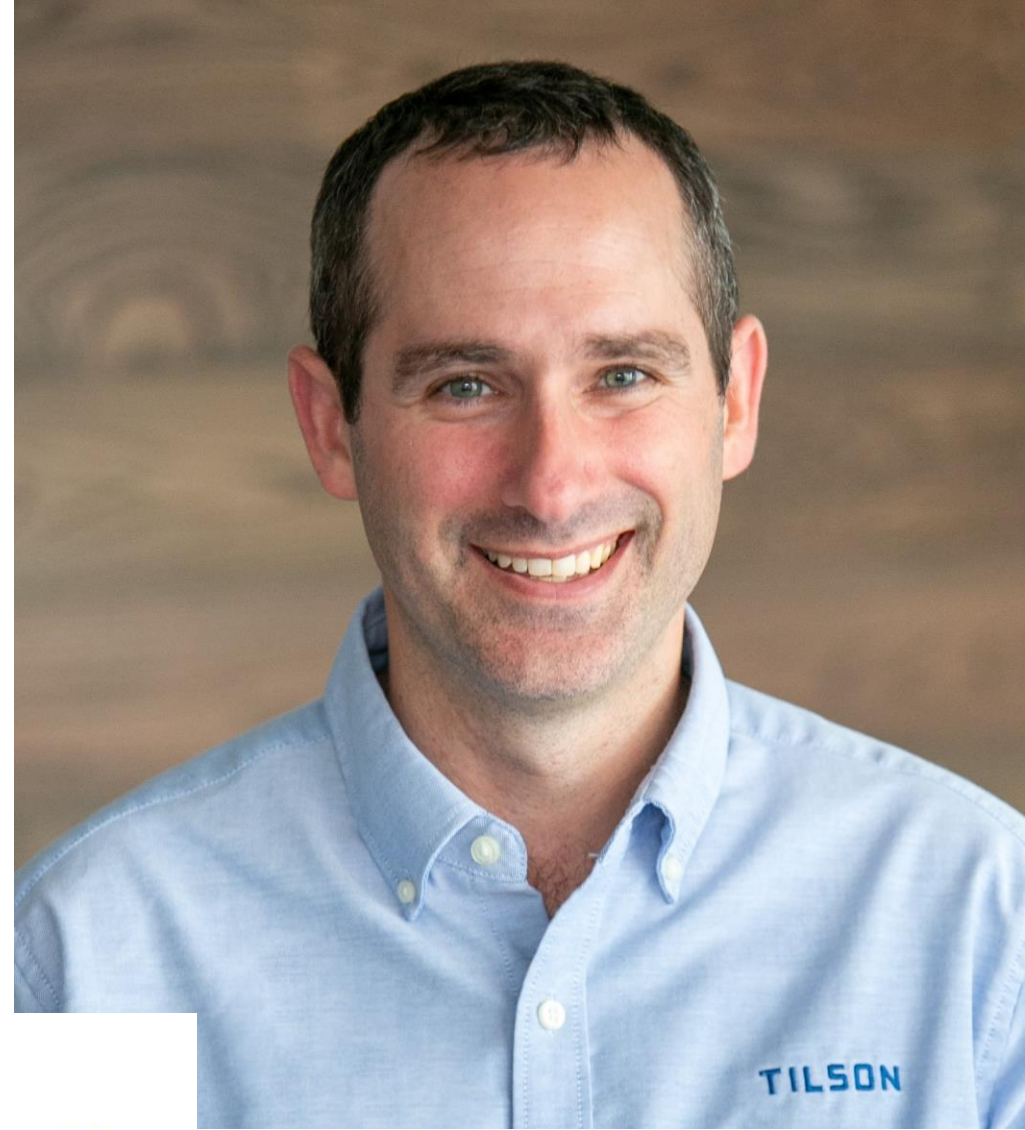




Path to 5G

—
Kurt Jacobs – kjacobs@jmawireless.com





TILSON

Daryl Sullivan
Sr, Director
Hitachi Social Innovations



Brad Baumann, VP, Gabes





CORAL GABLES

THE CITY BEAUTIFUL
A World Class City with a Hometown Feel

SMART DISTRICT PROJECTS

STRATEGIC PLANNING – INNOVATION CONTINUOUS IMPROVEMENT CUSTOMER SERVICE – QUALITY OF LIFE

SMART CITY ECOSYSTEM COLLABORATION, PARTNERSHIP, INTELLIGENCE / CUSTOMERS, STAKEHOLDERS AND TECHNOLOGY



SMART CITY HUB VALUE, TRANSPARENCY, OPEN DATA AND ANALYTICS, ACTIONABLE INFORMATION, EFFICIENCIES CITIZEN ENGAGEMENT, MOBILITY, ACCESSIBILITY, INCLUSION, CROWDSOURCING, COLLABORATION

DATA MARKETPLACE OPEN DATA PORTALS 	APP STORE 	TRANSPARENCY PORTALS 	CRIME INTELLIGENCE CENTER
IoT DASHBOARDS 	ENTERPRISE SYSTEMS - eGOV 	CITIZEN ENGAGEMENT 	
GIS PORTALS 			

DATA PLATFORMS DATA AGGREGATION, INTEGRATION AND CORRELATION / BUSINESS INTELLIGENCE AND ANALYTICS BACKEND

PUBLIC & PRIVATE CLOUDS & DATACENTERS 	BIG DATA-AGGREGATION & ANALYTICS 	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING 	VIDEO ANALYTICS 	OPEN DATA & APIS 	HORIZONTAL & VERTICAL INTEGRATION
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INTERNET OF THINGS REAL-TIME URBAN AND ENVIRONMENTAL VISIBILITY / PHYSICAL INTERFACING

SMART LIGHTS 	TRAFFIC & PARKING SENSORS 	PUBLIC SAFETY SMART EQUIPMENT 	ENVIRONMENTAL SENSORS & ACTUATORS 	SMART DEVICES 	SMART KIOSKS & DIGITAL SIGNAGE 	ROBOTICS & SMART VEHICLES
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HIGH SPEED COMMUNICATIONS AND RESILIENCE ROBUST, RESILIENT SMART CITY NETWORK FOUNDATION

RESILIENT NETWORK IEEE WINNER OF THE 	FIBER OPTICS 	WIRELESS BACKBONE 	METROPOLITAN ETHERNET 	PUBLIC & PRIVATE WI-FI NETWORKS 	SATELLITE & CELLULAR COMMUNICATIONS 	SMART ENERGY RESILIENCE
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DenseNetworks.com



Visit the City of Coral Gables website: www.CoralGables.com
 More information: visit www.coralgables.com/IT and www.coralgables.com/SmartCity
 Coral Gables City Hall • 405 Biltmore Way, Coral Gables FL 33134 • 305-446-6800

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 follow us on [Twitter: @CityCoralGables](https://twitter.com/CityCoralGables)

Hitachi Video Analytics Delivers Digital Insights

NEXT
2018

Operational & Business Intelligence



People Counter



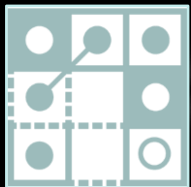
Traffic Analyzer



Queue Detector



License Plate Recognizer



Activity Visualizer



Parking Space Analyzer



Direction Controller



Camera Health Monitor

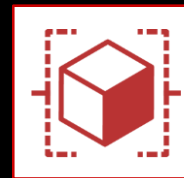
Security



Intrusion Detector



Facial Recognition



Object Detector



Video Enhancer

Privacy



Privacy Protector



European Privacy Seal
EP-P-F9LDTM / Valid till 2017-10

Police • Hospitals • Campuses • City Agencies • Retail • Financial Services • Transportation • Utilities

Data-Driven Operations and Safety Optimization



Curbside Management



Object Left Behind

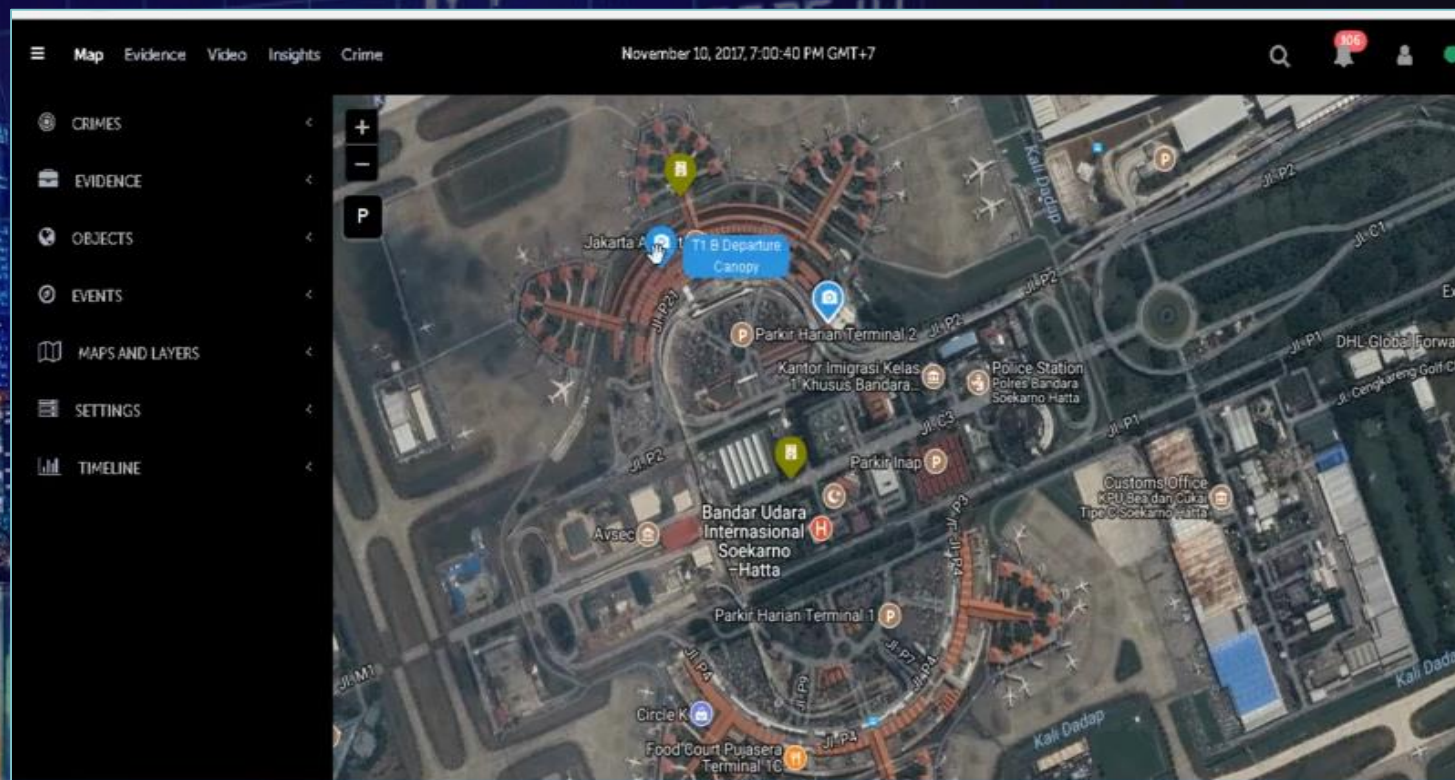


Cart and Vehicle Inventory



Passenger, Parking and Ops Analytics

+10 minutes to wait time
= 30% reduction in retail spend



Integrated Visualization – Augmented Video and IoT Insights

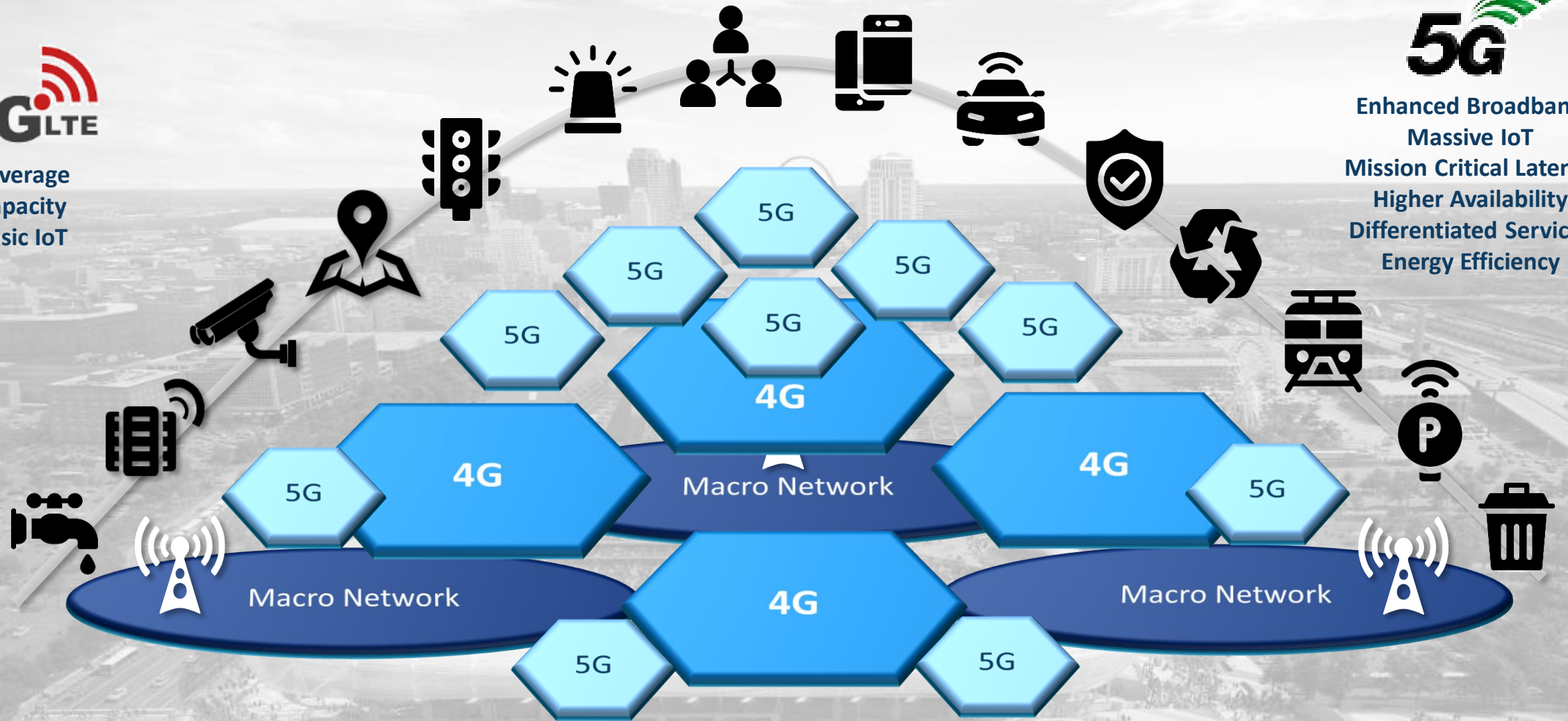
Smart City Network Densification

4G LTE

Coverage
Capacity
Basic IoT

5G

Enhanced Broadband
Massive IoT
Mission Critical Latency
Higher Availability
Differentiated Services
Energy Efficiency

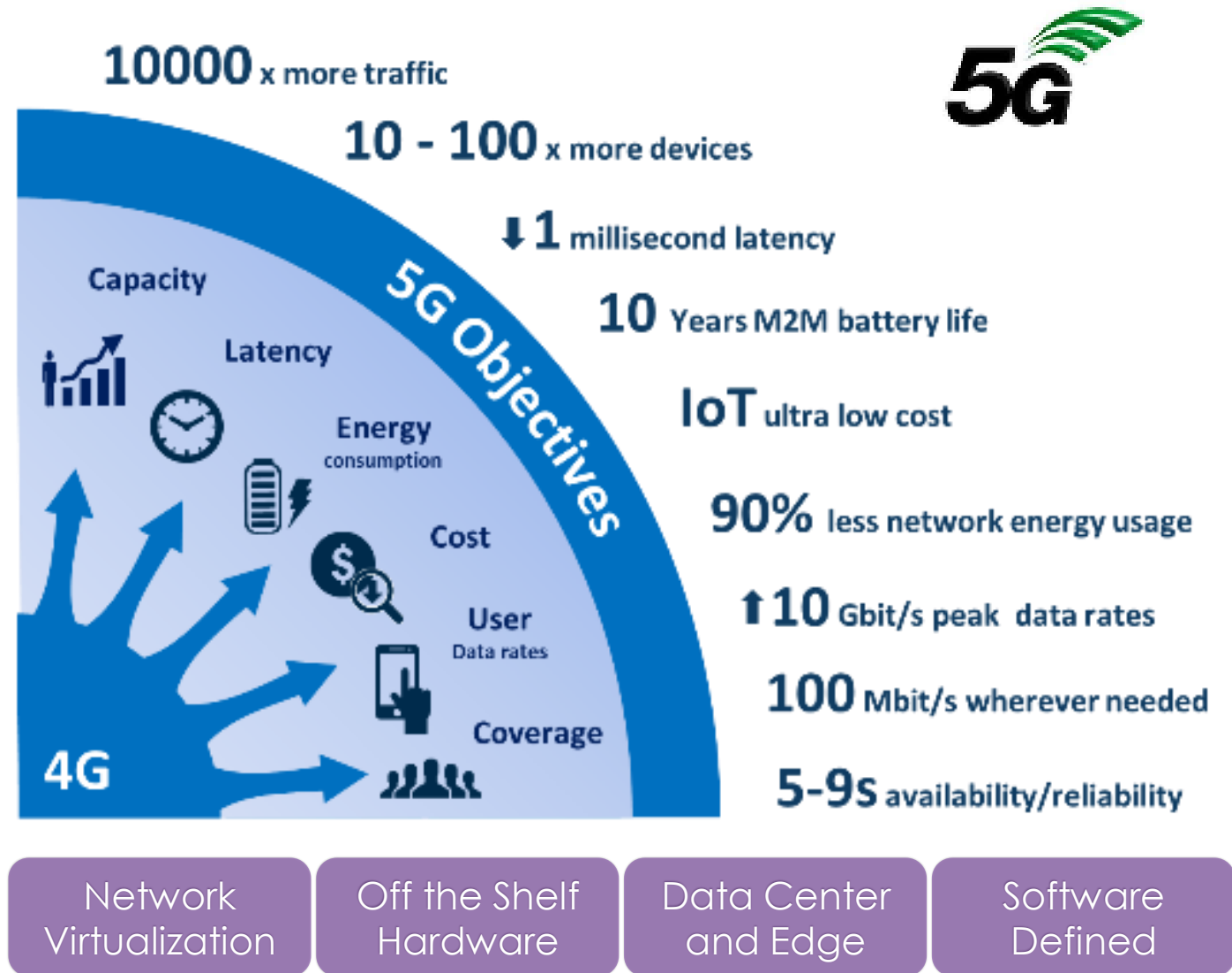




5G Objectives

- User vs. Edge vs. Core
- Not just about speed and scale
 - Energy/Power
 - Availability/Reliability
 - Cost
 - Ease of Deployment
- Different users will value different objectives
- Builds on 4G infrastructure

- Other technology and business shifts are concurrently happening



Capacity

Coverage



Bandwidth

ENTER

[click here for more information](#)

5G Technology Basket

“Its all good but you don't have to eat everything!”



5G

Spectrum: Expanded, Shared, Dynamic, mmWave

Topology: Distributed, User & Control Separation

Antennas: Massive MIMO, Beam Forming

Edge Computing: Applications, APIs

Security: Authentication, Privacy

Radio: New Radio (NR), Software, Micro Cells

IoT: Low Power, Low Latency, NB-IoT, CAT-M

Network: Slicing, Virtualization, SDN, SON, COTS

Interoperability: Path from 4G (NSA), Coexist with 4G (SA)



Small Cells

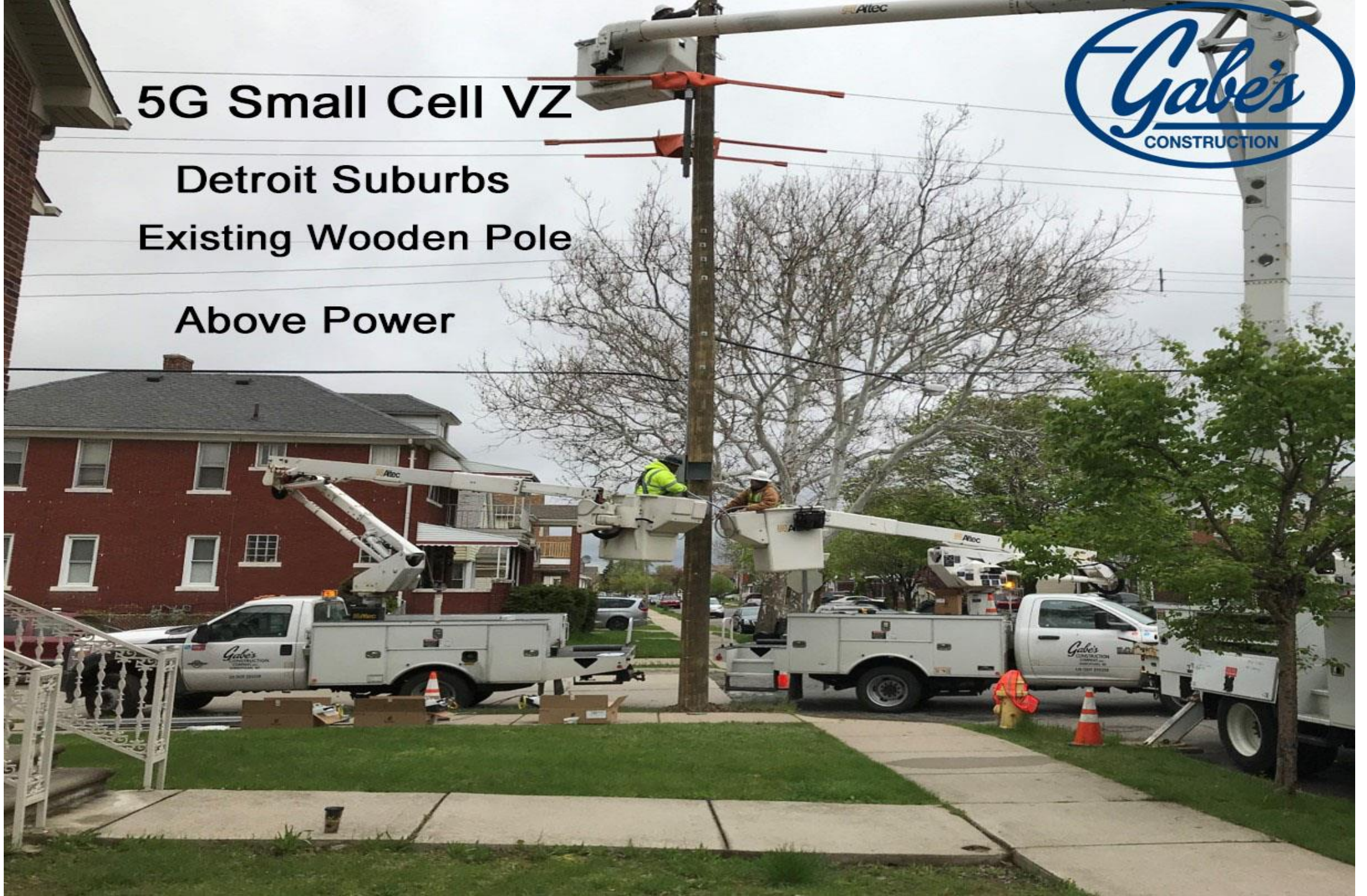


5G Small Cell VZ

Detroit Suburbs

Existing Wooden Pole

Above Power



5G Deployment 28 GHz mmWave

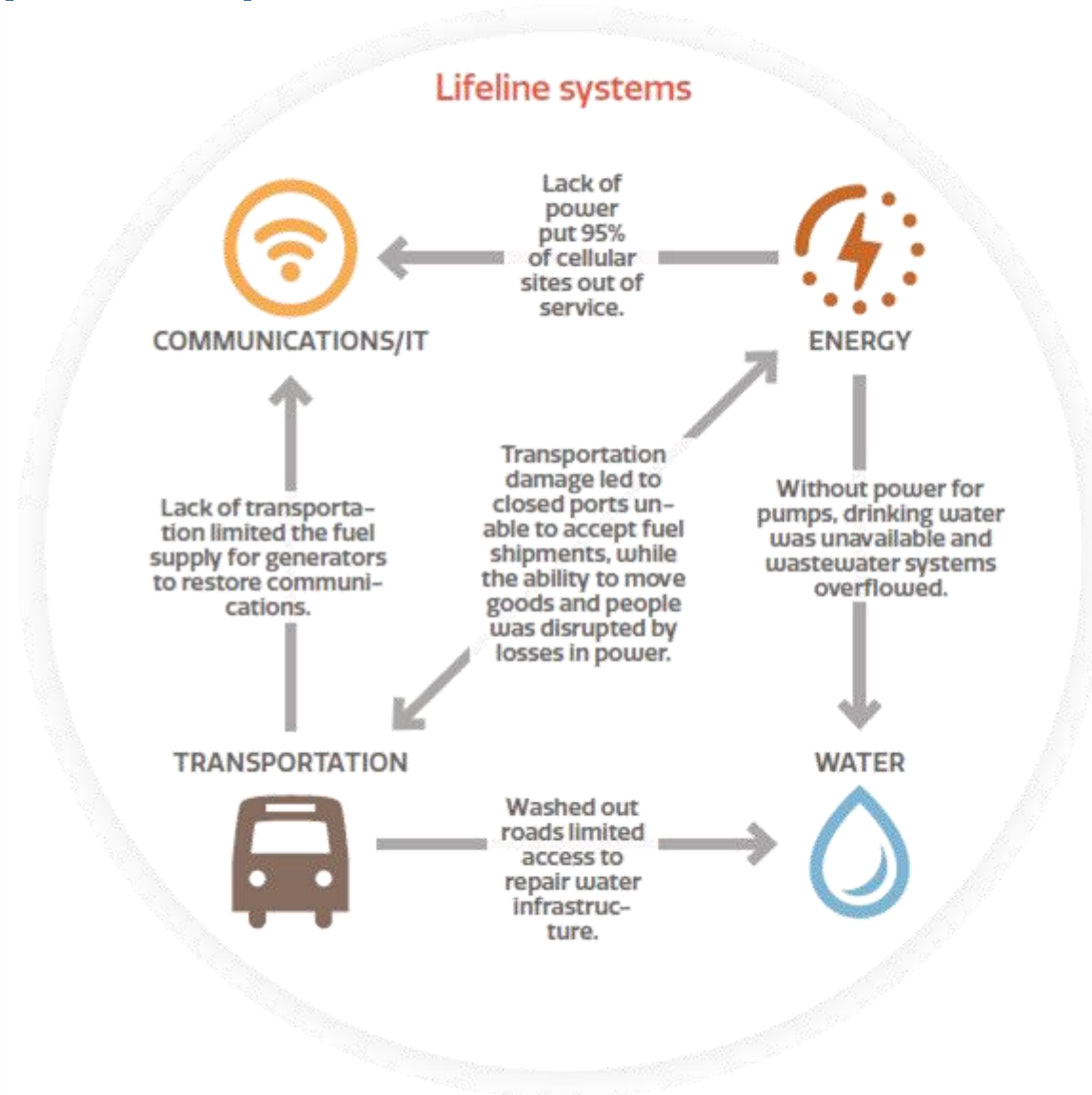
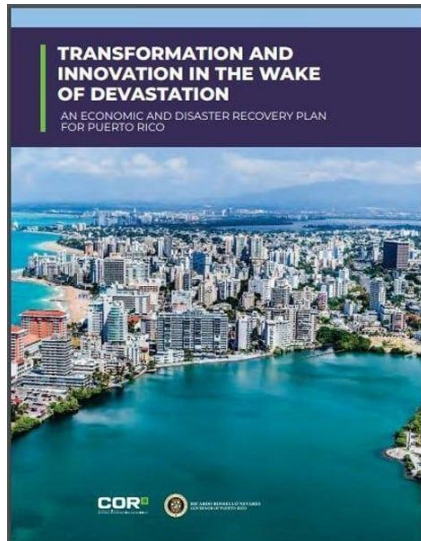
University of Michigan

Rooftop

Non Penetrating Sleds



Connectivity Dependence – 4G World



And without those lifeline systems:



Many healthcare facilities were not open, and people were unable to travel to those that were.



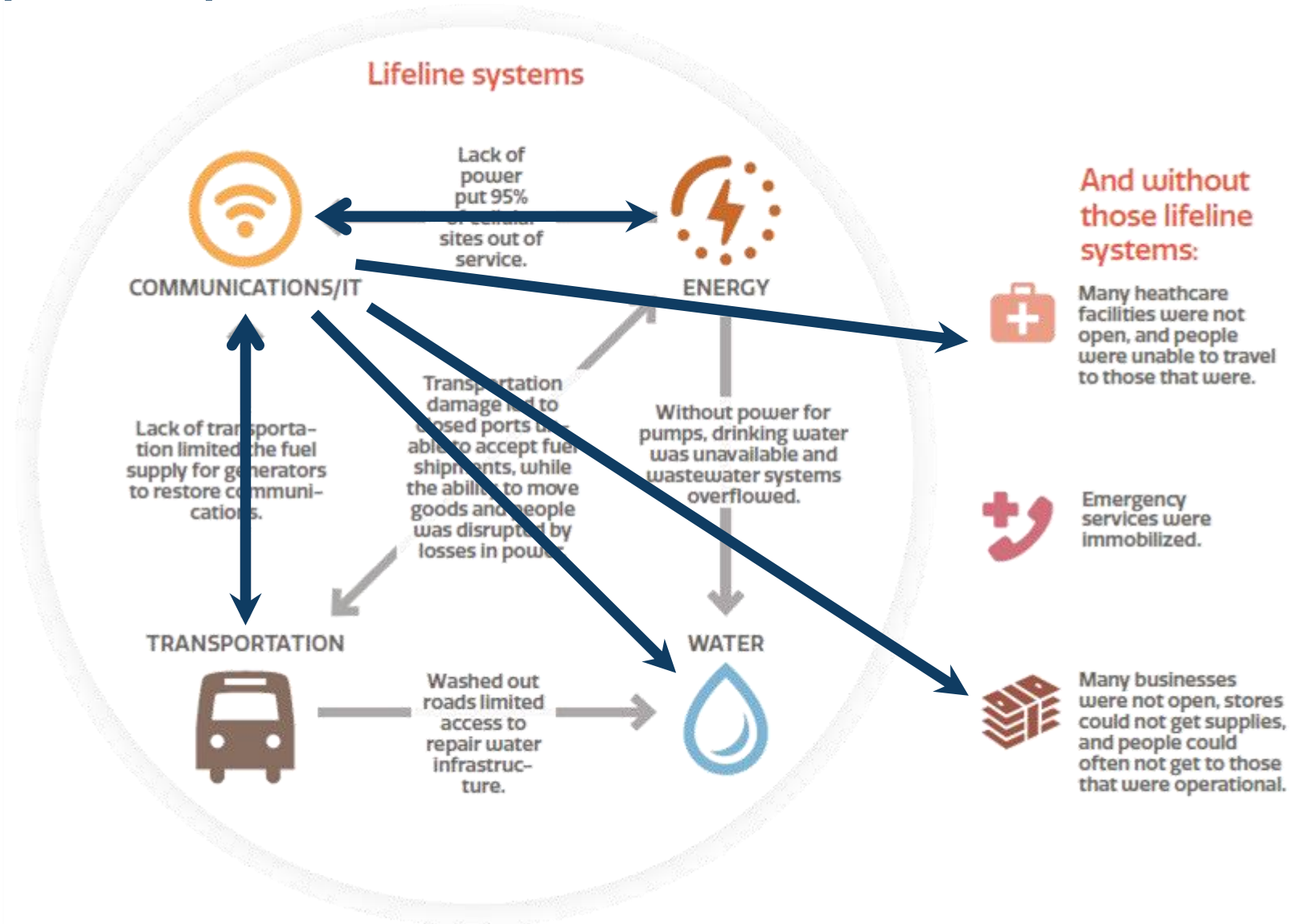
Emergency services were immobilized.

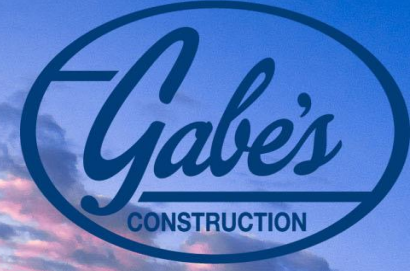


Many businesses were not open, stores could not get supplies, and people could often not get to those that were operational.

Connectivity Dependence – 5G World

- Smart Grid
- Smart Health
- Smart Enterprise
- Smart Water
- Smart City
- Autonomous and Connected Vehicle





4G LTE

4G LTE

4G LTE

Electric Forest Music Festival

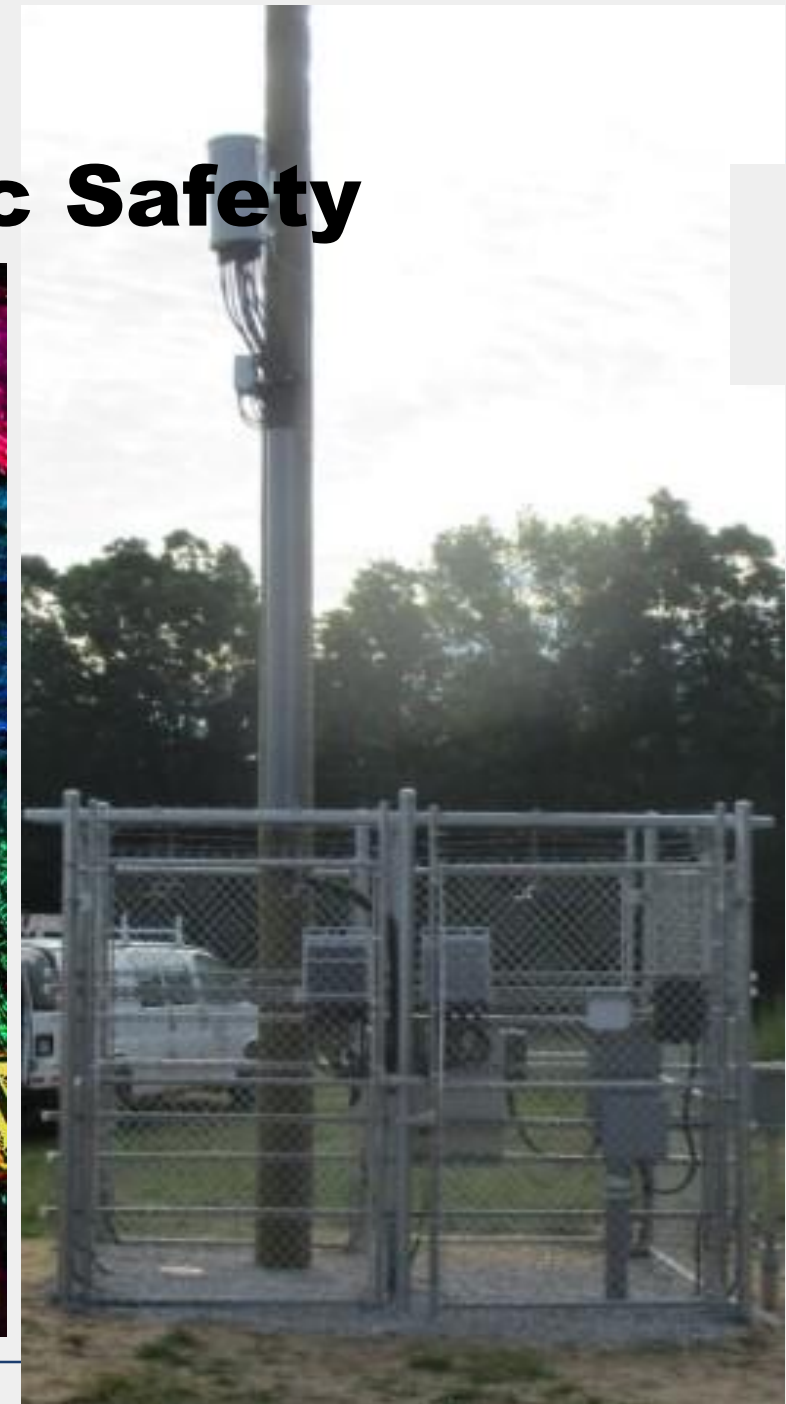
40,000 People

Densification

Capacity and Coverage



Remote Coverage/Capacity/Public Safety





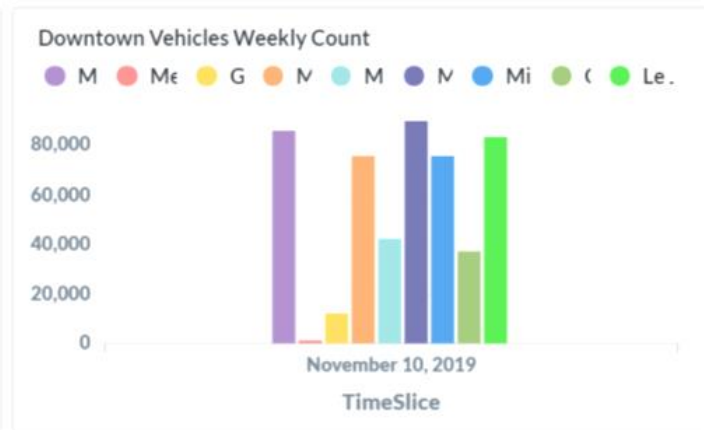
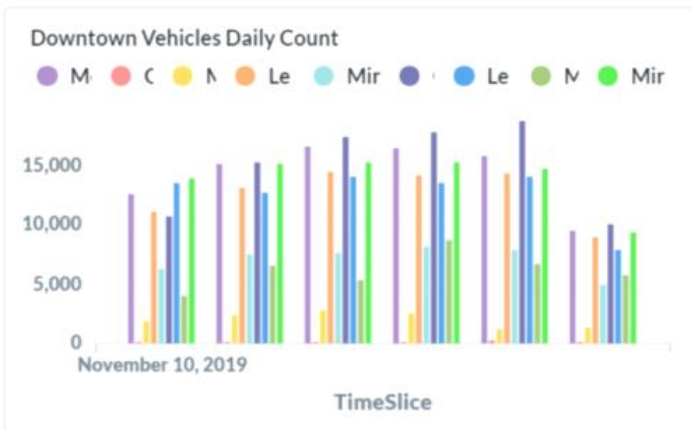
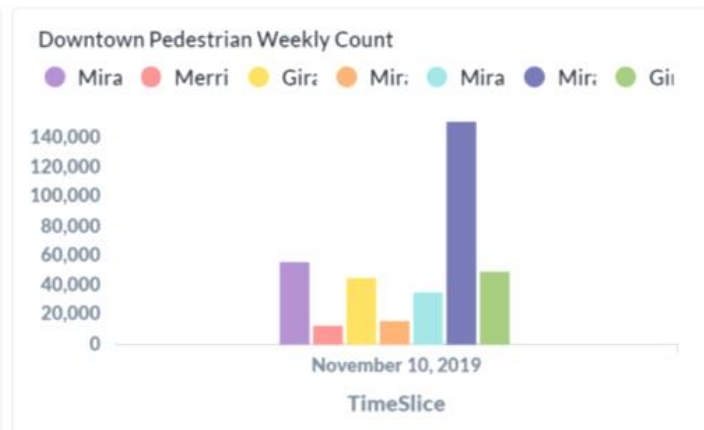
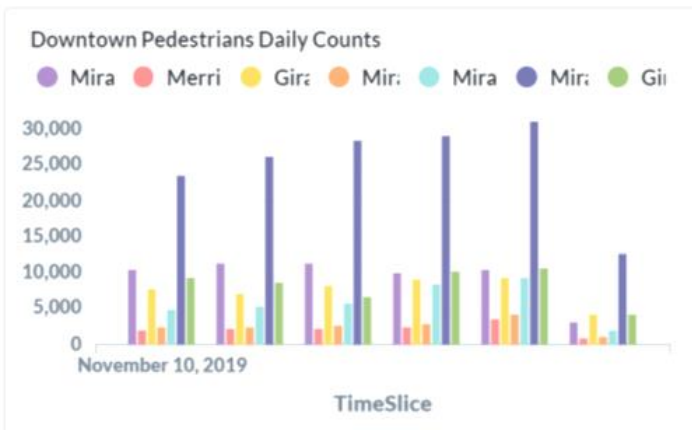
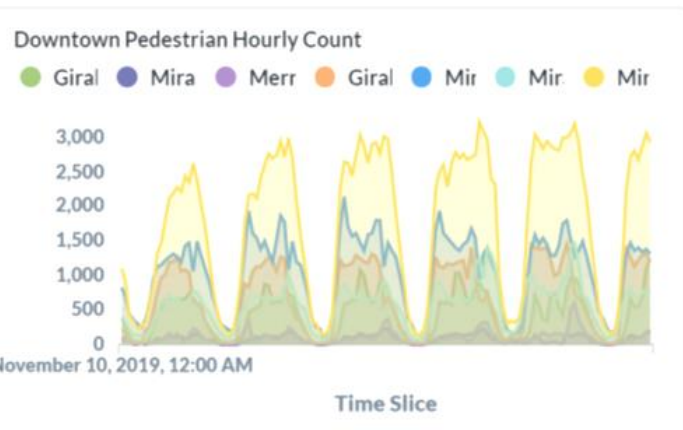
911 - What can go wrong?



Downtown Gables IoT Sensors

Miracle Mile, Giralda Ave., Merrick Way, Ponce De Leon Blvd., Salzedo St., Le Jeune Rd., Douglas Rd.
Blocks and Intersections

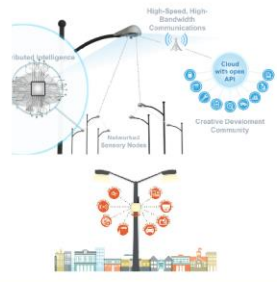
Coral Gables



INTERNET OF THINGS

REAL-TIME URBAN AND ENVIRONMENTAL VISIBILITY / PHYSICAL INTERFACING

SMART LIGHTS



TRAFFIC & PARKING SENSORS



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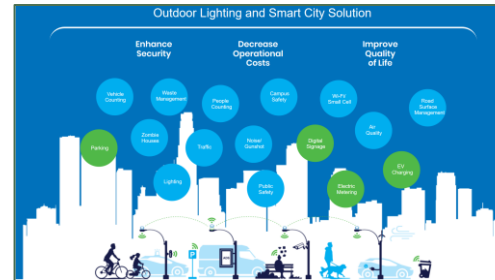
SMART KIOSKS & DIGITAL SIGNAGE



ROBOTICS & SMART VEHICLES



- ALPR, CCTV cameras and public safety smart devices
- Traffic sensors: pedestrians, vehicles, bicycles, visitors, RF
- Environmental sensors (waterways, air quality, noise)
- Smart Parking sensors (counting available/busy spots)
- Smart Lighting controllers & LoRa network
- Smart City Digital Kiosks; Smart Building SHM sensors
- Telemetry sensors and actuators; Fleet Management, etc.

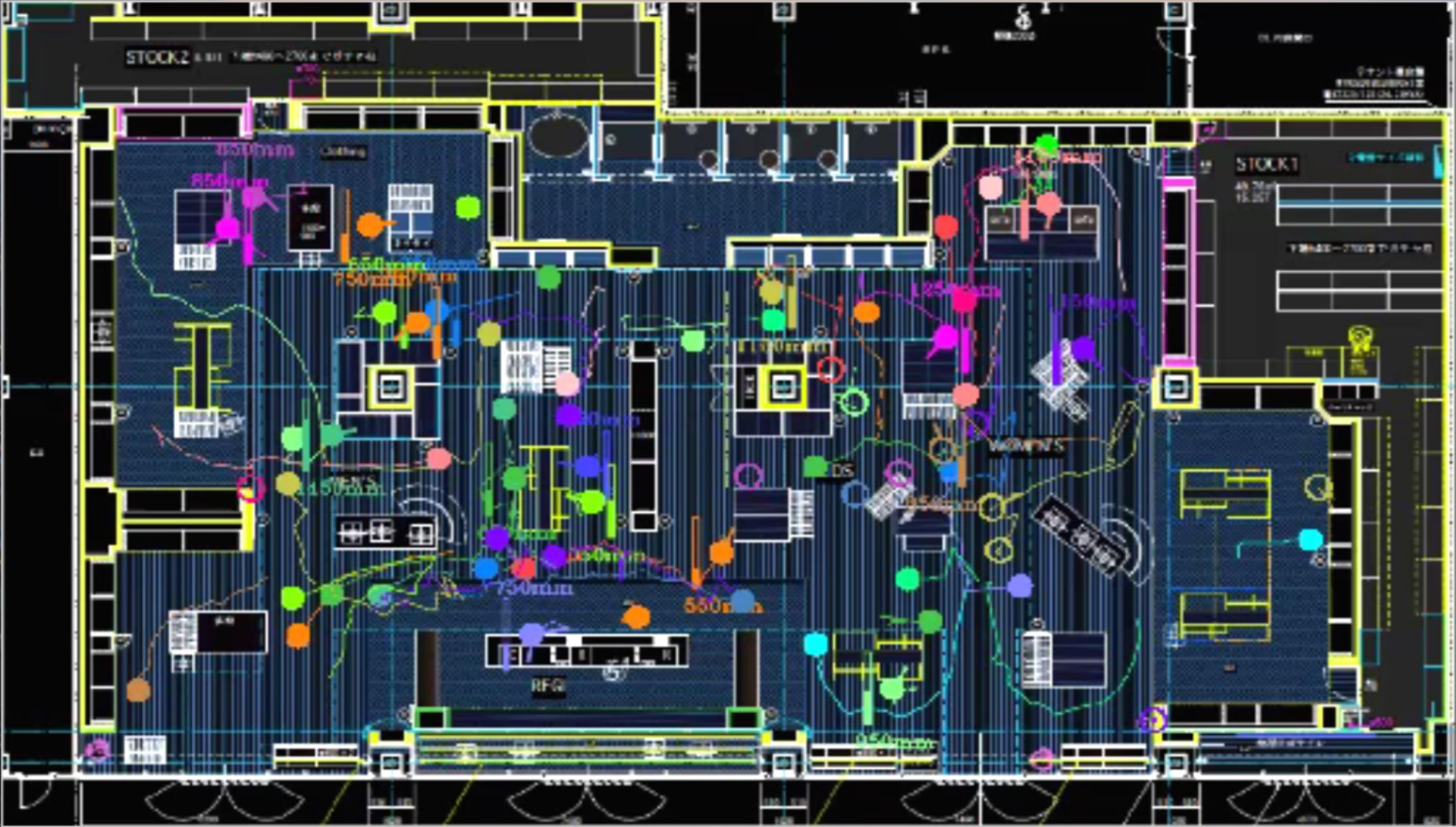


- IoT sensor data is strategic and becomes actionable information (traffic engineers, public safety officers, urban planners, city management, researchers, businesses, public in general)
- Open IoT data aggregated in the smart city hub and private IoT data is studied by researchers, marketing and city analysts and used by businesses, planners, public safety officials, traffic engineers, city officials and constituents that are part of the smart city ecosystem
- Constituents benefit from actionable sensor data with dashboards visualization and statistics by hour/day/week/month
- Used for urban planning and design, for traffic and civil engineering to design better and safer roads and infrastructure
- Used by businesses to design strategies (retail, service), grow sales, understand market and consumer needs.



SMART CITY HUB PUBLIC PLATFORM:
WWW.CORALGABLES.COM/SMARTCITY

3D Lidar Facility Movement and Journey Tracking



Privacy Protection: Generating Rich Insights Without Personally Identifiable Information (PII)

Video Privacy Protection:

- Detects people and pixelates or color-masks full body
- Additional analytics can analyze original images
- **Transparency:**
- Original feed can be accessed for investigations, requiring a keycard and passcode; actions are tracked for GDPR readiness

3D Lidar:

- No personally identifiable information (PII) is captured
- Can be used in privacy-sensitive locations
- Privacy protected by design



Hospitals • Schools • Cities • Retail • Financial Services • Transportation

Obstacles to Smart City Implementation

Feedback from city leaders in the US to identify key barriers.

1. Budget constraints

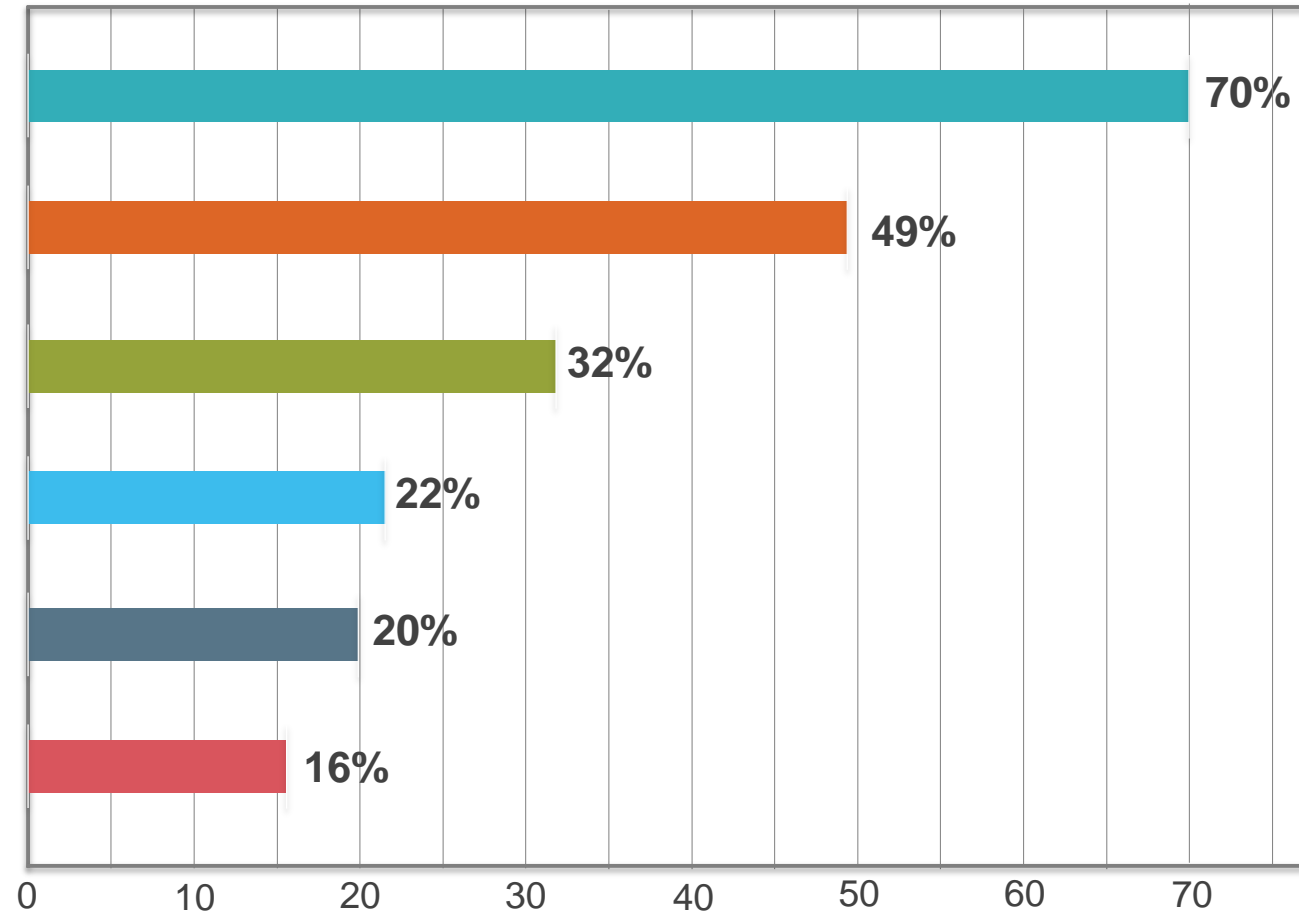
2. Lack of resources/ expertise

3. Policy hurdles – Legislation

4. Ownership across departments

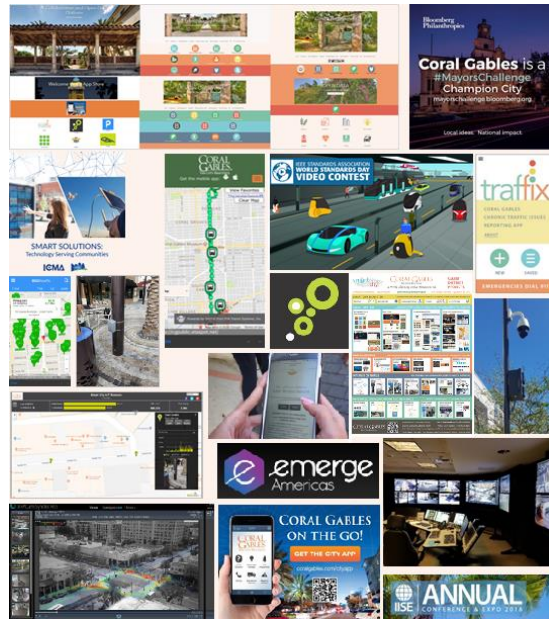
5. Gaining stakeholder support

6. Short-term mindset



CITY OF CORAL GABLES INFORMATION TECHNOLOGY DEPARTMENT SMART CITY CASE STUDIES, COLLABORATION AND SUCCESS STORIES LEVERAGING STANDARDS AND BEST PRACTICES

Citizen Engagement, Outreach and Communication
SHARE → LEARN → PARTNER → COLLABORATE
Add Value, Improve Programs, Augment Capacity



VIDEO:



Smart City Collaboration:

- University of Miami:
 - Smart City Data Analytics
 - Coral Gables Smart City Solutions Competition
 - Smart Microgrid
 - Civic Engagement & GIS
 - Crime Analysis
- Florida International University:
 - Cyberinfrastructure, Policy & Training
 - Waterway IoT
 - Virtual Libraries
- Bloomberg Philanthropies

Smart City Case Studies:

- ICMA
- IEEE
- IISE
- NLC
- Smart & Resilient, ETSI, StateTech, etc.
- ASQ, QP, ITEA

Other Collaboration:

- NIST smart cities federal program and Global City Teams Challenge - Superclusters
- State, Counties, Cities, Military
- NLC, FLC, eRepublic/GovTech, SCC
- Trade and Business Orgs, CTIA, IOTC

