FEBRUARY 5 - 6 • LOS ANGELES, CA

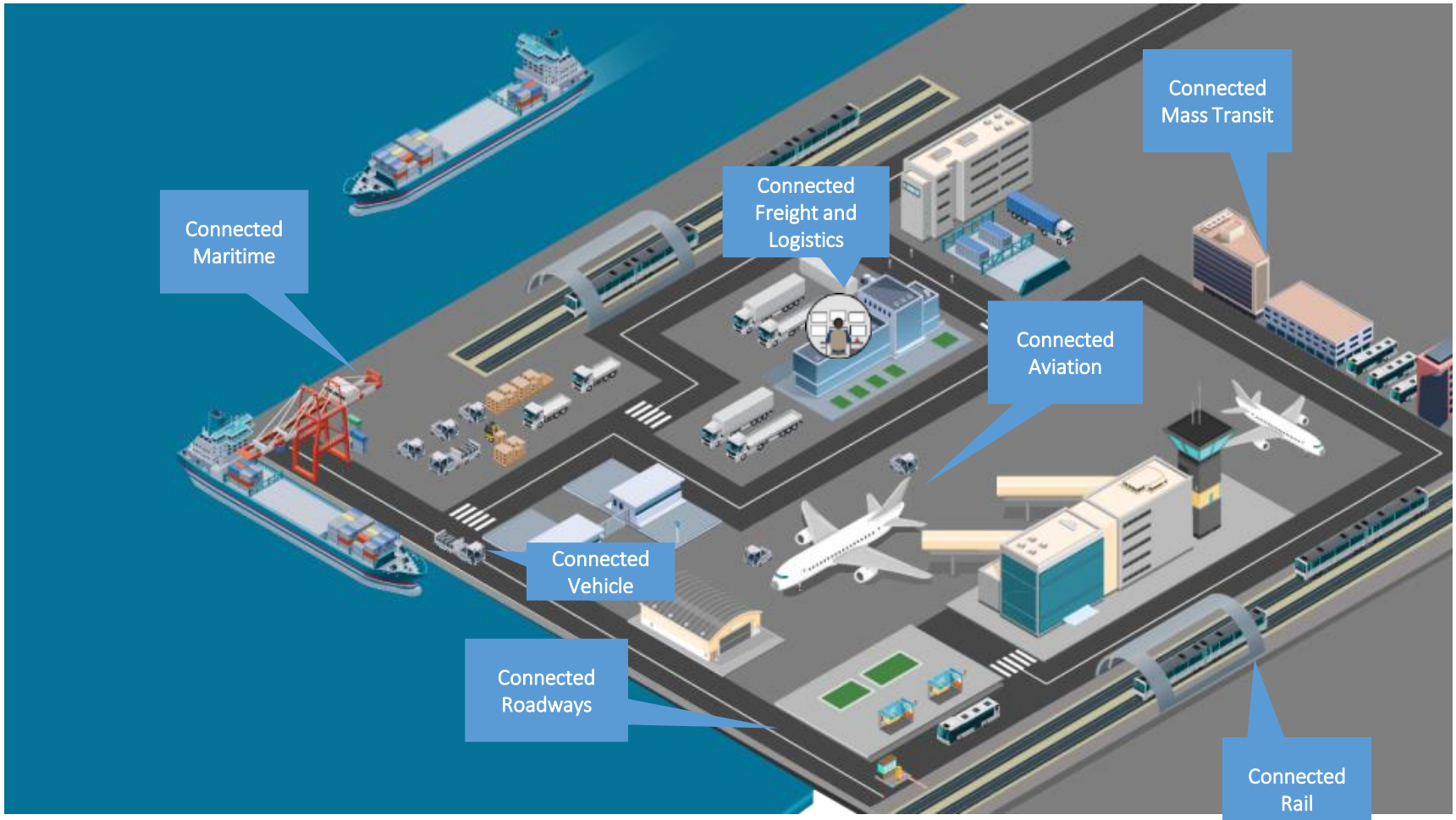
SMART PORTS

(INFORMATION TECHNOLOGY)

AAPA

The port of tomorrow is part of a digital community

Connected Transportation Sectors



Top Obstacles to Digital Transformation

Complex Integration	56%	prefer fully integrated and validated solution over separate best-of-breed vendors
Need to Automate Extraction of Insights and Resulting Actions	42%	pick analytics tools as most important enabler
Data Overload	40%	cite data management as #1 capability they need to improve
Expanded Security Vulnerability	76%	cite security is an important element of IoT implementation
Siloed Networks	25%	have experienced increased network strain when implementing IoT initiatives

Port of Rotterdam

https://youtu.be/PECbWmx3x0U

The industry is changing

Bigger problems, need larger solutions

Container Terminal / Intermodal Operations

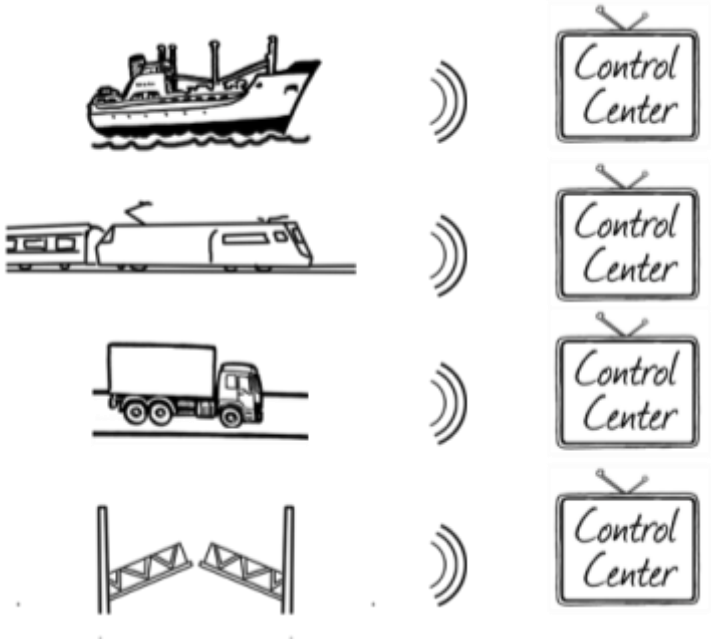
- Telemetry/Safety IO
- Cameras on RTGs and Straddle Carriers for remote operations
- AGV Vehicle Connectivity for full automation
- Reduce Costs by Removing Fiber Spools on Cranes
- Facilitate moving cranes between blocks
- Backbone network for WiFi APs for mobile workforce/handheld devices

Port of Hamburg

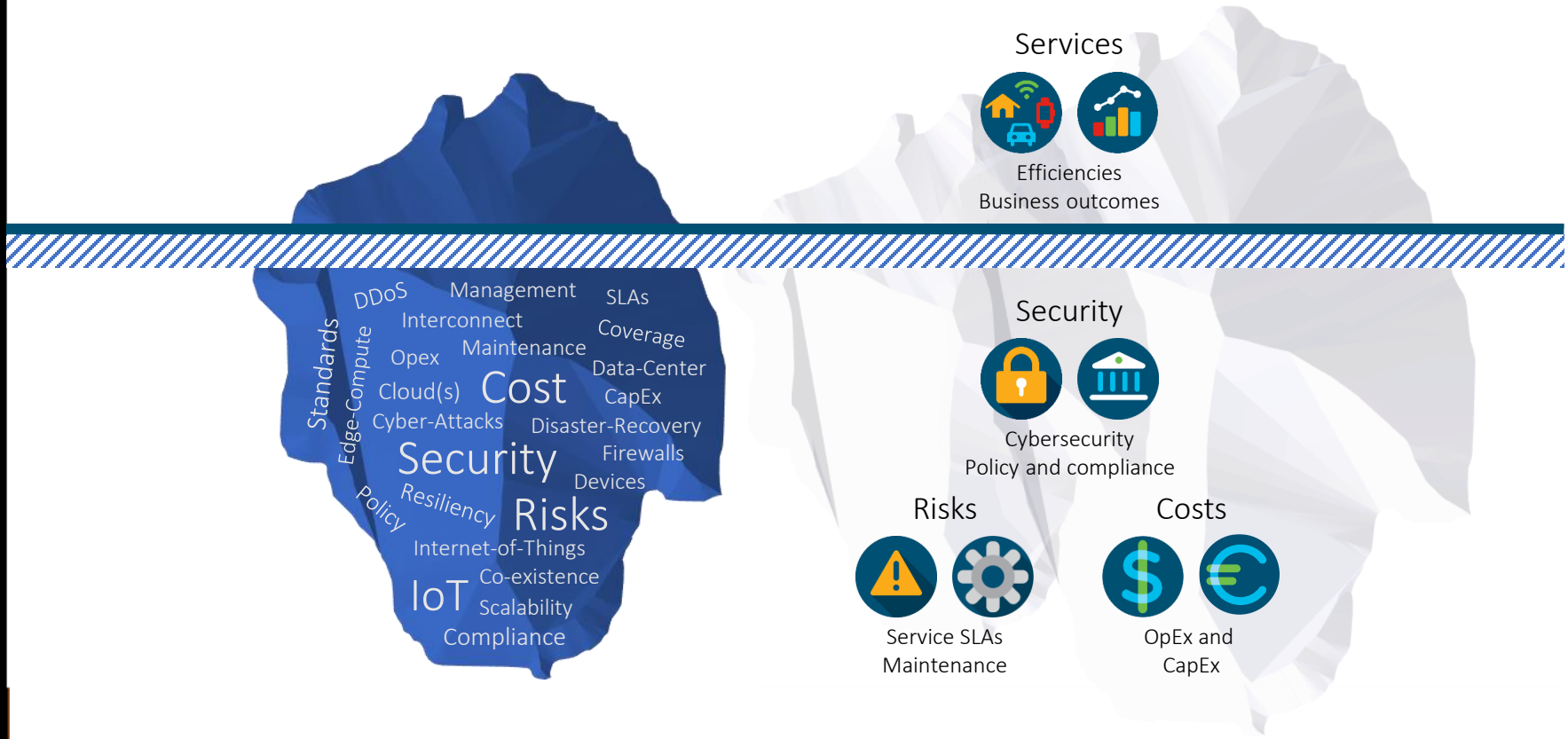
- One of the largest ports in Europe
  Over 140 million tons total turnover per year
- Biggest railway port in Europe
  200 freight trains with 5000 wagons per day
- 1900 employees
- 10,000 ships per year
- Connected to 900 harbors in 174 countries around the globe
- Strong growth in cruise ship tourism

Port of Hamburg – Legacy Issues

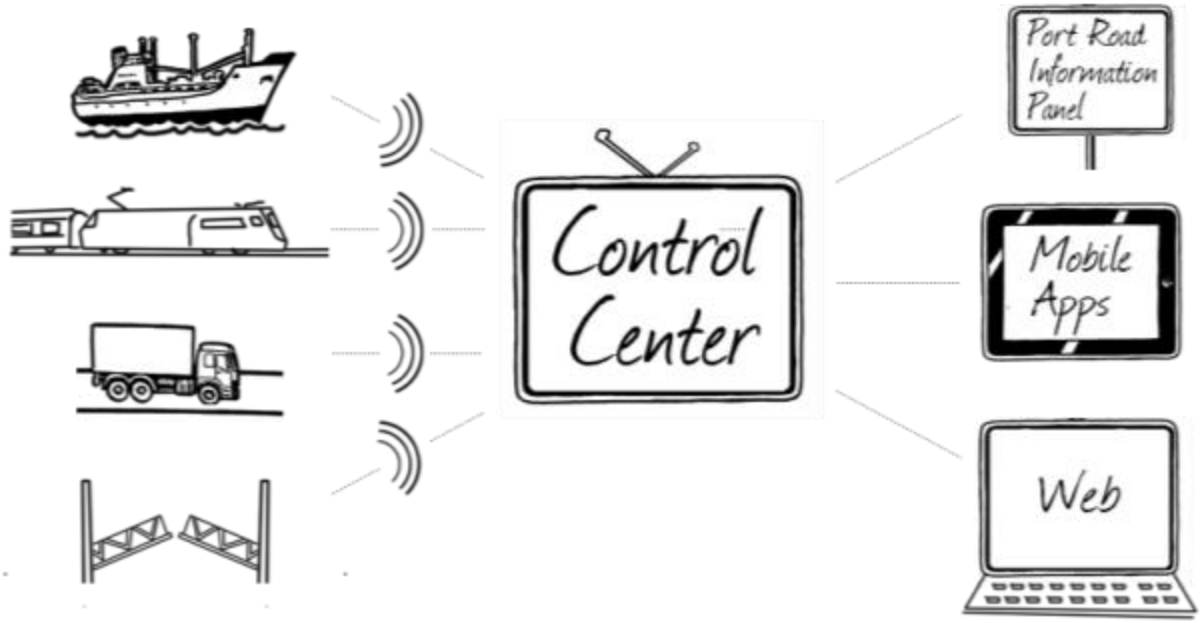
- 4 isolated control centers for
  - River
  - Railways
  - Roads
  - movable infrastructure
- About 300 traffic sensors
- 270 km of fiber optics
- First Hot Spots (WiFi)



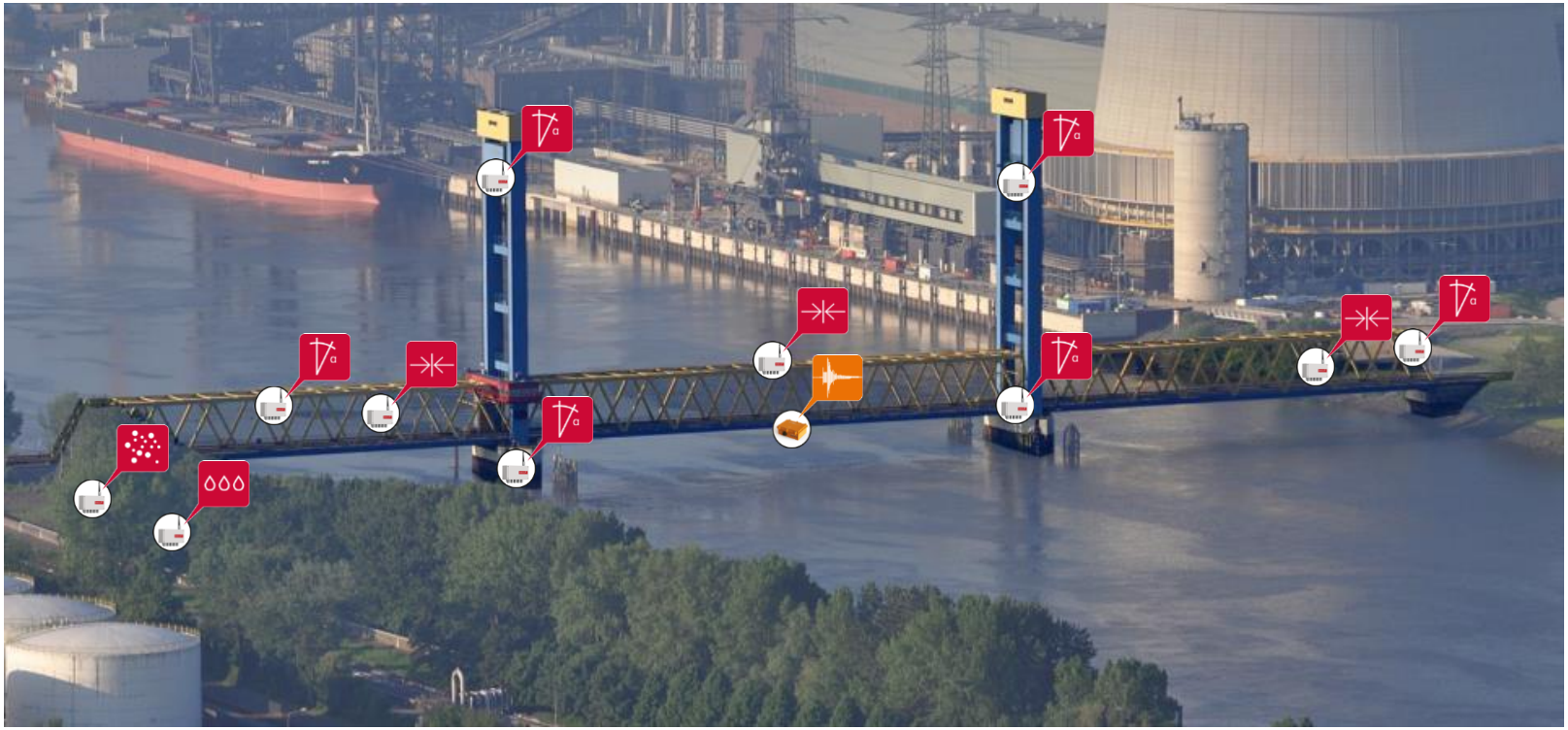
Hidden cost of siloed services



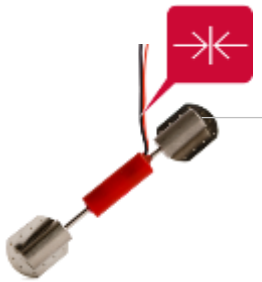
Port of Hamburg – Deployed Port Traffic Center



Port of Hamburg – Example Sensors

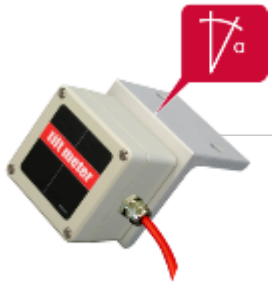


Port of Hamburg – Sensor Integration



Structural: strain gauges

Measuring the strain and stress on structural steel members.



Structural: tiltmeters

Settlements and relative displacements, tilt of piers and abutments.

Environment: air quality

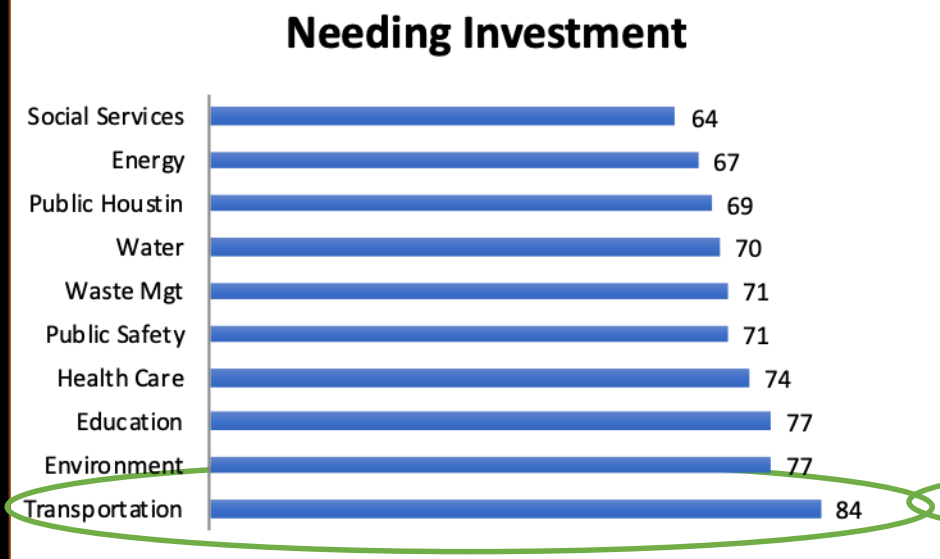
Pollution level: NO, NO2, SO2, CO and PM10.

Environment: weather

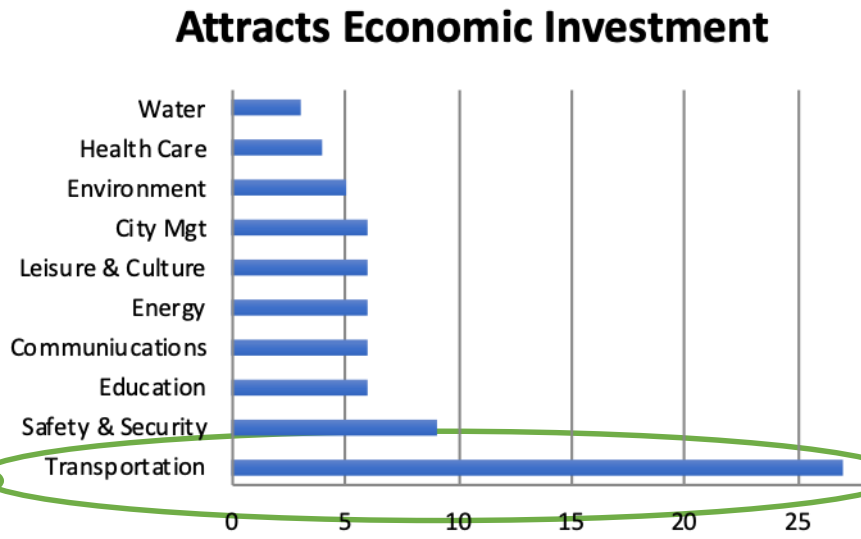
Rainfall, relative humidity, air temperature, wind speed/direction.

Transportation: The Top Priority for Cities

Need for investment over the next 5-10 years by infrastructure area



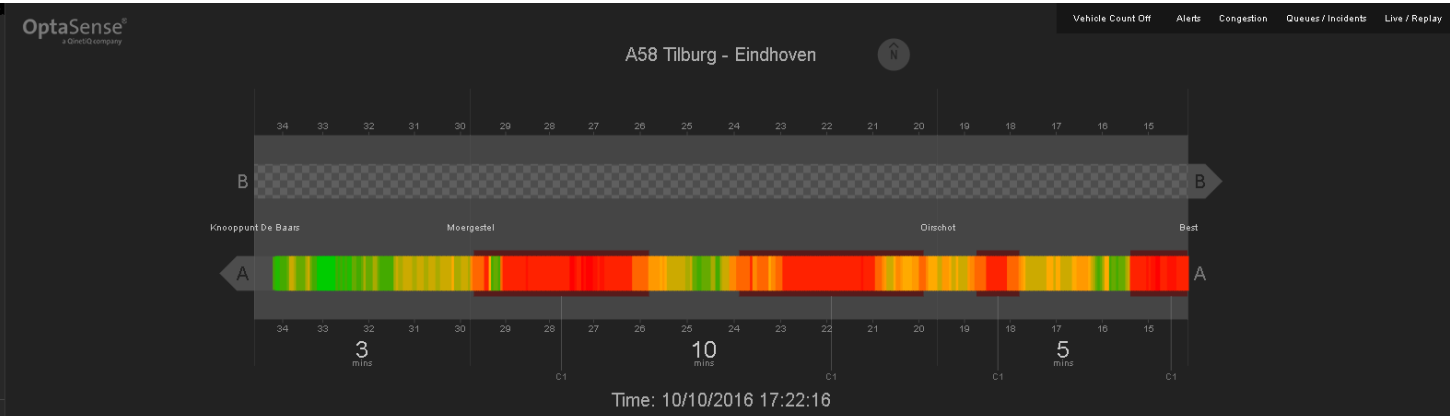
Infrastructure area most important in attracting economic investment

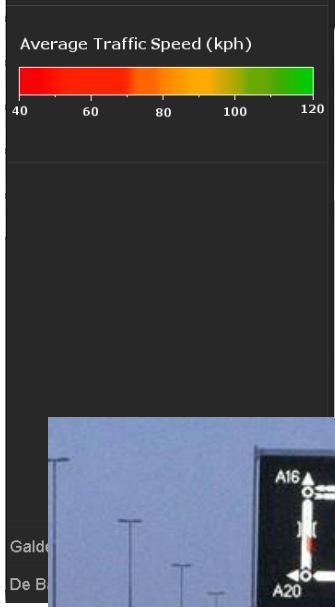


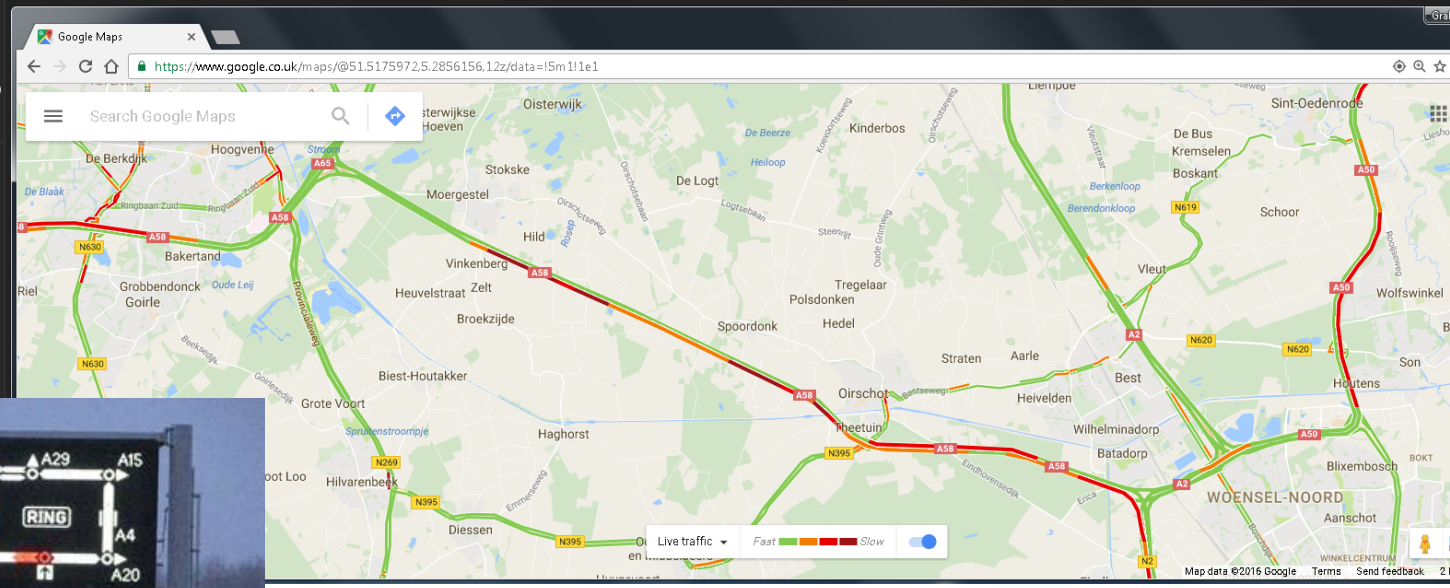
Survey of public & private sector stakeholders across world's top 25 cities

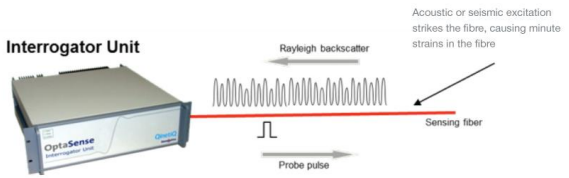
Connected Transportation Examples

SMART PORTS (Information Technology) ● FEBRUARY 5-6, 2020





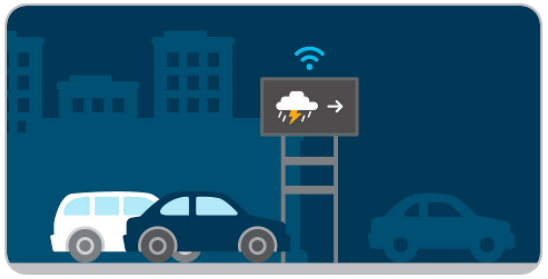




Fog Computing Example

Dynamic message sign automation

Real-time information on weather, traffic accidents, lane closures, work zones, and more via digital signage



Industry drivers

- Smart transportation and connected communities increasingly requiring dissemination of real-time information
- Dynamic message signs can share data from vehicles, sensors, and legacy devices to make roadways safer and more efficient for all travelers
- Automation enables more efficient traffic operations and operator safety

Business needs

- Legacy device integration—make use of existing signage to better communicate with travelers
- Connected vehicle applications—utilize dynamic messages signs to share data from vehicles-as-sensors e.g. DSRC

Capabilities

- Automate vehicle-as-sensor information, and provide notifications for all travelers
- Collect and disseminate real-time data streams including information on weather, queues, incidents, lane closures, and work zones
- Notify drivers, pedestrians, and operators in real-time

Business outcomes

- Fatality and crash reduction
- Prevention of secondary crashes
- Improved emergency response
- Improved operations and system efficiency
- A digital foundation ready for connected and automated vehicles
- Improved traveler communications

Stakeholders

- Traffic operators at DOT, City, and County
- Chief Engineer, District Engineers, Chief of Operations/Intelligent Transportation Systems

Fog Computing Example

Automated and connected vehicle notifications

Data collection that increases the safety of drivers and pedestrians in real time

Industry drivers

- Smart transportation and connected communities incorporating vehicle-as-a sensor e.g. DSRC technologies
- AASHTO SPaT Challenge for DSRC in all states by 2020
- Toyota and GM deploying DSRC on new vehicles
- Planning for automated vehicles

Business needs

- Data collection for real-time and predictive analytics
- Improve roadways and traffic signals today for future connected and automated vehicle applications
- Provide data to connected vehicle applications

Capabilities

- Collect and evaluate vehicle data in real-time
- Relay connected vehicle to infrastructure data for vehicles in real-time
- Visualize data on mapping applications and in existing traffic management centers
- Identify emergency needs in real time

Business outcomes

- Improve traveler notifications and reduce crashes
- Identify emergencies and respond to vehicles in real time
- Improve access and mobility
- Lower total costs for data collection, analysis, and predictive applications
- A digital foundation ready for connected and automated vehicles

Stakeholders

- Traffic operators at DOT, City, and County; potentially emergency responders and police departments
- Chief Engineer, District Engineers, Chief of Operations/Intelligent Transportation Systems

Fog Computing Example

Automation of roadway infrastructure

Integrated and normalized data across multiple sensors that delivers real time traveler information

Industry drivers

- Trends of connected and automated vehicles, changing mobility needs, and need for better traveler information
- Traffic fatalities on the rise since 2014
- Legacy ITS systems, roadways, and operations centers

Business needs

- Need to identify and report road weather changes in real-time
- Ability to utilize existing sensor technology to enhance traffic operations
- Advanced data collection and analysis
- Planning for future automation and legacy sensor integration

Capabilities

- Notify drivers, pedestrians, and operators of changing weather conditions in real-time
- "Single click" for operator intervention
- Automate responses and system changes based on real-time conditions

Business outcomes

- Maximize system efficiency, safety, and throughput
- A digital foundation ready for connected and automated vehicles
- Improved incident response

Stakeholders

- Traffic operators at DOT, City, and County
- Chief Engineer, District Engineers, Chief of Operations/Intelligent Transportation Systems

Fog Computing Example

Automation of roadway infrastructure

Integrated and normalized data across multiple sensors that delivers real time traveler information

Industry drivers

- Trends of connected and automated vehicles, changing mobility needs, and need for better traveler information
- Traffic fatalities on the rise since 2014
- Legacy ITS systems, roadways, and operations centers

Business needs

- Need to identify and report road weather changes in real-time
- Ability to utilize existing sensor technology to enhance traffic operations
- Advanced data collection and analysis
- Planning for future automation and legacy sensor integration

Capabilities

- Notify drivers, pedestrians, and operators of changing weather conditions in real-time
- "Single click" for operator intervention
- Automate responses and system changes based on real-time conditions

Business outcomes

- Maximize system efficiency, safety, and throughput
- A digital foundation ready for connected and automated vehicles
- Improved incident response

Stakeholders

- Traffic operators at DOT, City, and County
- Chief Engineer, District Engineers, Chief of Operations/Intelligent Transportation Systems

Fog Computing Example

Dynamic monitoring, metering and pricing

An efficient and effective means to maximizing traffic throughput and reducing roadway accidents

Industry drivers

- System efficiency and air quality standards
- System operations as a priority
- Need for traffic calming and queue smoothing

Business needs

- Need to manage recurring and non-recurring congestion based on real-time and predictive information
- Ability to change system operations including lane control, lane reversals, and speed limits

Capabilities

- Control the rate at which vehicles enter the freeway
- Monitor arterial traffic conditions and queuing
- Dynamically allocate lane access, lane merge control, and reversible lanes
- Enable hard shoulder running
- Support queue warning
- Enable active traffic management and dynamic speed limits

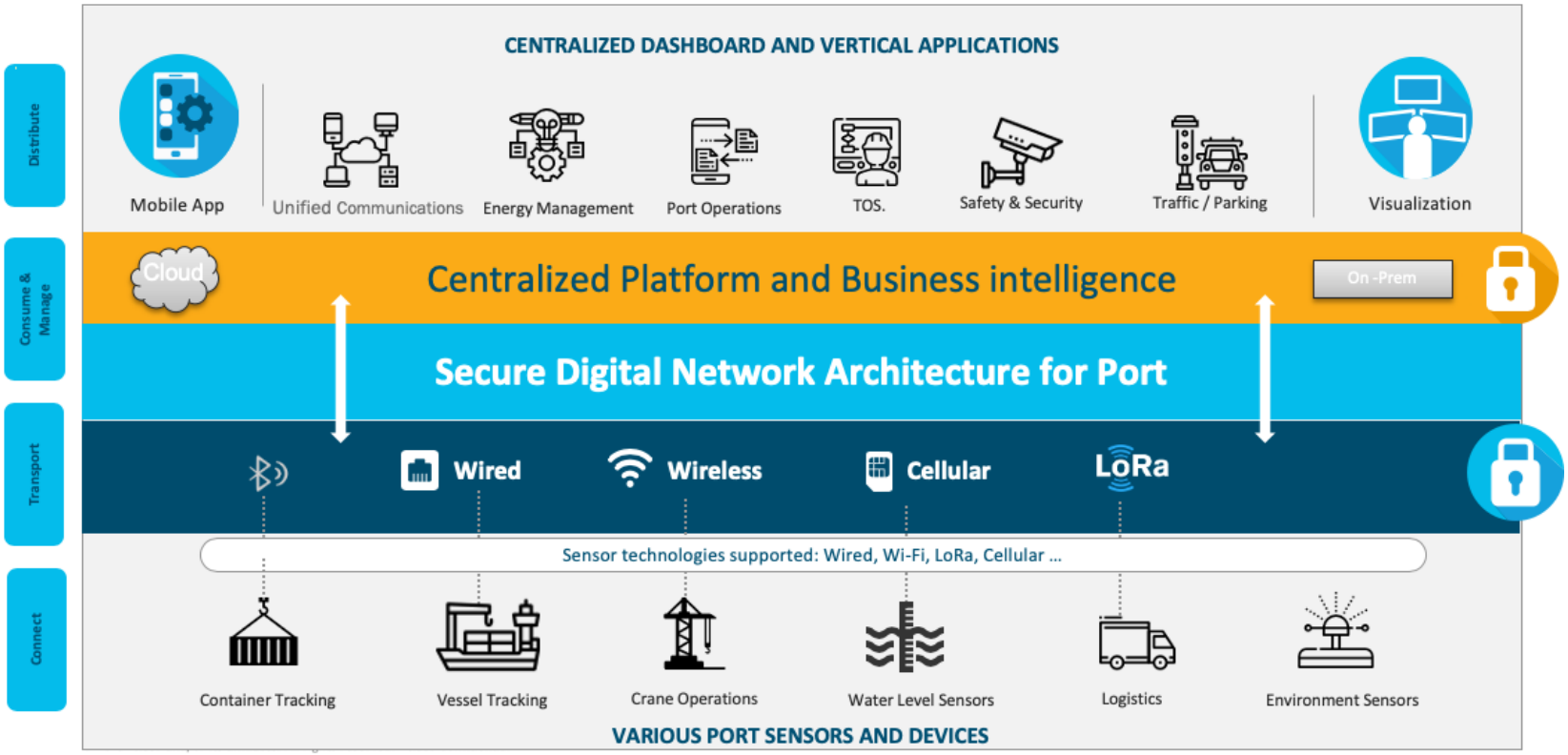
Business outcomes

- Maximize system efficiency and throughput
- Improved safety
- Queue reduction

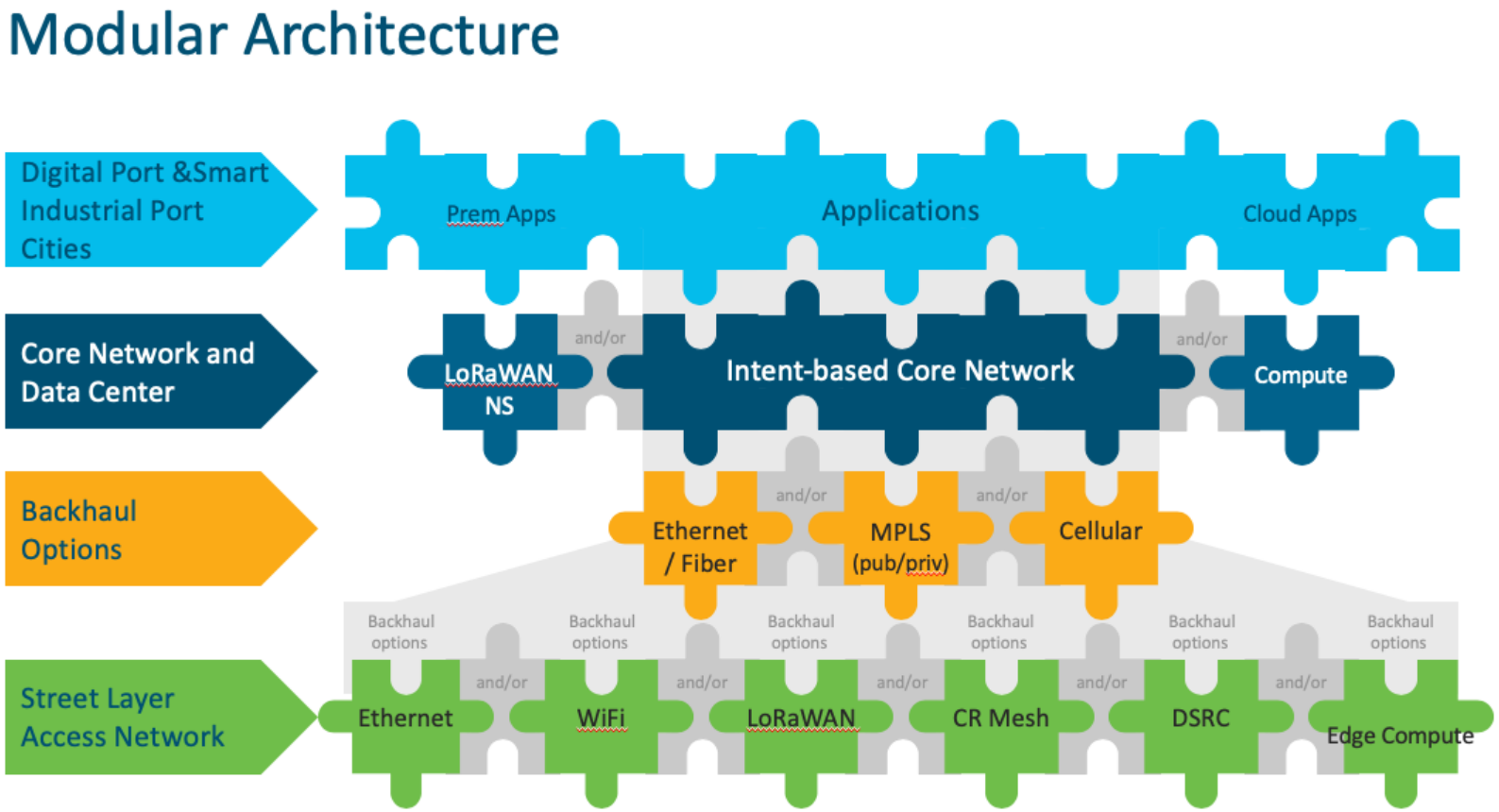
Stakeholders

- Traffic operators at DOT, City, and County
- Chief Engineer, District Engineers, Chief of Operations/Intelligent Transportation Systems

Cisco's Integrated Port Architecture

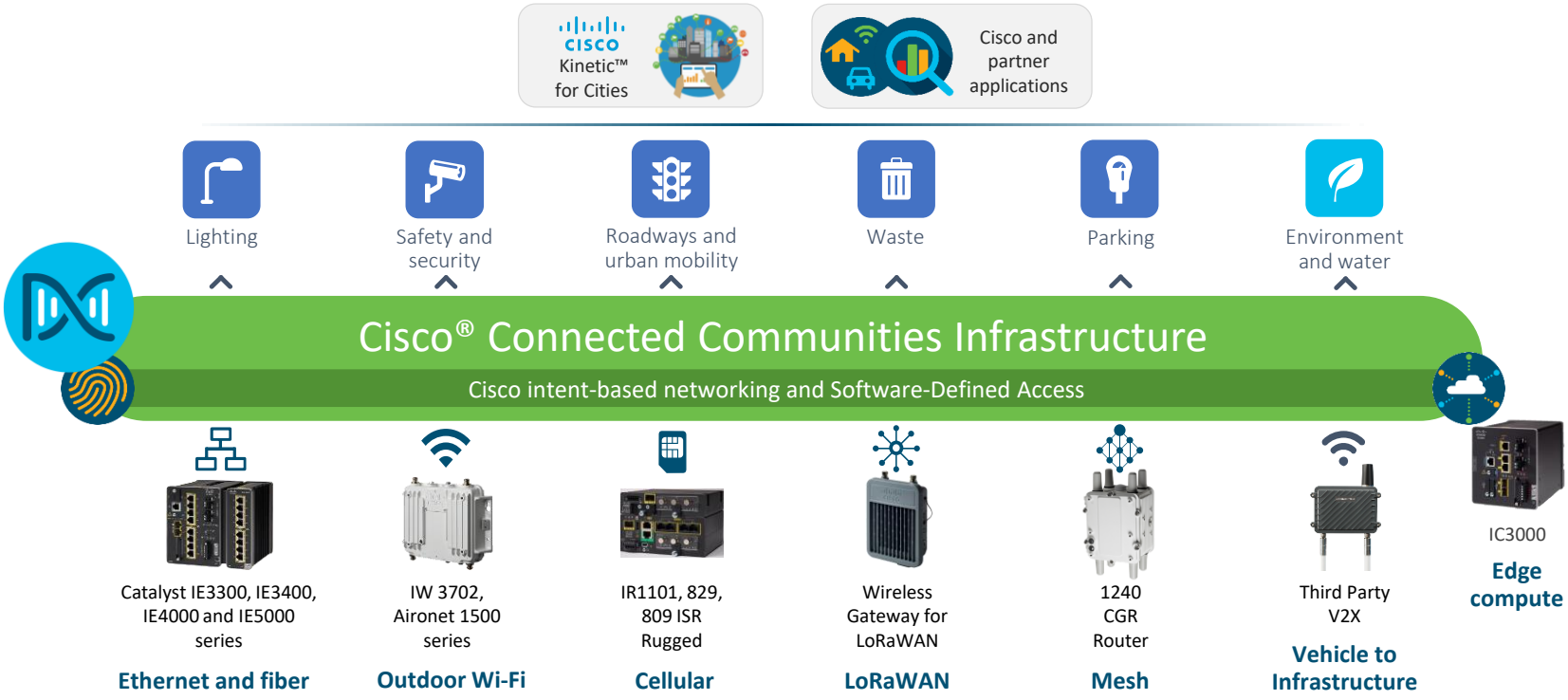


Modular Architecture



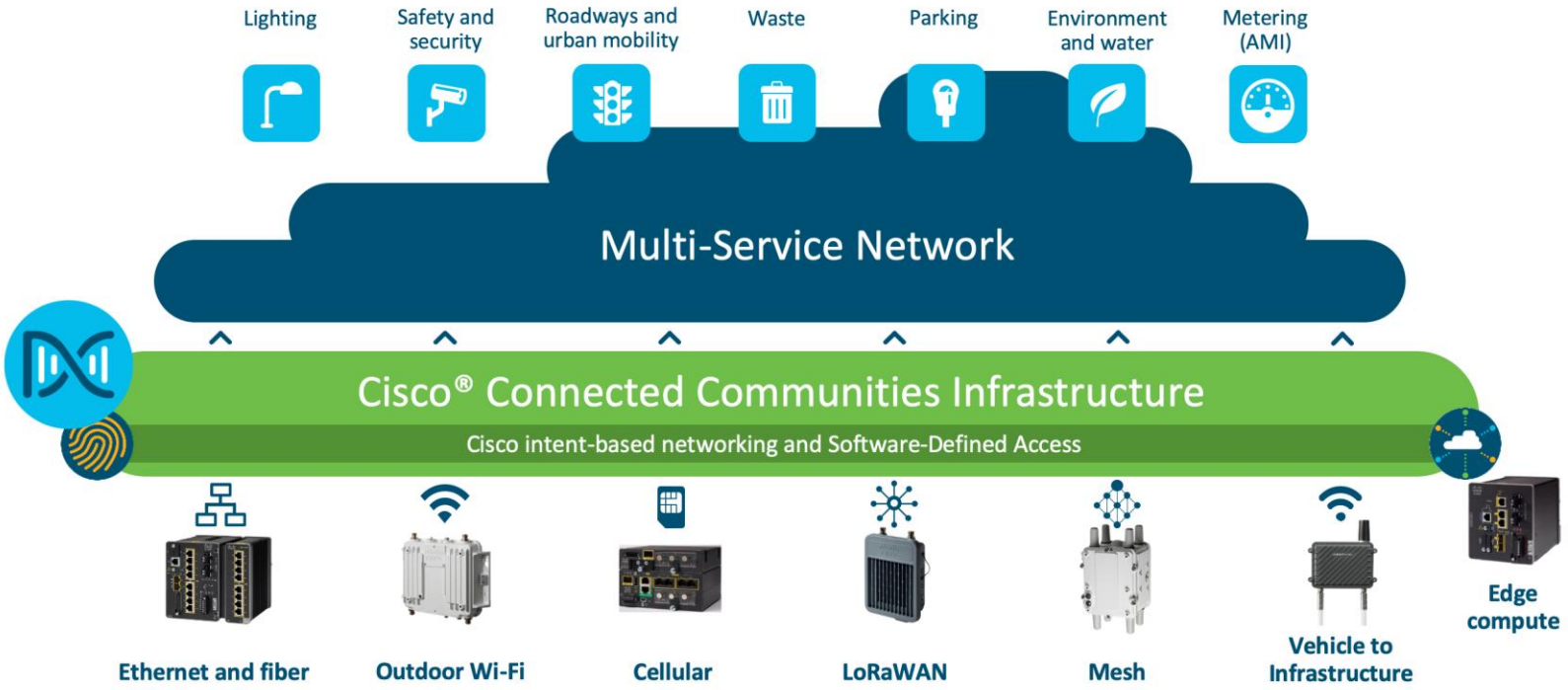
Cisco Connected Communities Infrastructure

A Cisco Intent-Based Network for Smart Cities and Connected Roadways



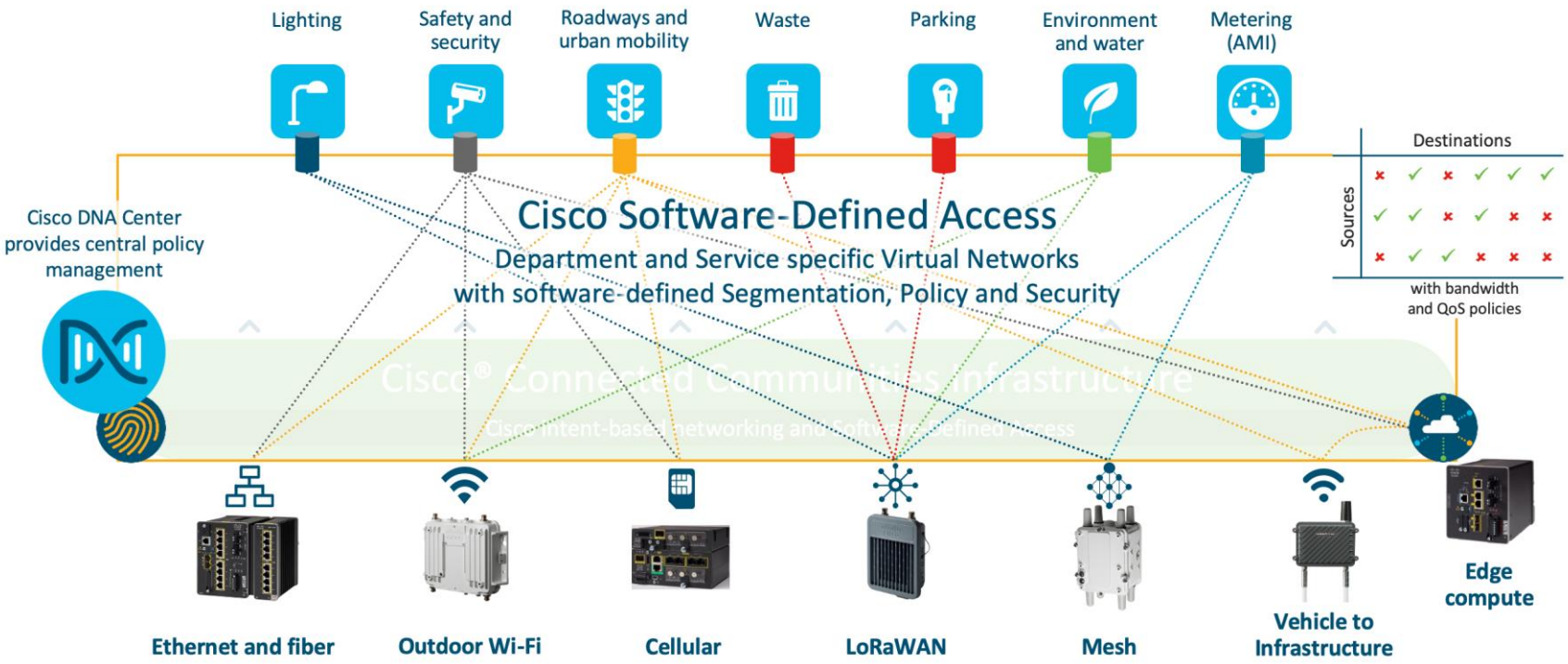
Virtual Networks and Segmentation

with Cisco Software-Defined Access



Virtual Networks and Segmentation

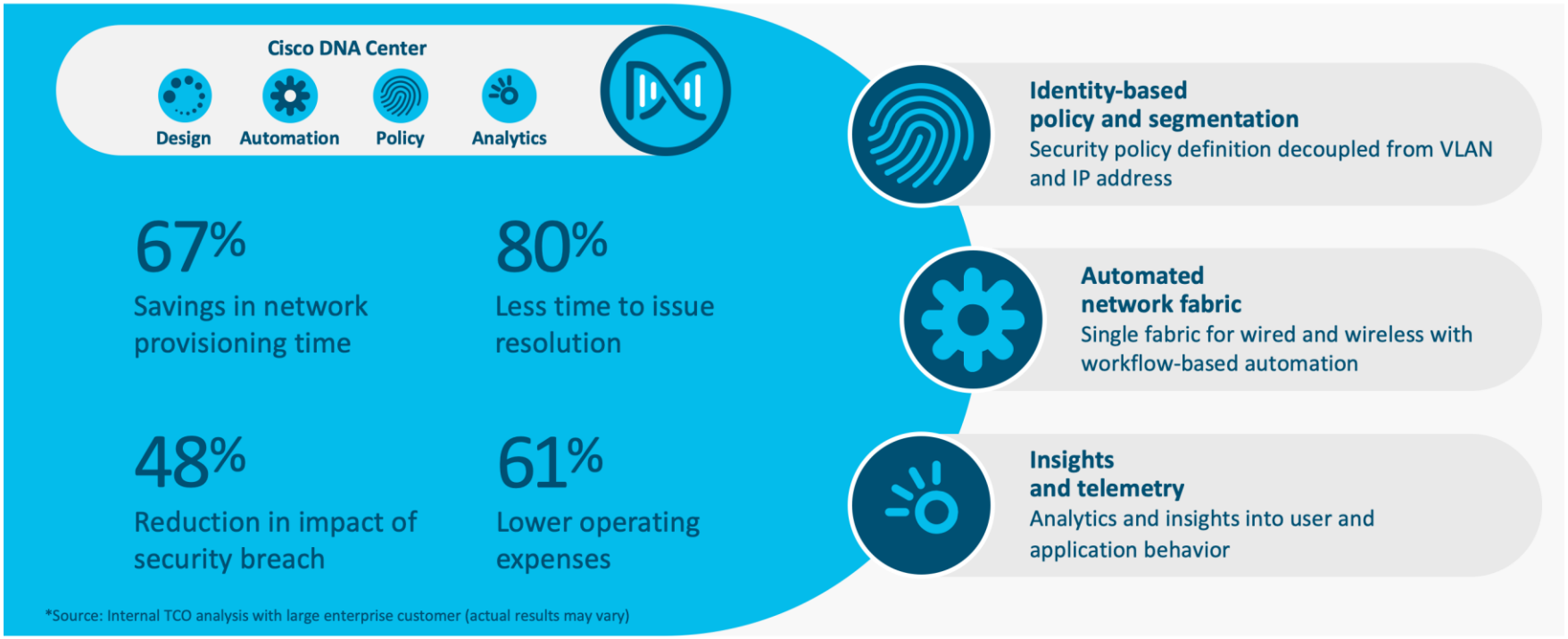
with Cisco Software-Defined Access



Benefits

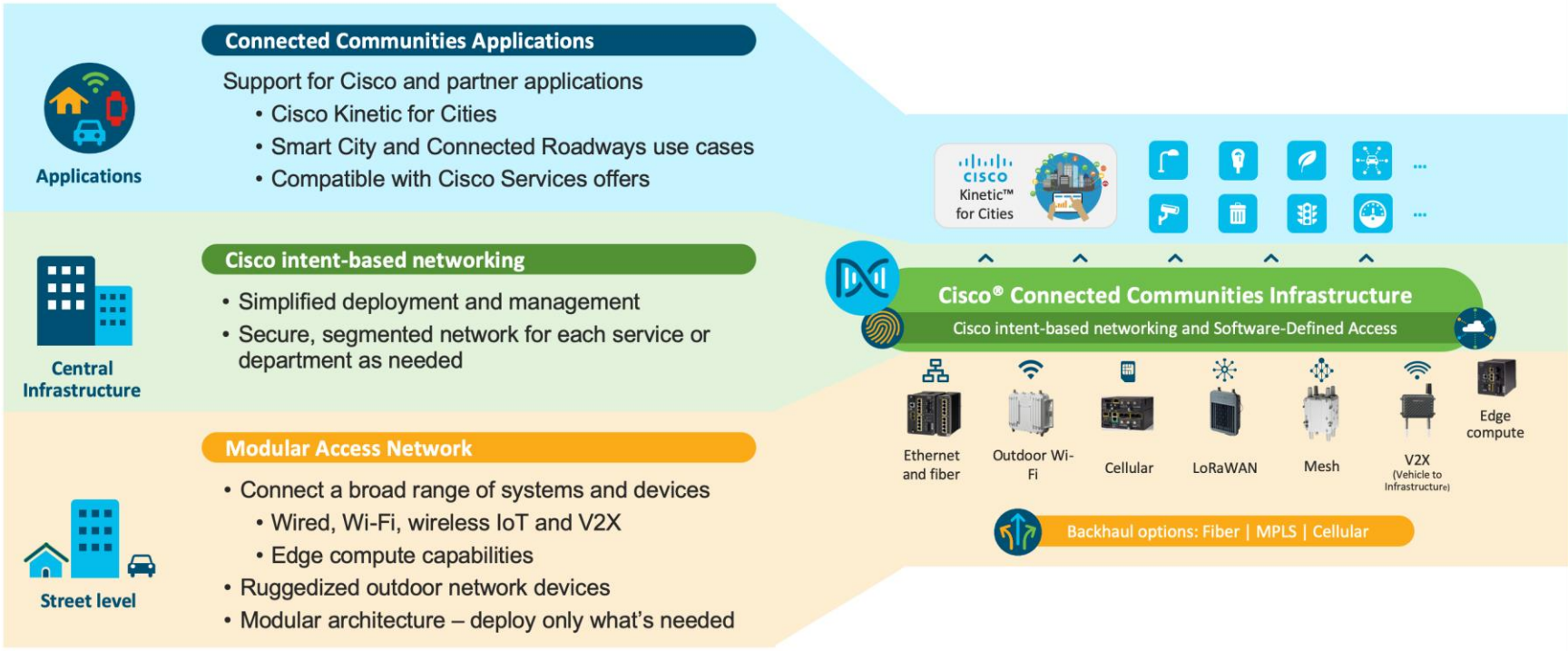
Cisco Software-Defined Access benefits

Networking at the speed of software

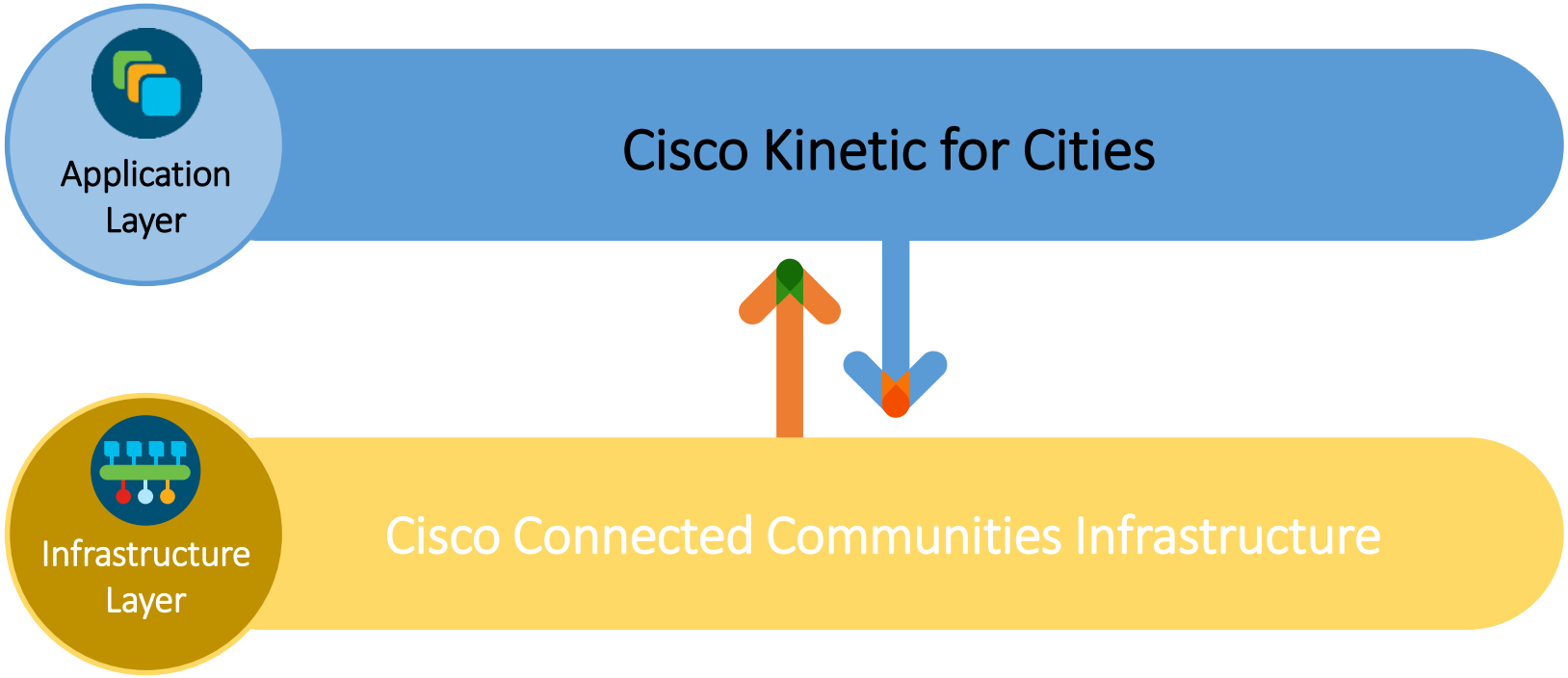


*Source: Internal TCO analysis with large enterprise customer (actual results may vary)

Connected Communities Infrastructure



Cisco's Approach for Data Integration



Cisco's Approach for Data Integration

Data From Any Device

- Connect with any technology
- Aggregate and normalize data across multiple sensors
- Provide a digital model for the city

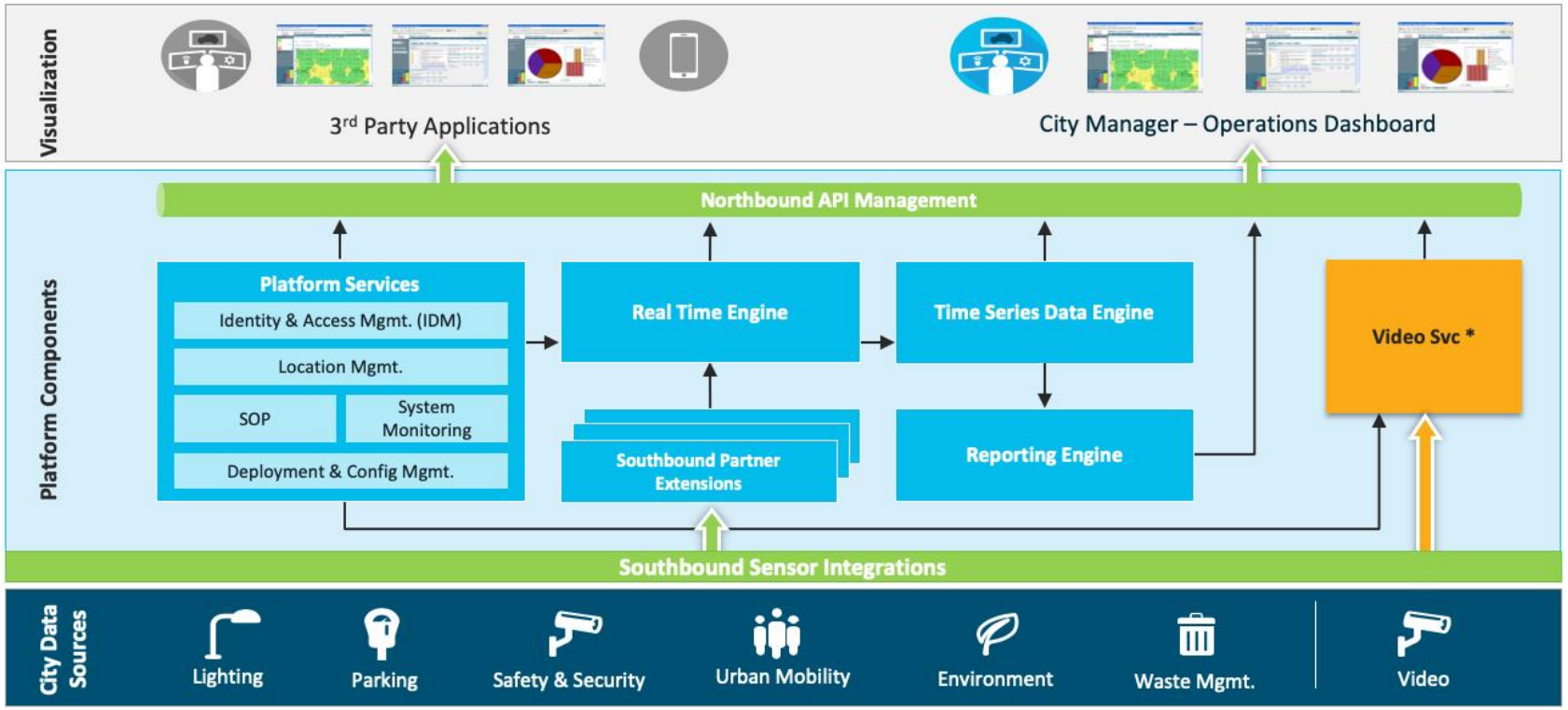
Cross-Domain Information

- Enable cross-domain contextual control (i.e., With outdoor lighting & crime)
- Process automation through policies

Open Ecosystem

- Expose APIs for local and global ISVs applications
- Secure key management and Role-Based Access Control

Cisco's Approach for Data Integration



Example Kinetic Front End