Development of a Sensor Web-based Disaster Decision Support System for Integrating Multi-agency Sensor Information

Presenters: **Farzad Alamdar** and **Dr. Mohsen Kalantari**
Co-researcher: **Prof. Abbas Rajabifard**
Centre for Disaster Management and Public Safety (CDMPS), The University of Melbourne

FIG Working Week 2016

CHRISTCHURCH, NEW ZEALAND 2–6 MAY 2016

Recovery from disaster

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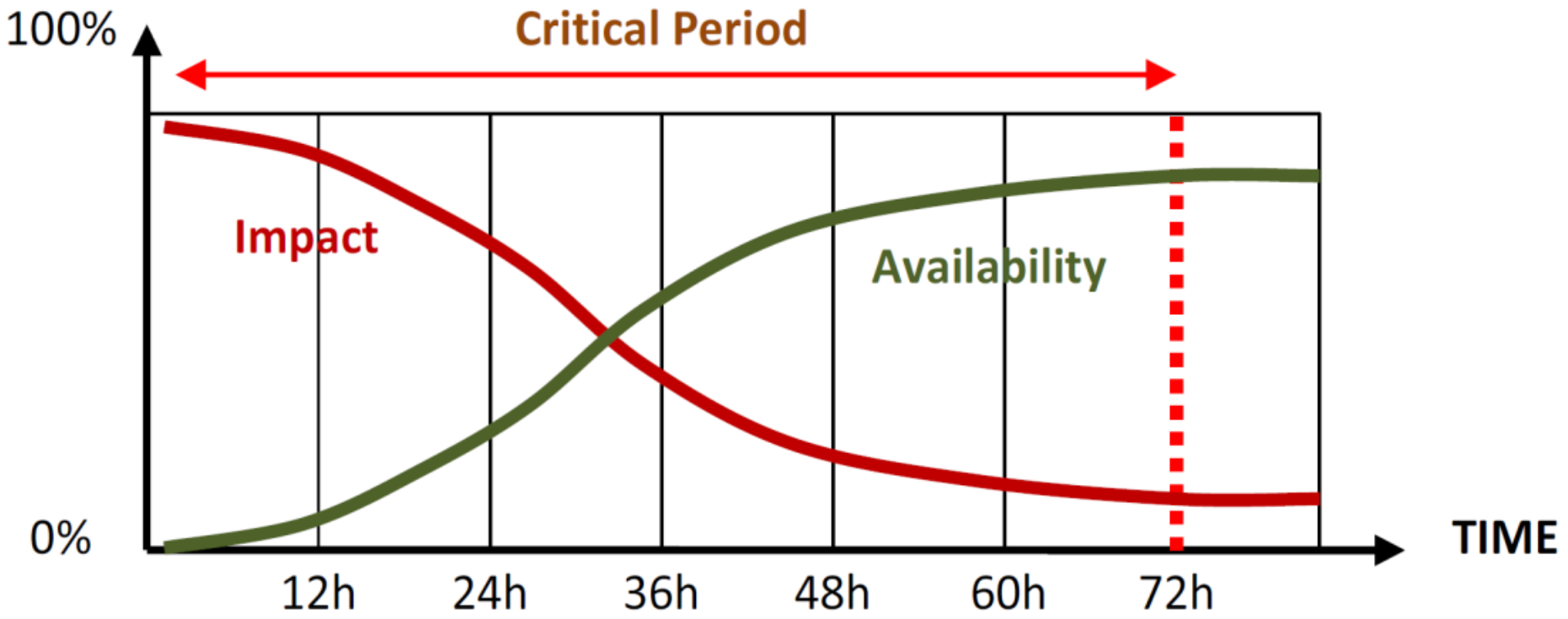
DISASTER DOMAIN

People are panicked and traffic movement is unpredictable.

DISASTER DOMAIN

Availability versus Impact of disaster information over time



(Source Murphy 2010:2)

SENSING DOMAIN

Today, Sensors are everywhere….

Personnel device

Vital sign sensor

GPS-based tracking sensor


Pedestrian counting sensor


CCTV camera in urban areas


Wearable sensor


Body cam sensor


Automated weather station


Rainfall gauge


River height gauge


CCTV cameras on roads


Rain watch radar


Lightening Detector

Temperature sensor


Flood detector

Inductive vehicle Detector

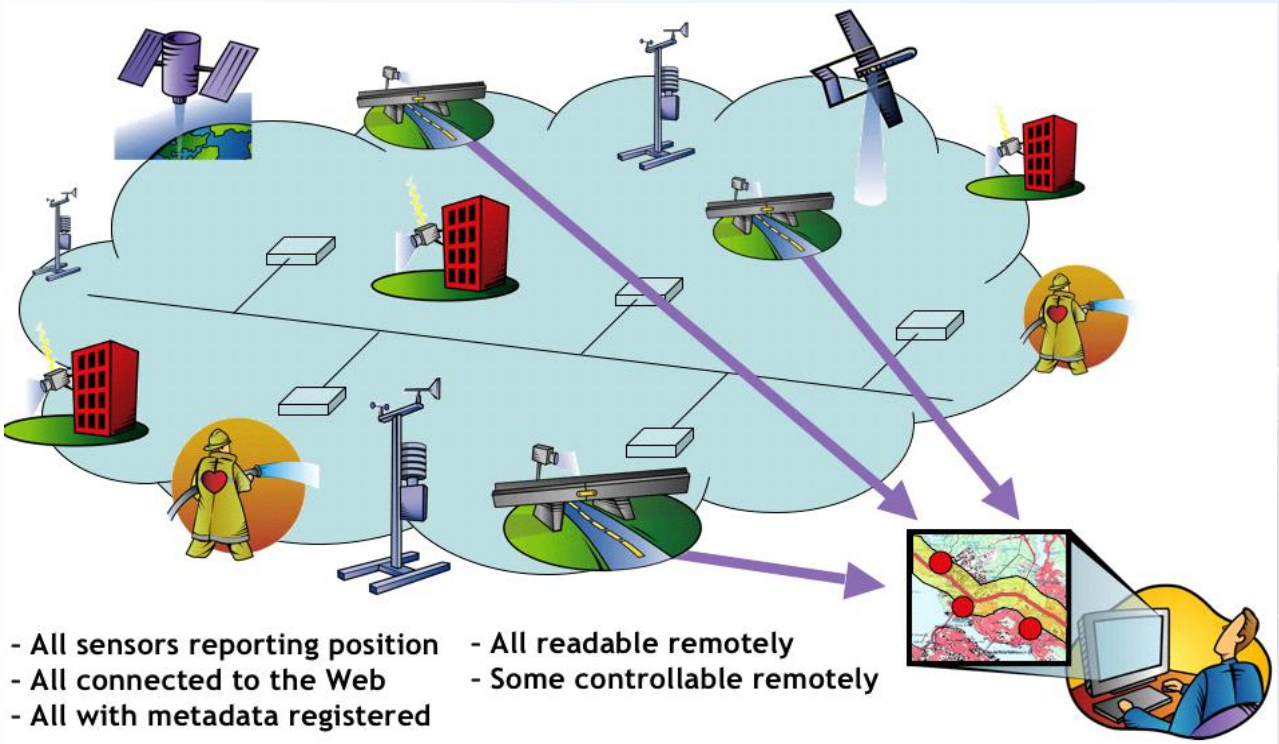

In ground parking sensor

Source: internet

Multisource	Multisourced sensors for disaster response	ter response
High tempo spatial res	*Real-time disaster information*	*e-sensitivity*
Wide range	*Wide range of disaster information*	*amic Nature*
Automated c	*Automated support for response operations*	*allowance on delay*

We need real-time and actionable sensor information reaches government agencies and disaster decision makers

SENSOR WEB



"… web accessible sensor networks and archived sensor data that can be discovered and accessed using standard protocols and application program interfaces (APIs)"

From OGC 07-0165 - OGC Sensor Web Enablement: Overview and High Level Architecture

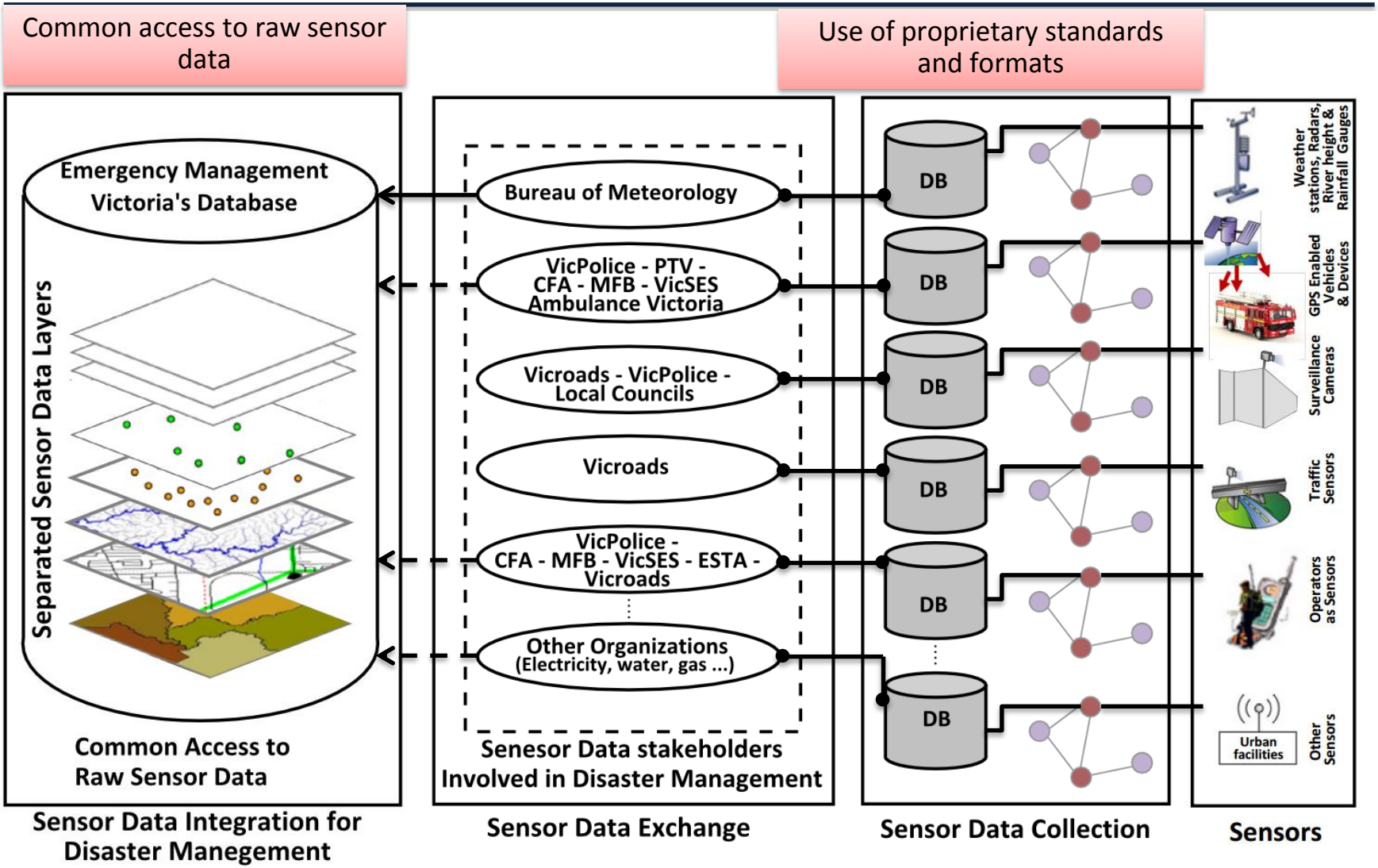
SHORTCOMINGS

OGC SWE standards:

- not designed for disaster management
- not acknowledged in disaster management sector
- not well studied in multi-agency disaster management

Also,
In most cases, providing raw sensor observations is not particularly useful to busy disaster decision-makers.

CASE STUDY:
CURRENT USAGE OF SENSOR DATA IN DISASTER MANAGEMENT SECTOR

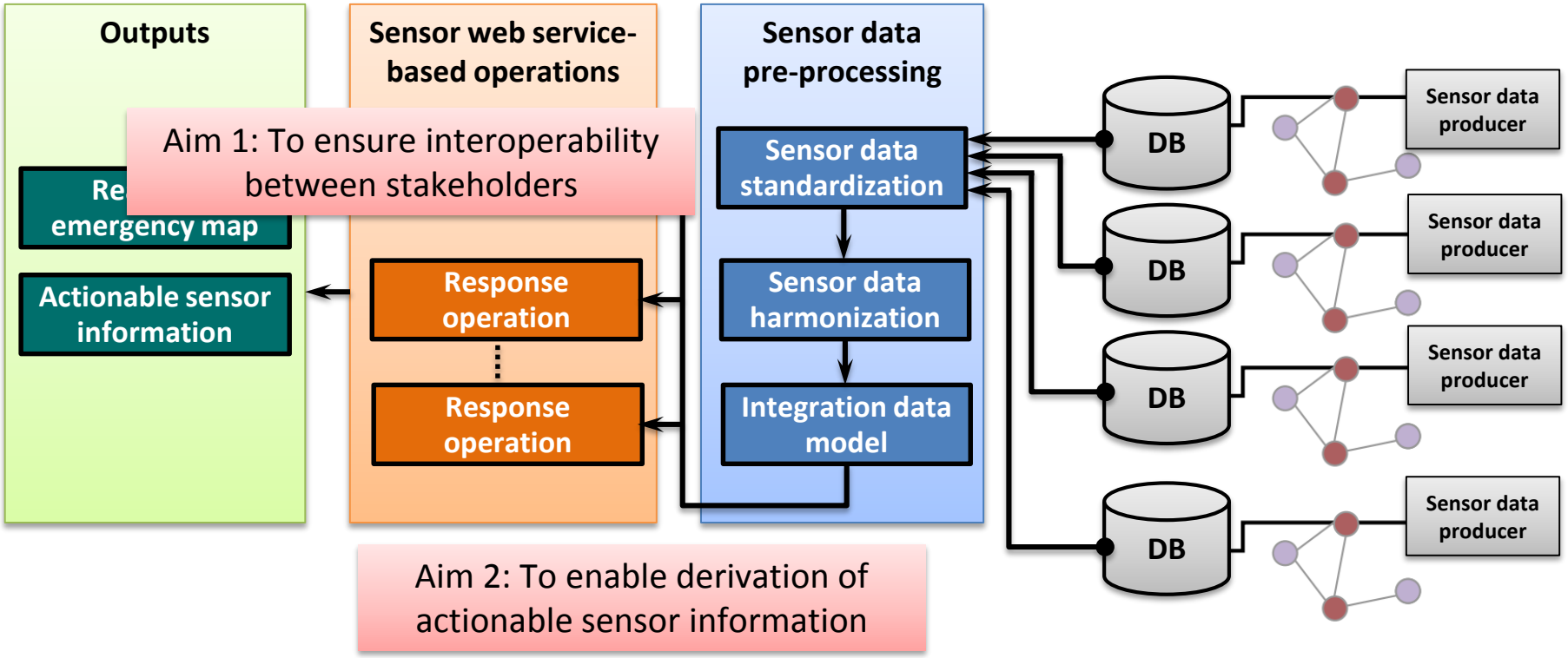


AIM

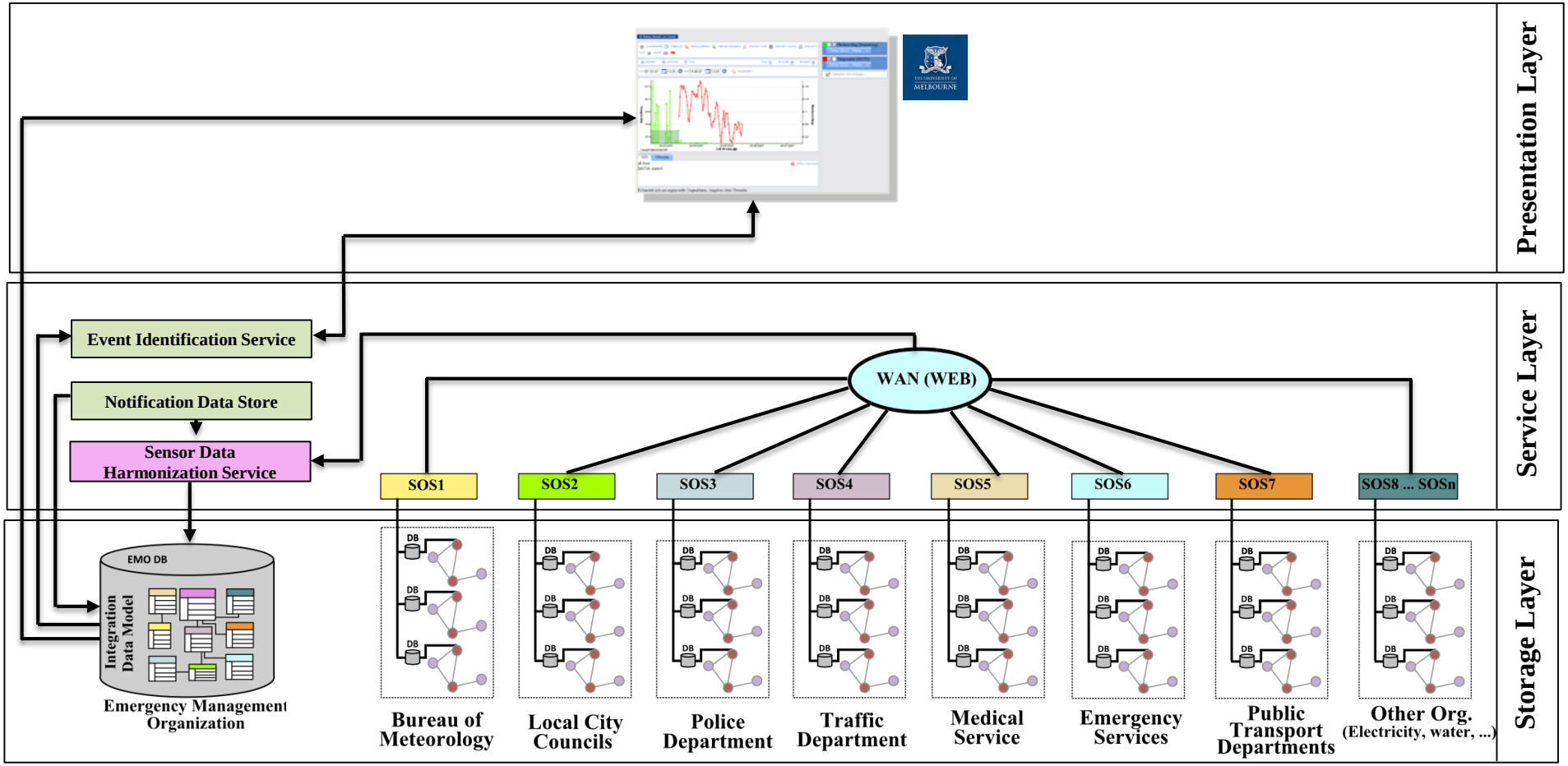
Developing an integrated approach for multi-agency sensor information integration that:

1) Ensures interoperability between sensor data providers and disaster management authorities; and
2) Supports derivation of actionable emergency information from raw sensor observations.

CONCEPTUAL DESIGN OF THE PROPOSED APPROACH



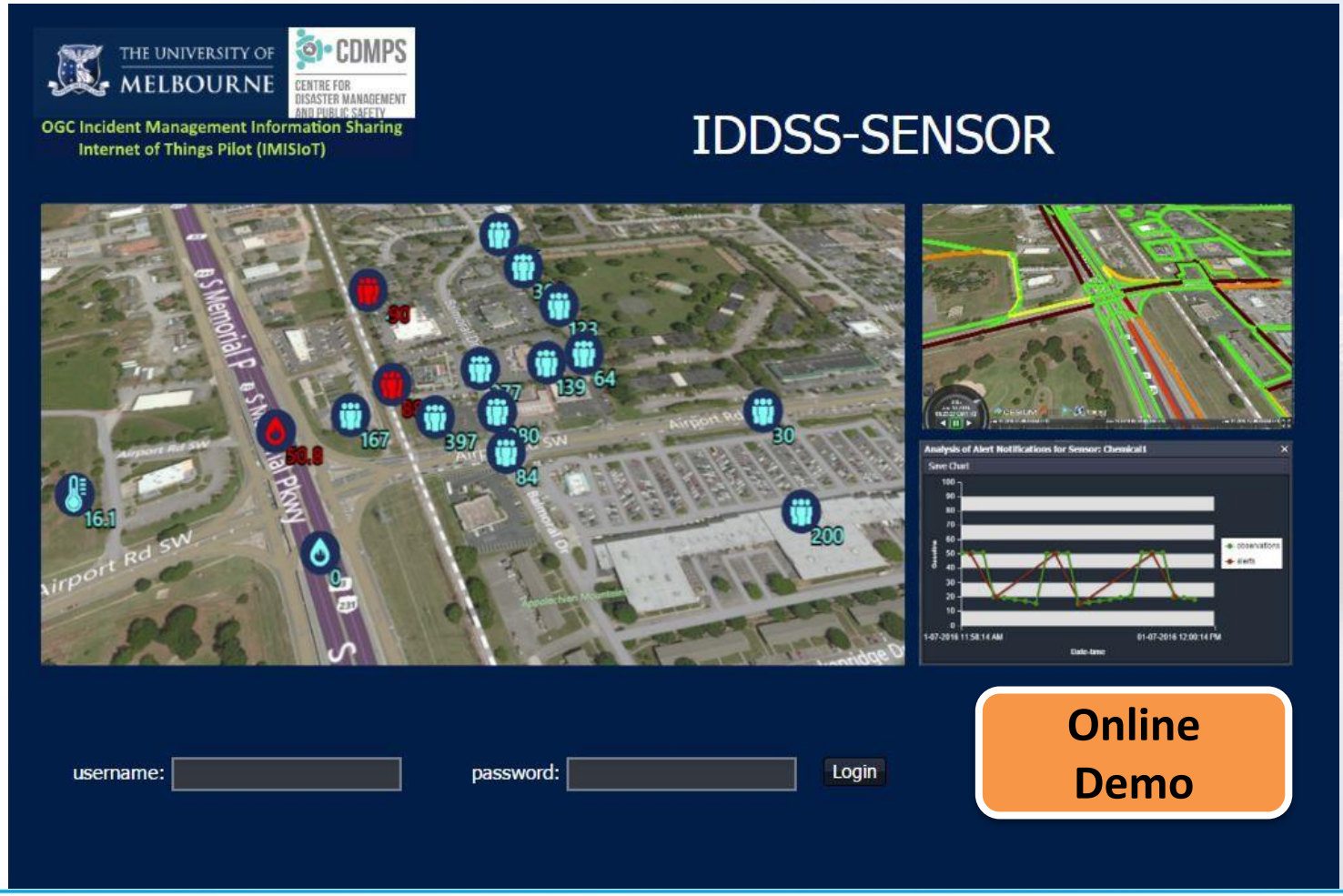
PROTOTYPE SYSTEM ARCHITECTURE



IMPLEMENTATION TECHNOLOGIES

Implementation Technology	License	Purpose
52^{0}North SOS	Open Source	Web-based access to sensor data
CESIUM	Open Source	To visualize sensor observations and the results of services
PostgreSQL + PostGIS	Open Source	to store our sensor data and other spatial datasets.
Ext JS	Open Source	To prepare the user interface of the prototype system.
GeoServer	Open Source	Web-based access to static spatial data
IDDSS	Open Source	To use IDDSS functionalities during prototype development
Apache Tomcat	Open Source	Web server and servlet container
Java	Development Language	developing language for the server side of the prototype system
JavaScript	Development Language	developing language for the client side of the prototype system

IMPLEMENTATION RESULTS



CONCLUSIONS

- Predominant use of proprietary formats and standards
- Sensor data sources are primarily produced for different purposes rather than disaster management
- In most cases, providing raw sensor observations is not particularly useful to busy disaster decision-makers.
- Improved access, exchange and usage of organizational sensor data for disaster management.
- Existence of other integration levels/issues for sensor data enablement of disaster management.

Thank you!