: Event Begins

Current State	Future State
Circuit-switched network	Broadband network
Voice and text messaging	Multi-media/supplemental data
Limited context	Situational awareness



Use Case: First Responders Dispatched

Current State	Future State
Static route data	Optimal route analysis and live traffic analysis
Limited contextual information	Real time contextual and situational awareness
Siloed communication – manual interoperable coordination	Automated interoperable coordination, dynamic data sharing



Use Case: Triage & Fire Response

Current State	Future State
Voice driven communication and decision making	Information-rich communication and decision making
Localized applications and resources	Shared applications and resources
Periodic check-in procedure	Real time monitoring and analysis to track resources and assets (i.e. Indoor location)



Use Case: Evacuation Procedure

Current State

Voice dependent tracking

Limited occupancy awareness

Broadcast communication

Static exit paths

Future State

Real-time tracking of First Responders for personnel safety and accountability

Smart building monitoring and social media analysis

Targeted multi-media communication methods

Dynamic evacuation system



Current State	Future State
Limited location based data sources	Enhanced integration of location based data sources
Centralized applications and services	Distributed applications, services and interfaces
Limited data capture	Comprehensive data analysis
Manual data reporting	Real-time automated data tagging and distribution



Use Case: Post-Event Analysis

Current State	Future State
Limited event data capture	Coordinated data analysis
Manual entry	Industry standard system interfaces to capture digital records
Manual recording of actions/decisions for future analysis	Automated post event analysis



Analytical Needs Ecosystem

Current State	Future Integrated and Interoperable State
Tradition-based tactics	Data-driven science-based tactics
Local information	Global information
Data-poor decision making	Information-rich decision making
Untapped or unavailable data	Comprehensive data collection, analysis, and communication
Isolated equipment and elements	Interconnected equipment and elements
Human-operations	Human controlled, collaborative, and automated operations
Lack of awareness	Situational awareness

Reference: NIST Publication 1191





- Open ecosystem for application developers and device manufacturers
- Standards and interfaces to support interoperability
- Data security and privacy
- Multiple U.S. national-level initiatives related to smart emergency response
- National movement towards open government data

SAFETY



National and State Park

Industrial Plant

Trains

Homes

Water Plant

Cell Sites

Trucks

Smart City

Enterprises

Remote Worker

Rivers

Cars

Ports

Oil Rigs

Forest

Electrical Transformer Site

intrado[®]

QUESTIONS?

THANK YOU!

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