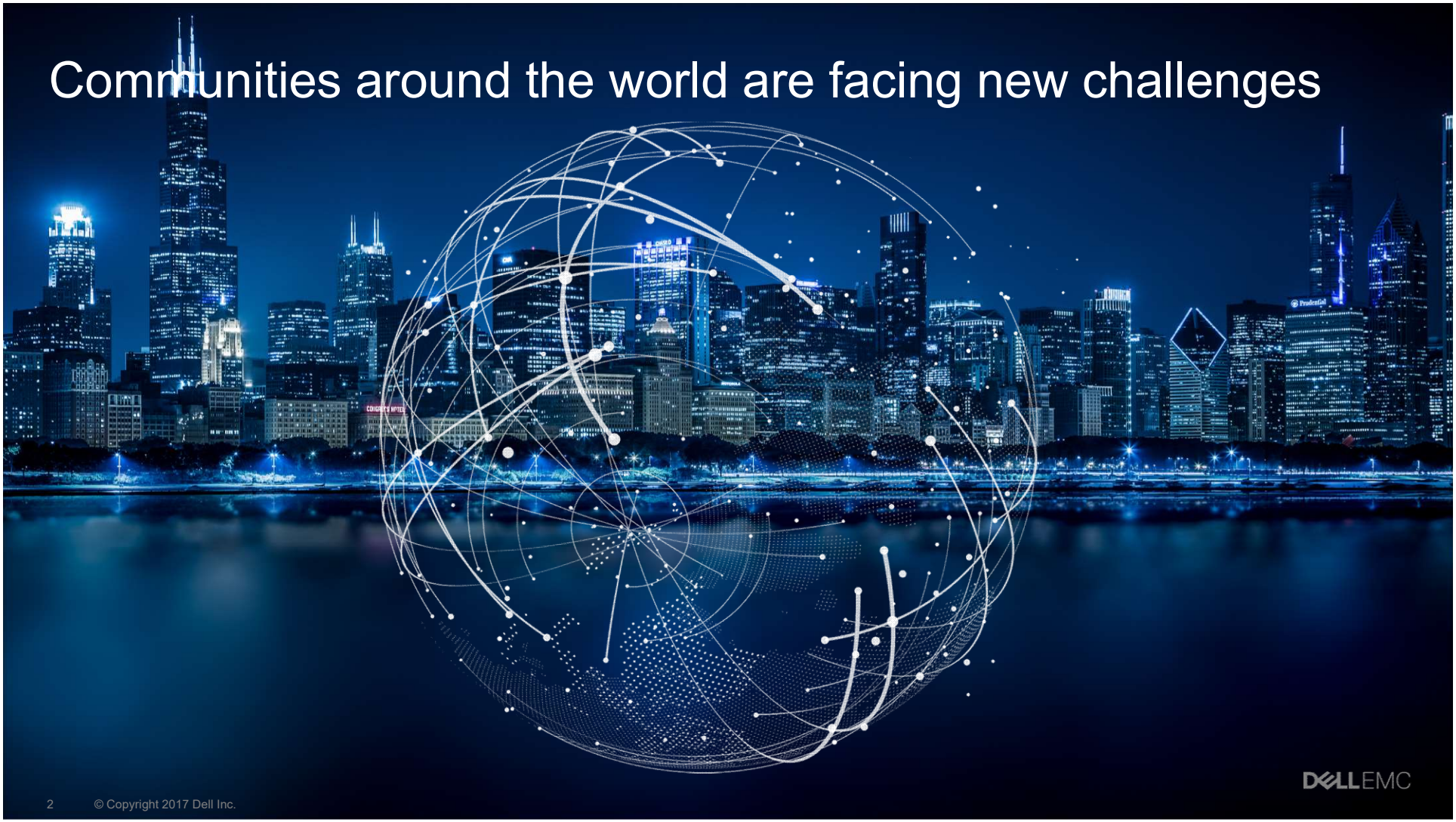
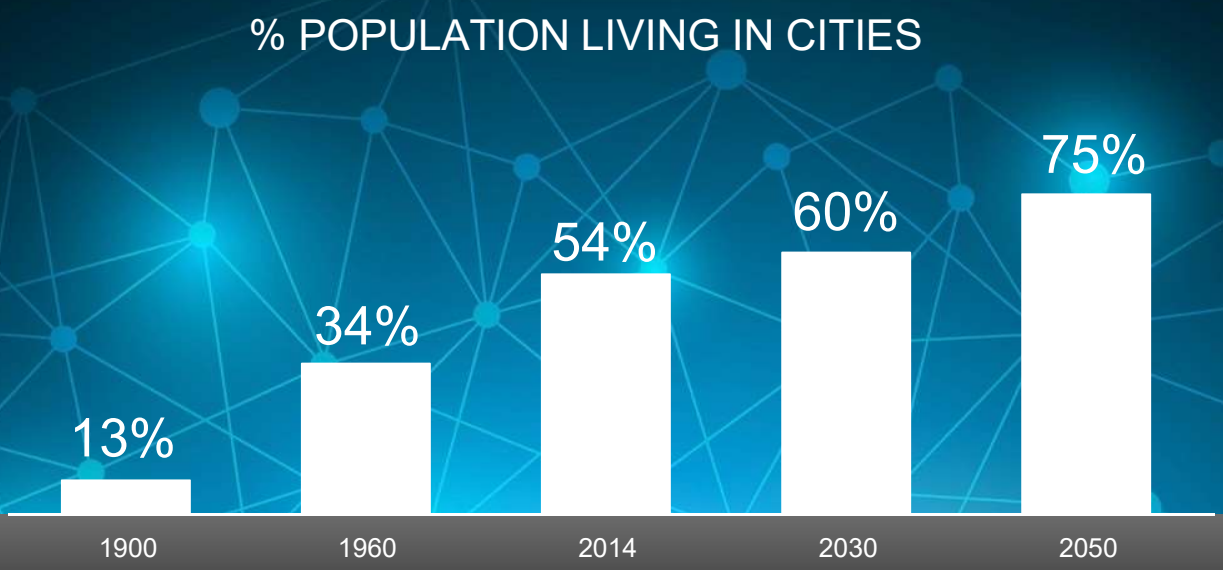

Digital Communities:
The Dell Technologies
Unique Approach
Rob Silverberg
CTO, Digital Communities
DELL
DELL EMC
Pivotal
RSA
Secureworks
virtustream
vmware
Boomi
DELL Technologies

Communities around the world are facing new challenges



Accelerated urbanization



Accelerated urbanization amidst more challenges

AGING, UNPLANNED INFRASTRUCTURE

ENVIRONMENT SUSTAINABILITY

UNPRECEDENTED URBANIZATION

DECLINING PUBLIC BUDGETS

Cities can change the world with technology

Drive economic, environmental and social benefits

Become an innovative digitally transformed community, business and individual

EFFICIENT

Optimized use of resources:

People

Businesses

Environment

SAFE

Anticipate risks & protect people & information:

Everyone must trust the system

ENRICHING

Integrated daily life services:

Blending many facets of work & life to improve quality of life

FOR ALL

Enriched life & business experiences for every citizen:

All must benefit

No favorites

Imagine a world where cities

Optimize traffic flows in real-time

The city of Bellevue installed adaptive traffic lights and saved drivers **$9 million** annually by reducing traffic times more than **36%** during peak traffic times.

Reduce energy consumption

Eight Spanish cities reduced their electricity consumption by **64%** and saved over **4,300 tonnes** of C02 in 2014, thanks to efficient street lighting systems and technologies that both cut costs and benefit the environment.

Use predictive policing

The Los Angeles Police Department used Predictive Policing to reduce crime rates and save more than **$9 million** a year.

Improve city functions

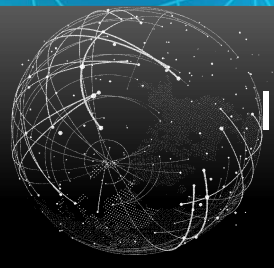
New York city used predictive analytics to increase building inspector efficiency.. Without analytics, only 13% of inspections found dire conditions, but with analytics, more than **70%** of inspections resulted in a vacate order.

Detect a drop in air & water quality

Chicago's Array of Things is a city-wide sensor network that measures temperature, barometric pressure, carbon monoxide, nitrogen dioxide, sulfur dioxide, ozone, pedestrian and vehicle traffic, and surface temperature.

Automate Waste Management

Seoul used smart trash cans with real-time monitoring to cut waste collection costs by **83%** and increased the recycling diversion rate to **46%**



Interwoven in the fabric of our lives
Continuously adapting

Core value: leverage data insight to continuously improve service delivery

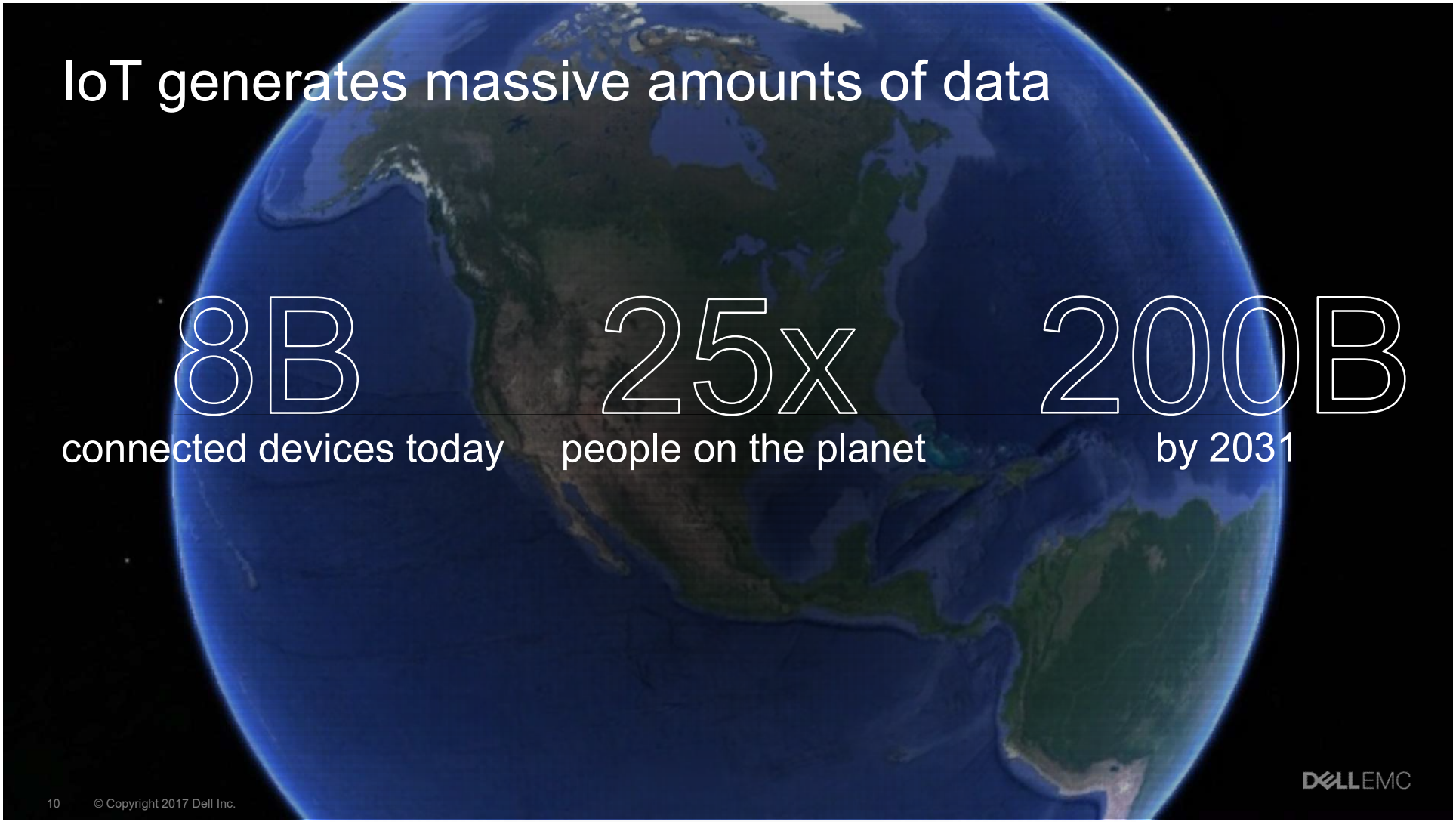
Deriving insight from data through analytics

Sharing insight across the ecosystem

Connecting data from all utilities and all services

Scalable, repeatable patterns

IoT generates massive amounts of data



8B
connected devices today

25x
people on the planet

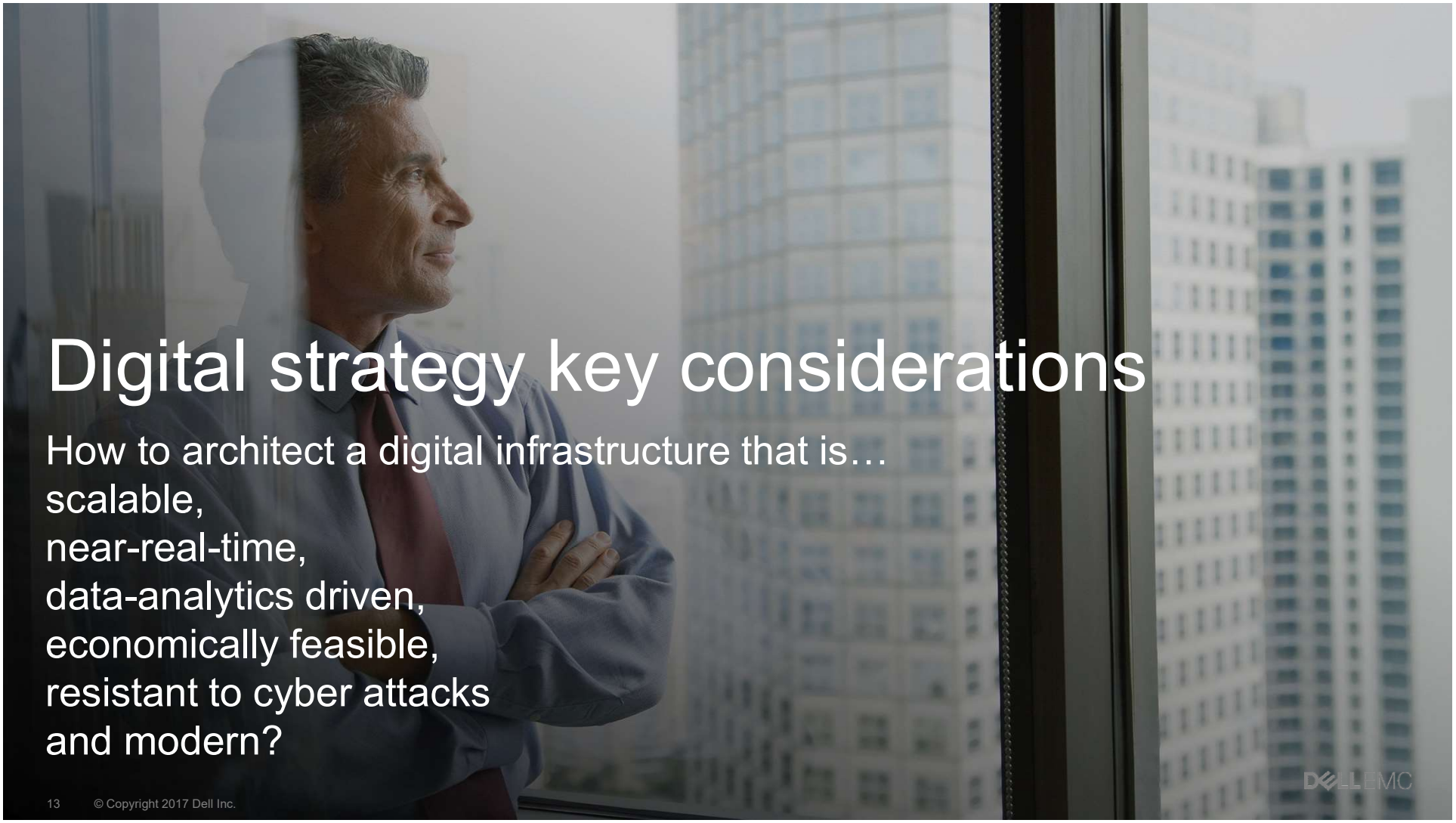
200B
by 2031

A citizen-centric view

Digital city services increase citizens overall quality of life.

The more usage of the digital city services, the higher the quality of life achieved

The effects of successful ICT-based smart city services: From citizens' perspectives
Hsiaoping Yeh, National Kaohsiung First University of Science and Technology, Taiwan

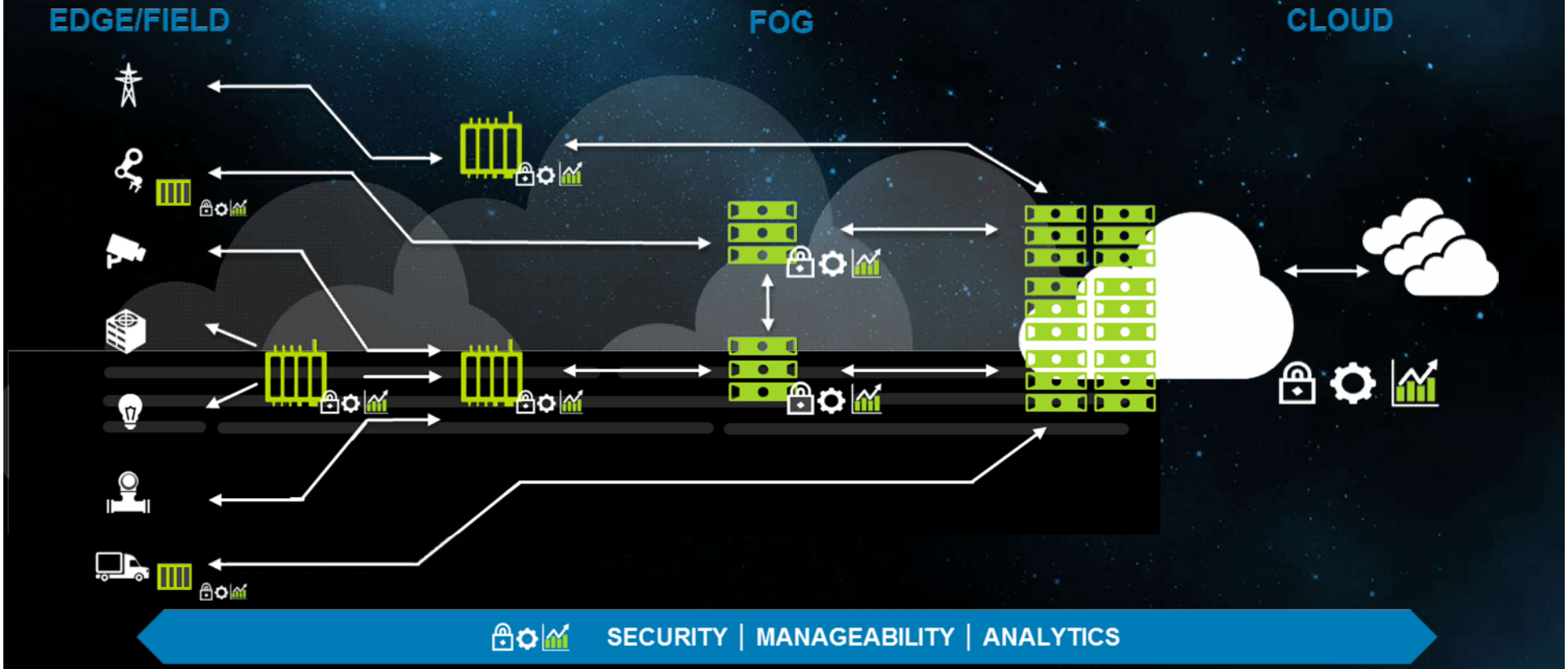


Digital strategy key considerations

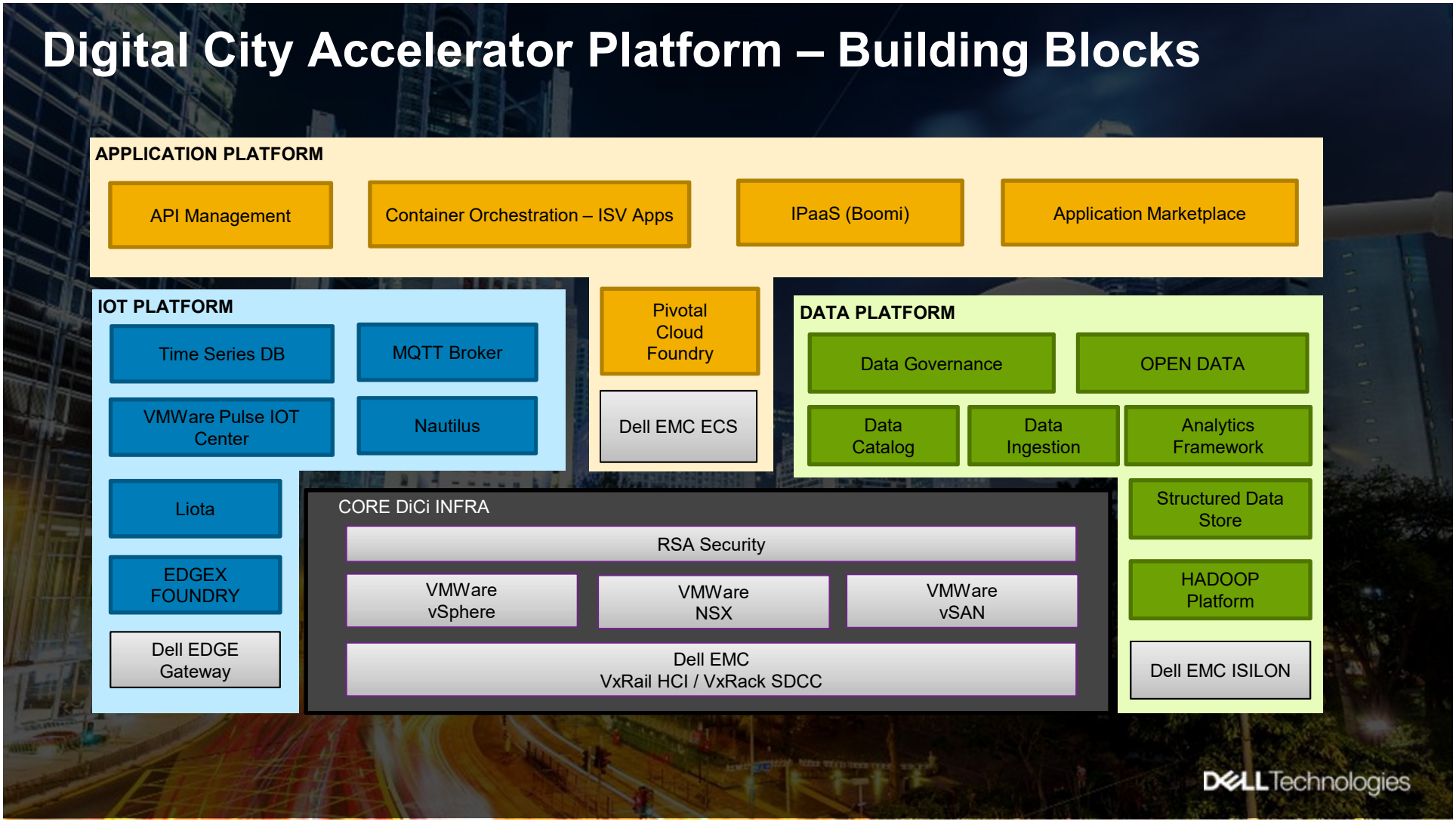
How to architect a digital infrastructure that is…
scalable,
near-real-time,
data-analytics driven,
economically feasible,
resistant to cyber attacks
and modern?

Technologies enabling distributed architectures

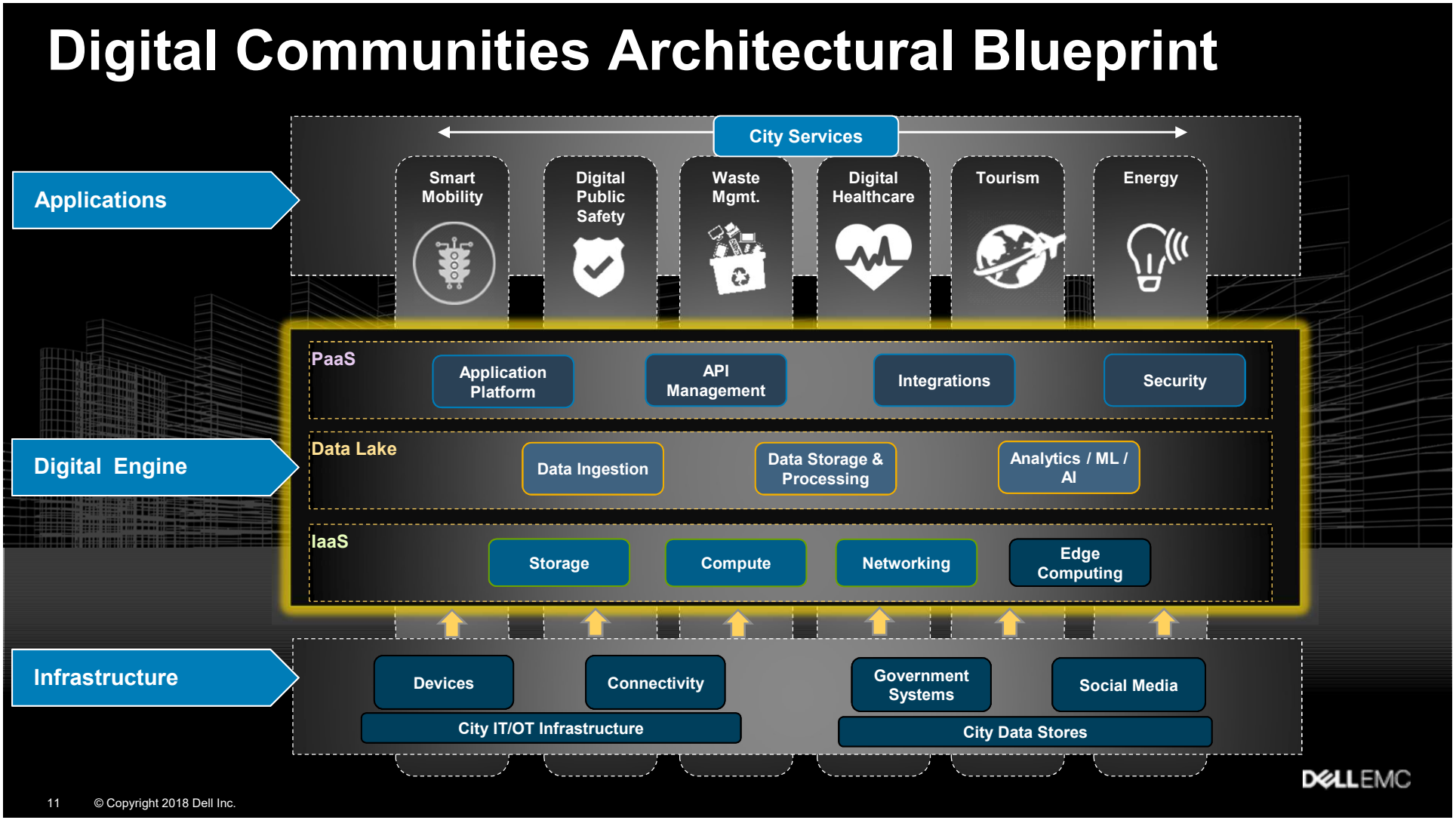
Digital Cities require a flexible IT infrastructure



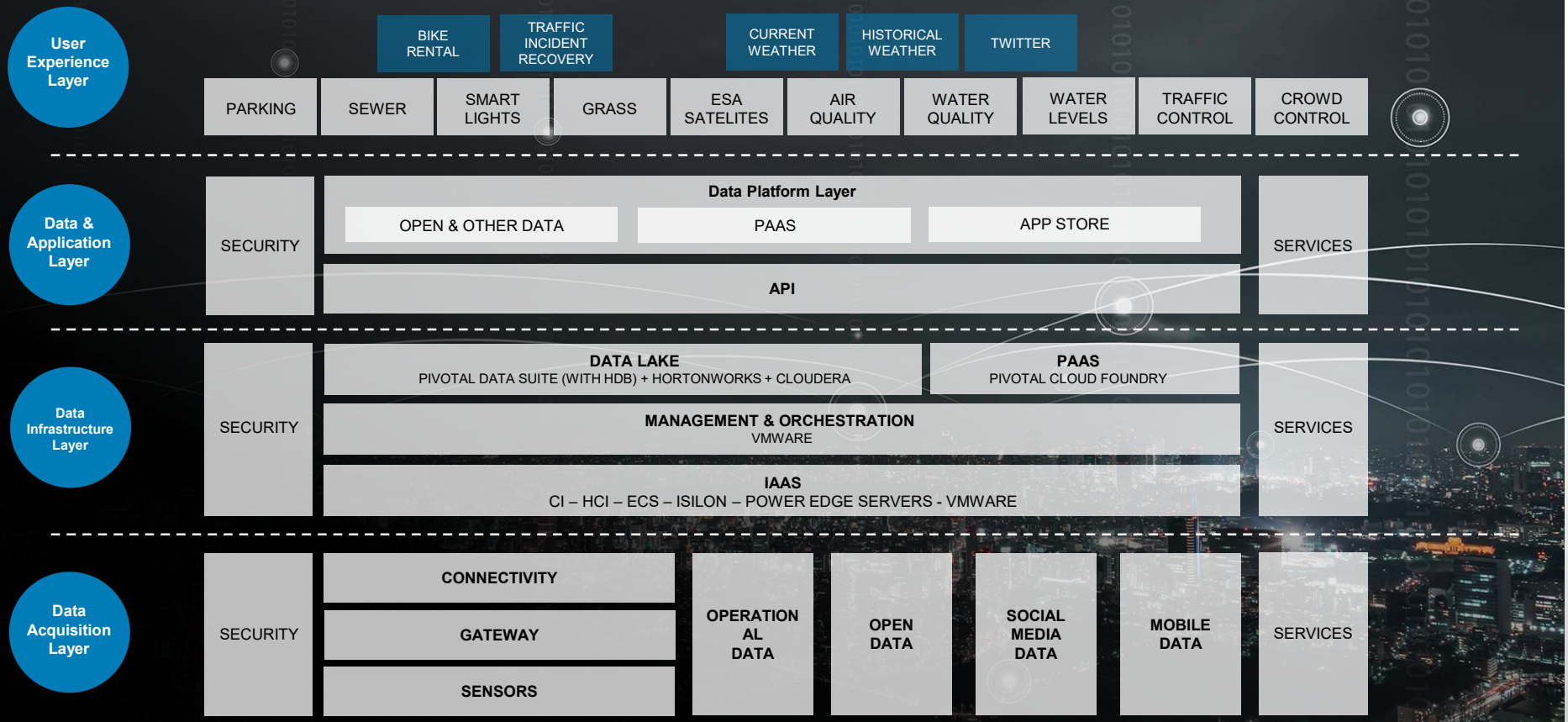
Digital City Accelerator Platform – Building Blocks

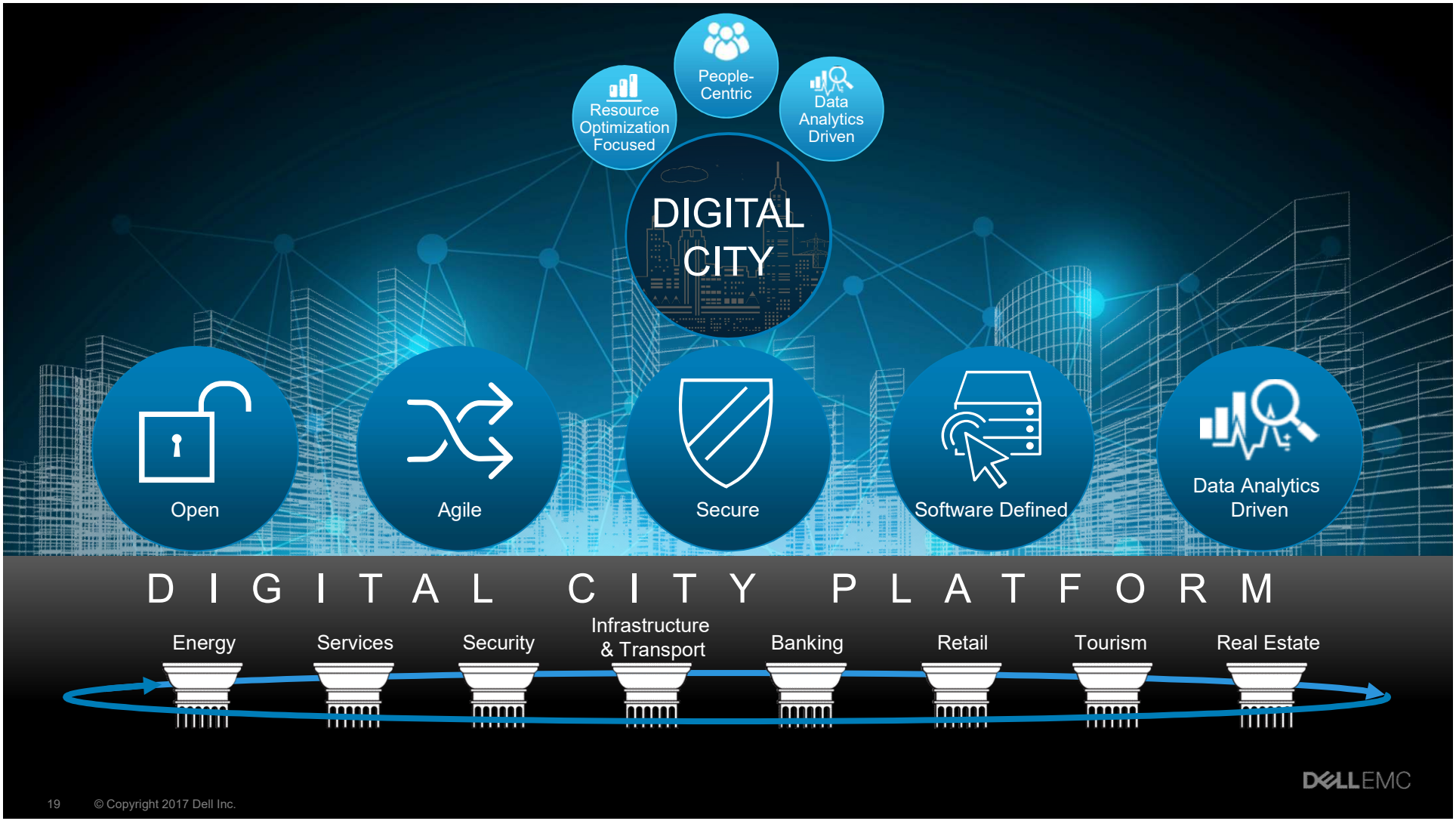


Digital Communities Architectural Blueprint

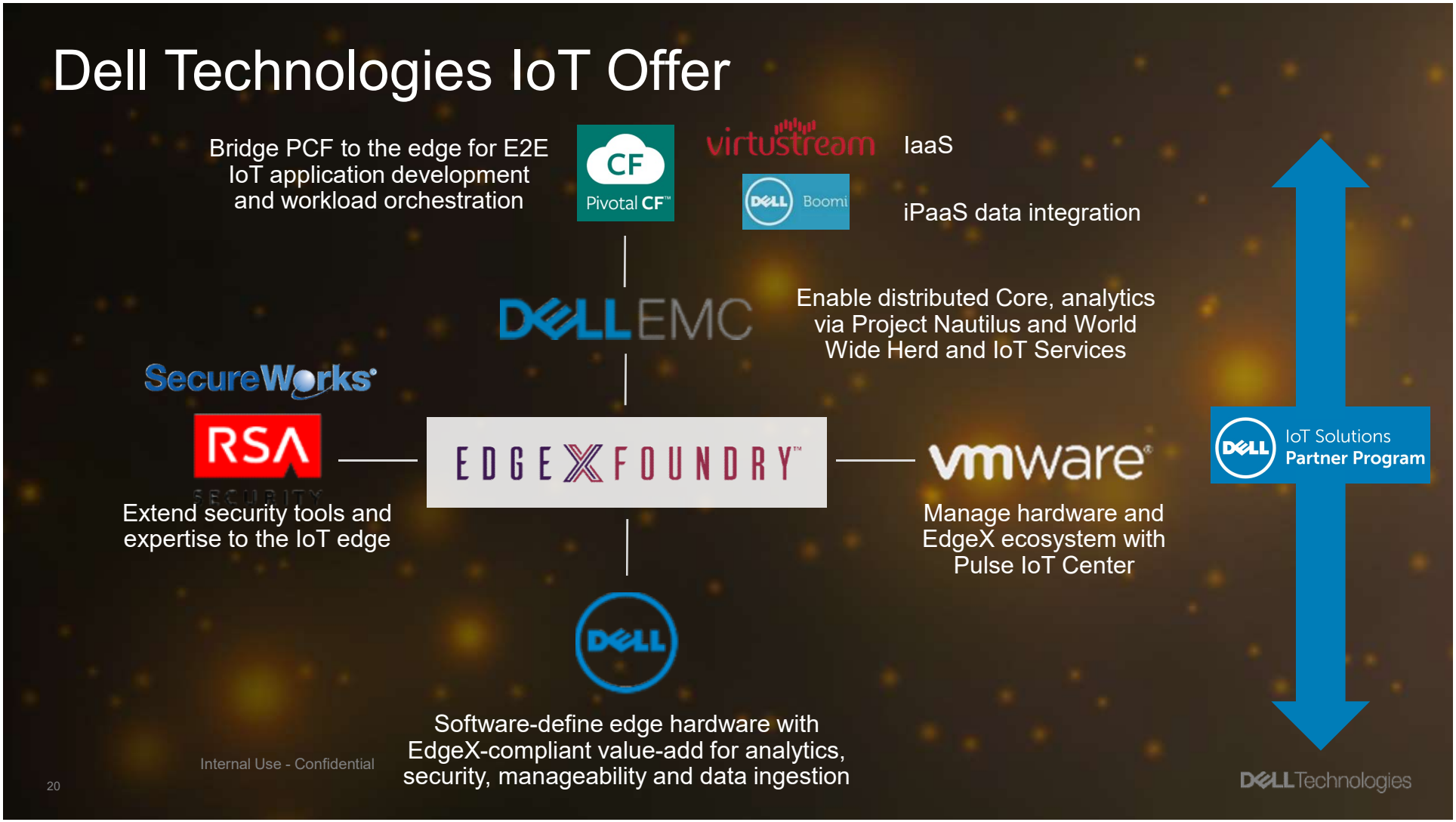


DIGITAL CITY DATA ARCHITECTURE





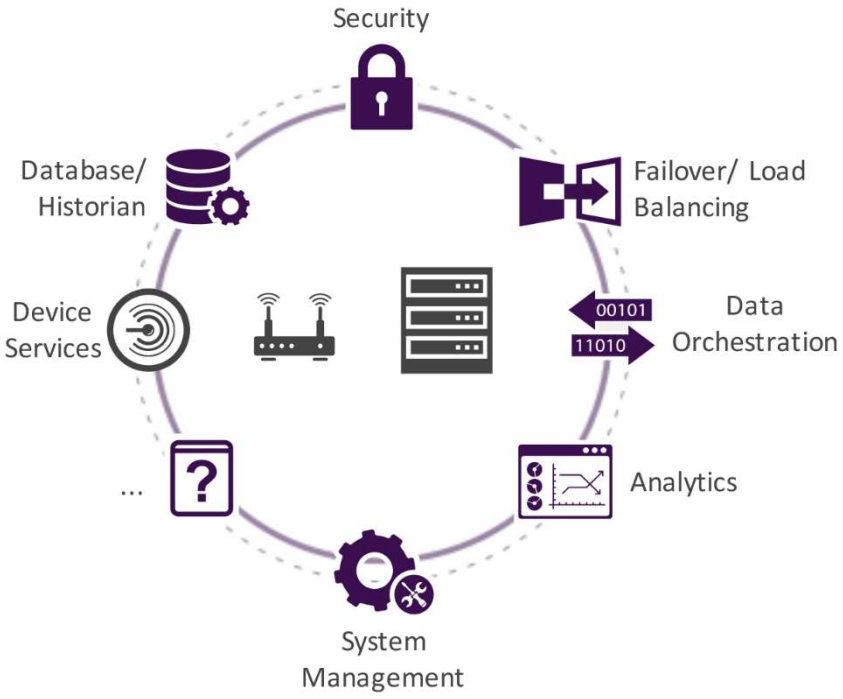
Dell Technologies IoT Offer



EDGE X FOUNDRY™

Any Combination of Standards

Interoperable Edge Applications



Choice of Backend Applications

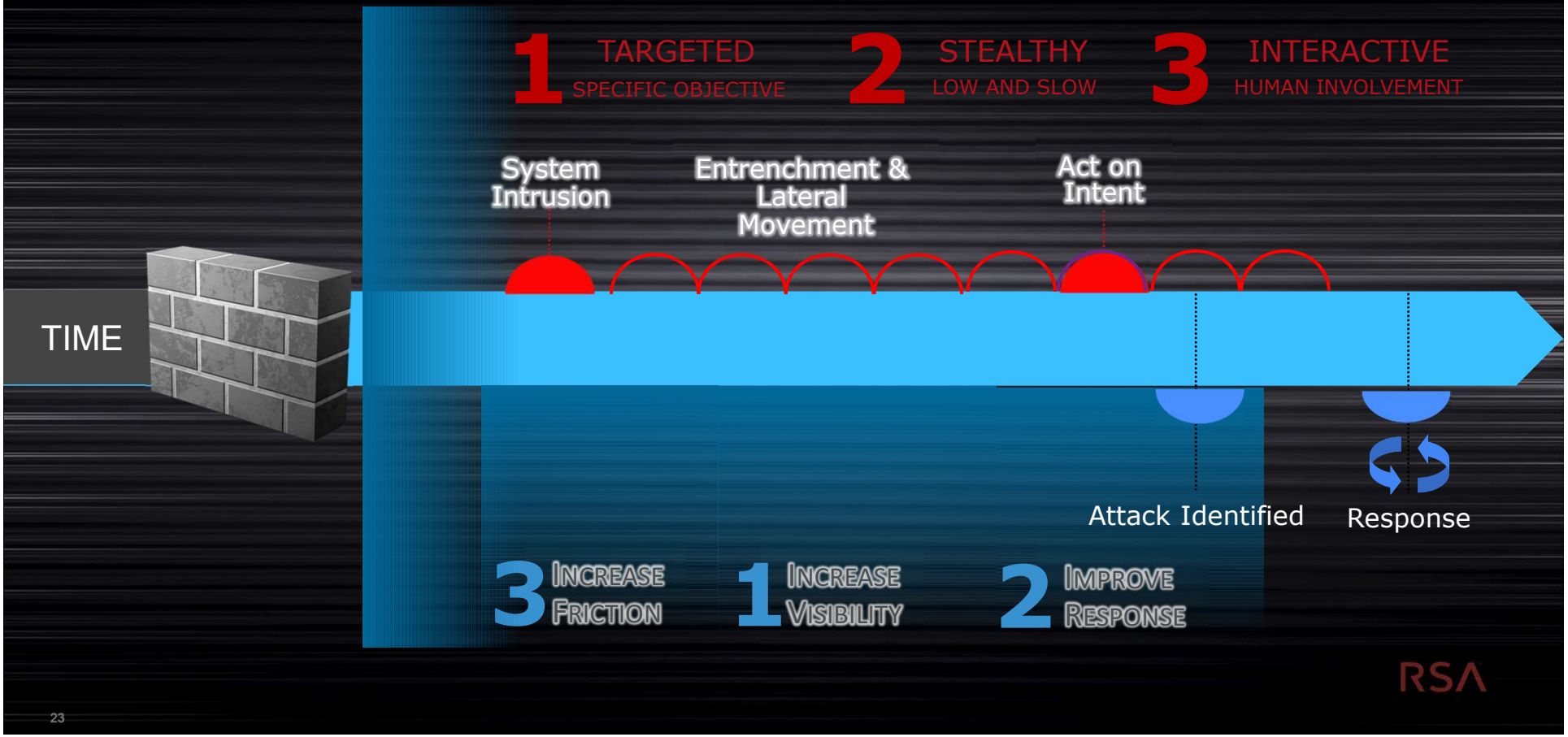
The old world of cybersecurity

Traditional security
focused on **prevention**

Traditional threats
focused on **intrusion**

RSA

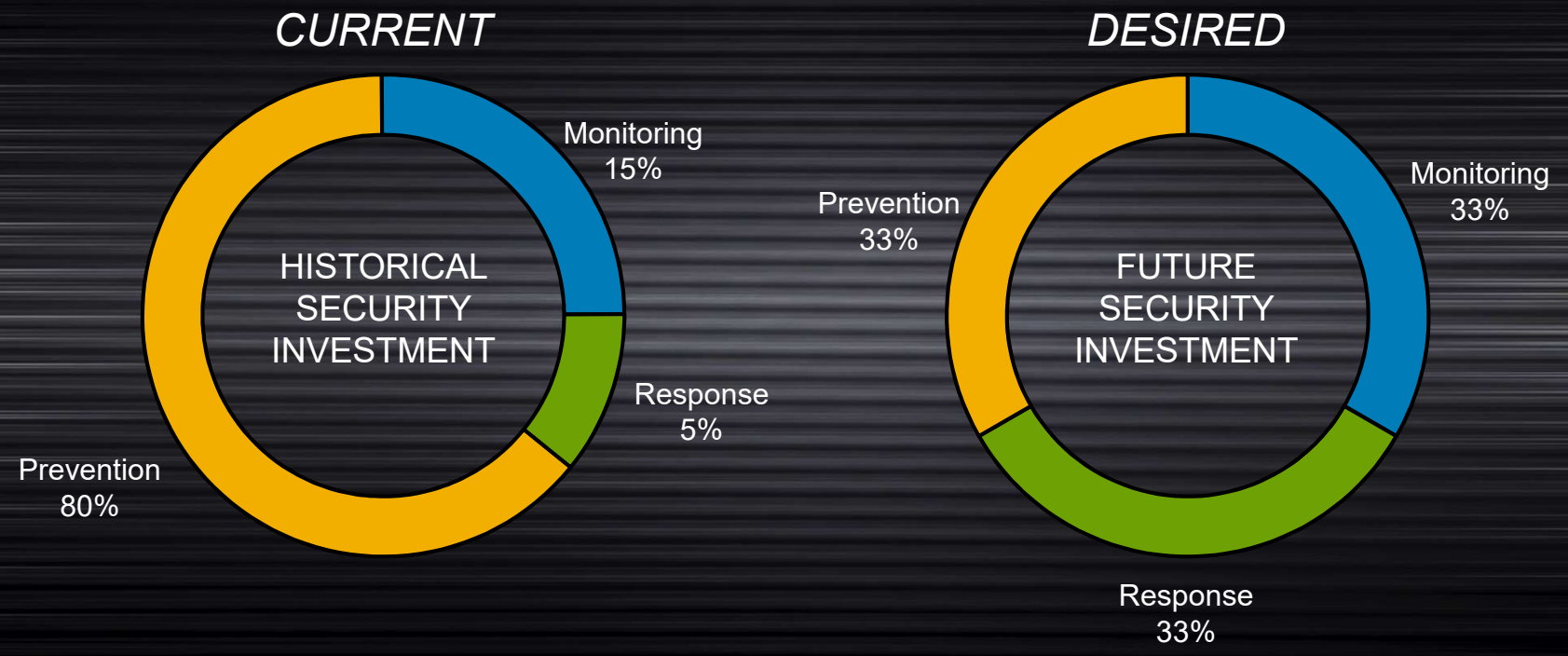
Advanced threats are different



RSA

Advanced security is different

Shift in focus. Shift in spend.

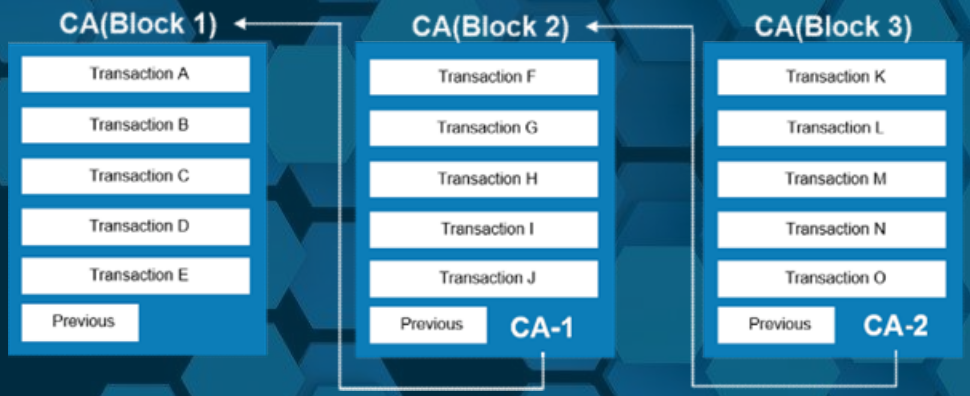


RSA

What is Blockchain?

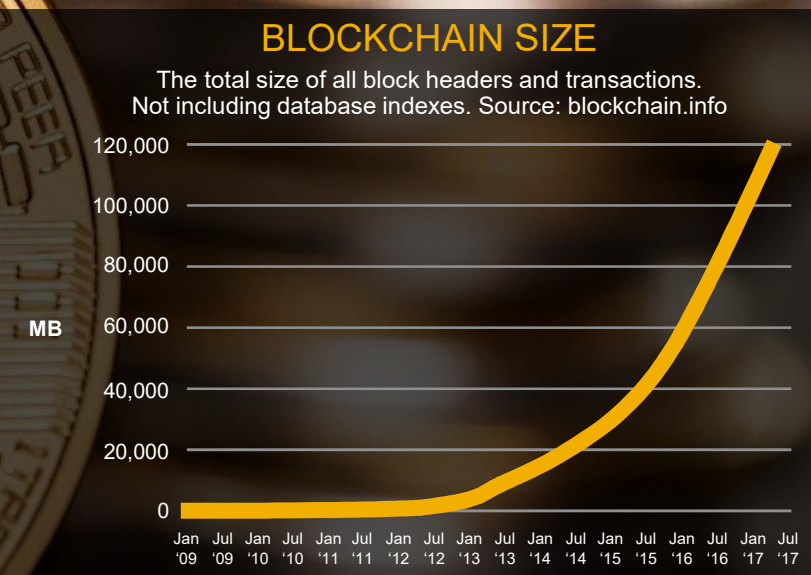
Wikipedia defines Blockchain as follows.

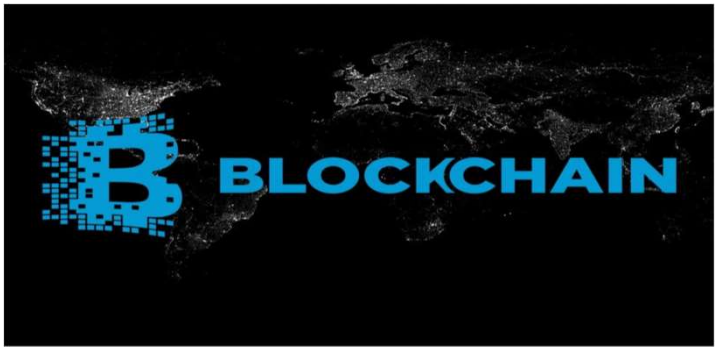
A distributed database that is used to maintain a continuously growing list of records, called blocks.



First Blockchain: Bitcoin

Wikipedia: The first blockchain was conceptualized by Satoshi Nakamoto in 2008 and implemented the following year as a core component of the digital currency bitcoin, where it serves as the public ledger for all transactions.

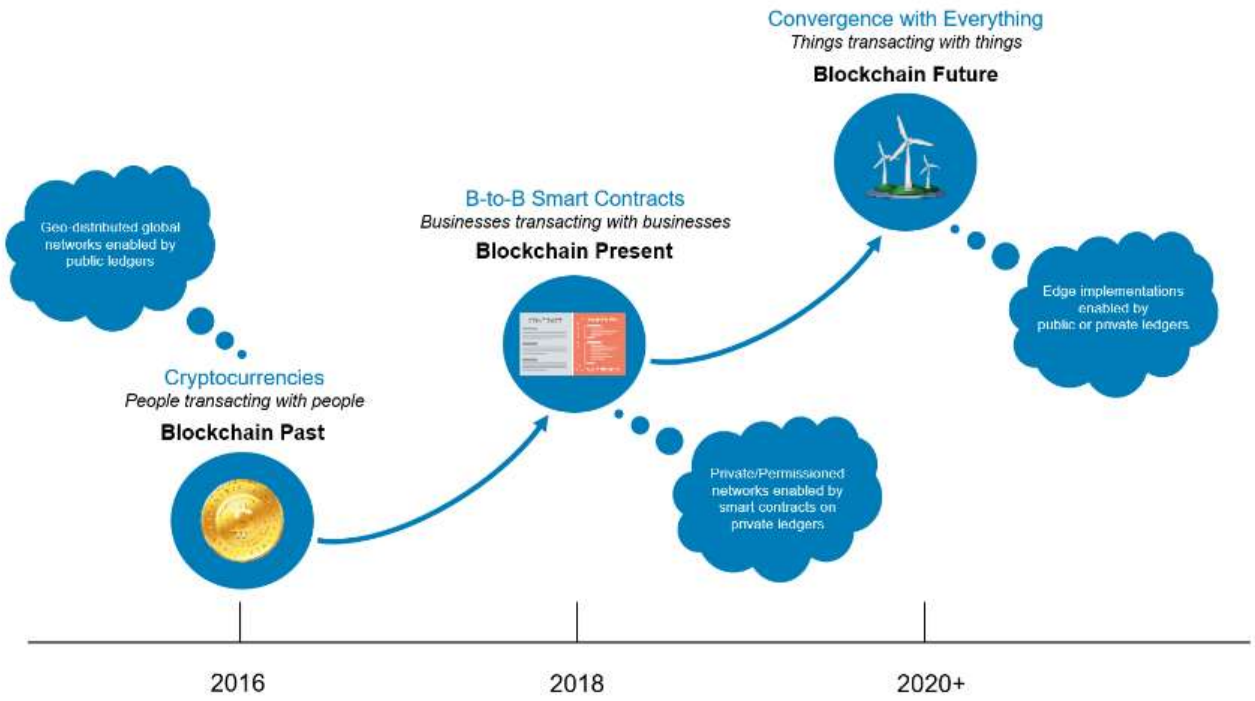




>

bitcoin

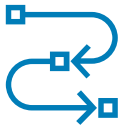

```
contract Mortal {
    address owner;

    event Killed(address indexed from);

    function Mortal() {
        owner = msg.sender;
    }

    function kill() {
        if (msg.sender == owner) {
            Killed(owner);
            suicide(owner);
        }
    }
}

/// @title Voting with delegation.
contract House is Mortal {

    enum houseStats [ Poor, Mediocre, Good, Excellent ]

    struct Bid {
        address bidder;
        uint256 bidValue;
        bool accepted;
    }

    uint256 public askingPrice;
    uint256 soldPrice;
    bytes32 public streetAddress;
    address  public houseOwner;
    address buyer;
    houseState public state;
    bool public inspected;
    address houseInspector;
    address mortgageBroker;
    bool mortgageApproved;
    uint256 mortgageValue;
    mapping(address => Bid) bidList;
    uint256 public numBid;
    bool acceptedBid;


    event HouseOnMarket(address indexed seller, uint256 indexed askingPrice, bytes32 indexed stAddress);
    event BidPlaced(address indexed bidder, uint256 indexed biddingPrice);
    event BidRejected(address indexed bidder, uint256 indexed biddingPrice);
    event BidAccepted(address indexed bidder, uint256 indexed biddingPrice);
    event Inspected(address indexed inspector, uint indexed status);
    event Mortgaged(address indexed lender, uint256 indexed value);
    event HouseSold(address indexed buyer, uint256 indexed price);
```



What is blockchain or distributed ledger technology?

Append Only Digital Ledger

Leveraging Encryption



With Business Logic & Rules

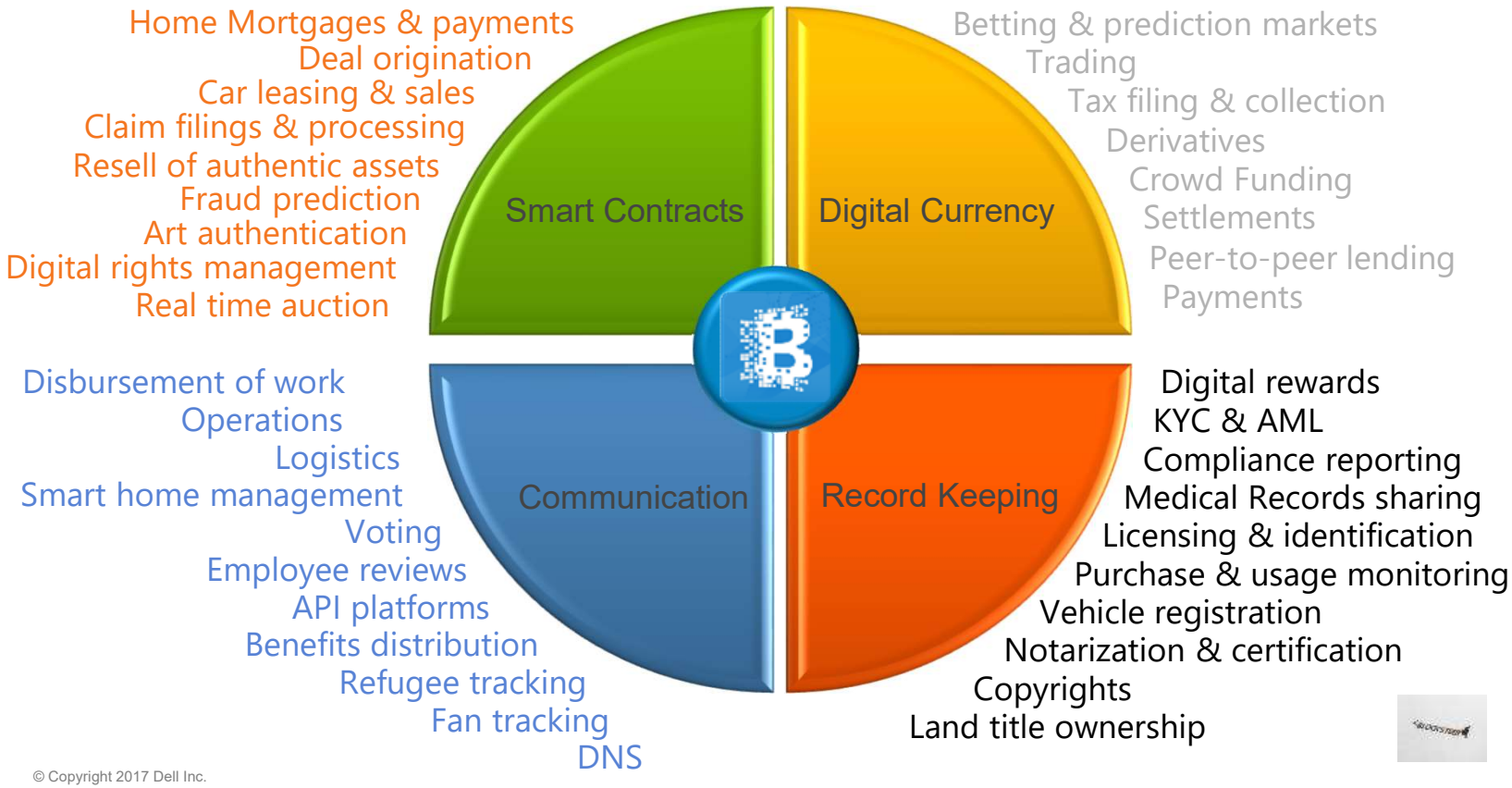
Enforced Using Smart Contracts

Geo-distributed Consensus

Immutable and Secured

Abundance of Use Cases

Financial ● Insurance ● Media ● Medical ● Government ● IoT ● Consumer




GDT
GDT SMARTX® City Solution
powered by DellEMC

GDT SMARTX® Community Solution powered by DellEMC

SAP Predictive Analytics		Collaboration		Performance Management	
Data Modeling	Wrangling	Story Experience	Mobility	Applications	ERP

Datacenter + DellEMC/VMware/Virtustream

Smart + Connected Digital Platform

GDT Digital Network Architecture for SMARTX® Edge Solutions

SENSORS

VEHICLES

BUILDINGS

CITIES, UNIVERSITIES, CORPORATE CAMPUSES, HOSPITALS, RETAIL, COMMUNITES, AND. . .

Urban Data Management

Better outcomes for citizens, communities and city

08-05-2017

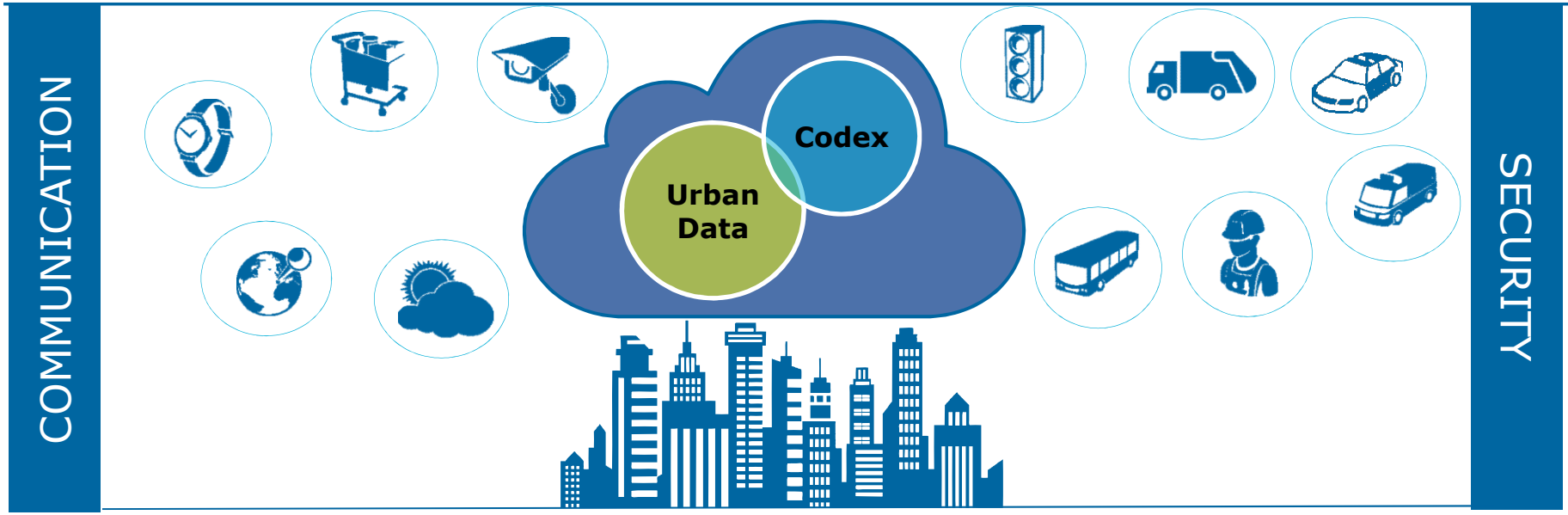
DELL EMC

Atos

UDM is a Smart City Offering

- Open Data
- Internet of Things
- Retail
- Mobility
- Health
- Agriculture
- Home
- Education
- Smart Grid/ Smart Energy
- Government

Data as the enabler



Efficient
Optimized use of city resources

Seamless
Integrated daily life services

Safe
Anticipate risks and protect people and information

Impactful
Enriched life and business experiences

Urban Data Management

Economy of Data

An "Economy of Data" organization targets potential users and providers of data to form a multi-sided market, building shared data asset platforms to be used by the participating players

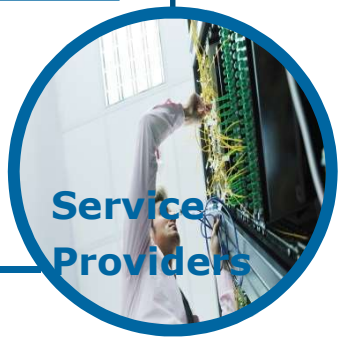
- Community member
- Visitor / Commuter
- User
- Resident

Reduction of city costs against data

Personalized services against payment

- Operations
- Economy
- Planning
- Contract

Data against added value

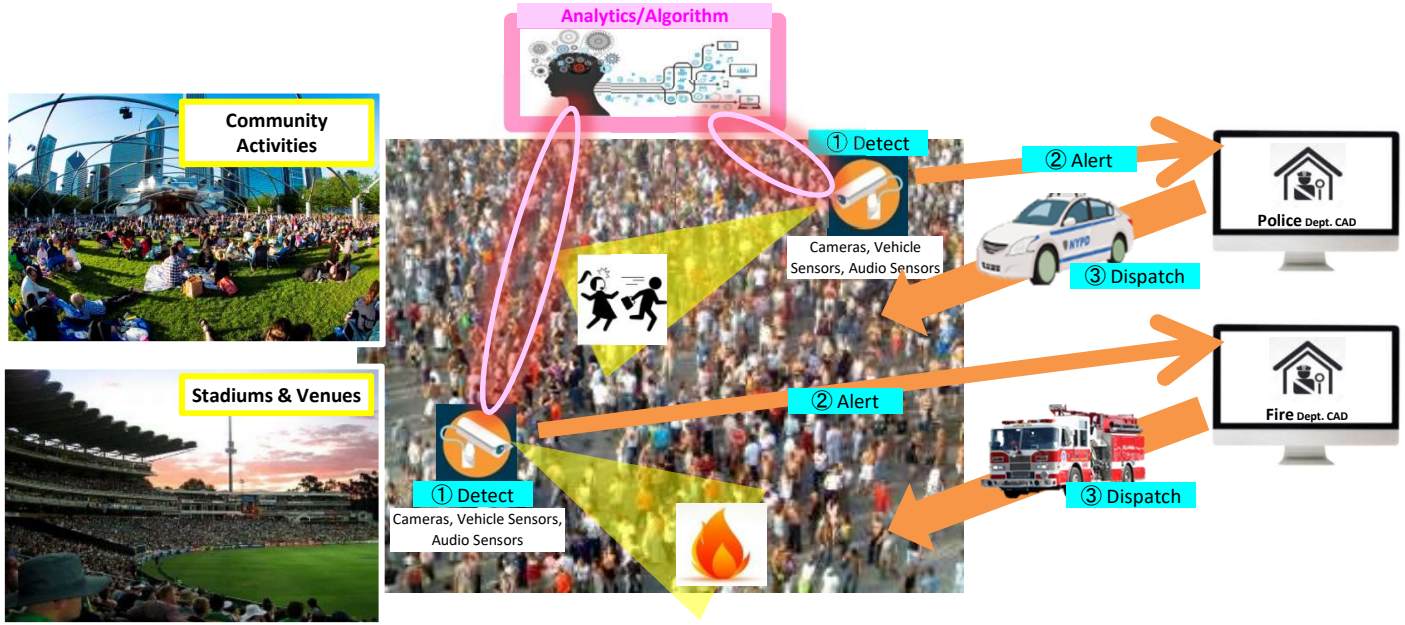


- Innovator
- Utility
- Economic
- Contract

Public Safety Edge Analytics

"Public Safety Solutions for Cities (Park/Stadium)"

- "Cognitive Foundation"
  - Cognitive Foundation provides Multi-Layer and End-End computing resources, and manage them automatically.
  - City can focus on business process design.
- Multi-sensor Analysis - Optical Sensors and advanced public safety analytics
  - Data collected from video and audio analytics will be fed into scoring algorithms. These algorithms will match the information with similar scenarios that occurred in the past, and predict if it will result in a threat.
- Coordination with the City's First Responder, 911, and "CAD (Computer Aided Dispatch) system
- Dashboards and Alerts



The San Jose Laboratory

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

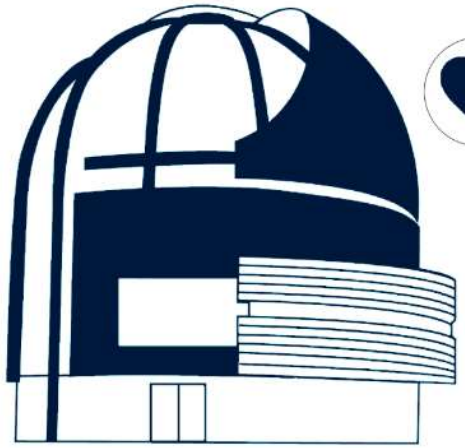
Residents 1.04M	1st In Bay Area	3rd In CA	10th In USA
Founded 11/29/1777			
180.2 Square Miles			
$3.5B City Budget			
6,600 Employees			
Elevations 0'– 4,372'			
3,500 Park Acres			
2,400 Miles of Streets			
Businesses 80K	#1 Healthiest		
$112K HH Income			
Median House $811K			

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

User-Friendly

Safe

Inclusive



Demonstration

Sustainable

San José Smart City Vision

Just as the world looks to Silicon Valley to provide the most creative, impactful technologies to disrupt industries and transform lifestyles, so too can San José become a global leader for civic innovation. Becoming a "smart city" means that game-changing technologies and data-driven decision-making will drive continuous improvement in how City Hall serves our community, and to promote concrete benefits in safety, sustainability, economic opportunity, and quality of life for our constituents.

- Mayor Sam Liccardo

Core of San Jose's Approach

CHAMPION THE CUSTOMER

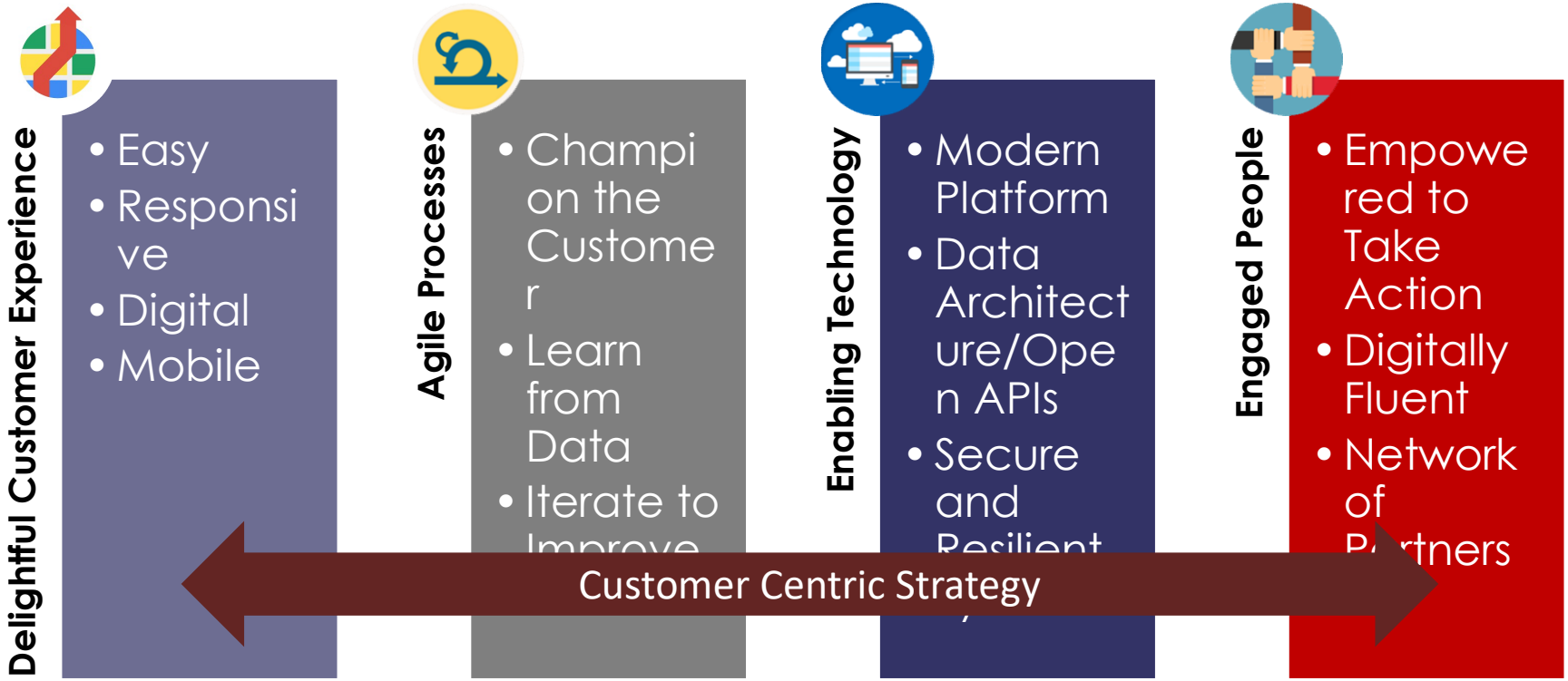
LEARN FROM THE DATA

ITERATE TO IMPROVE

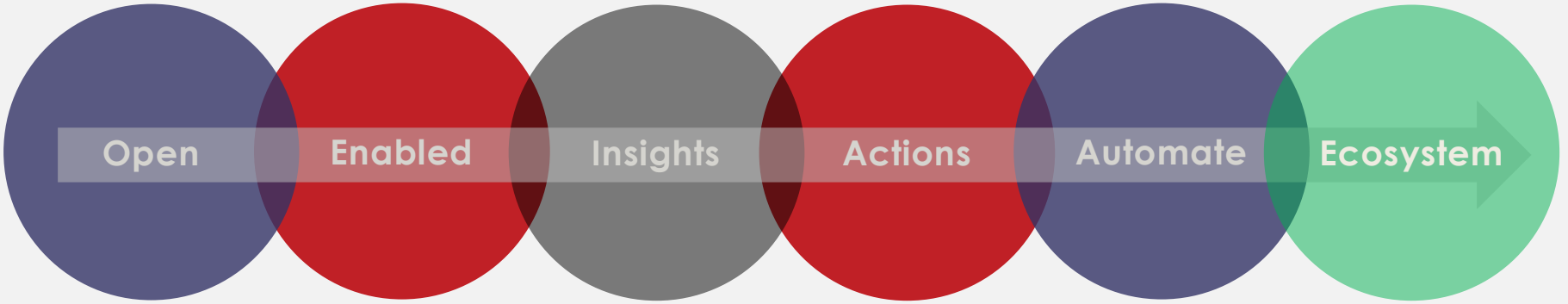
CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

2020 - Innovation in Action

San Jose aims to be as innovative as the community we serve



Data-Action Maturity Model



BUILD DATA FITNESS

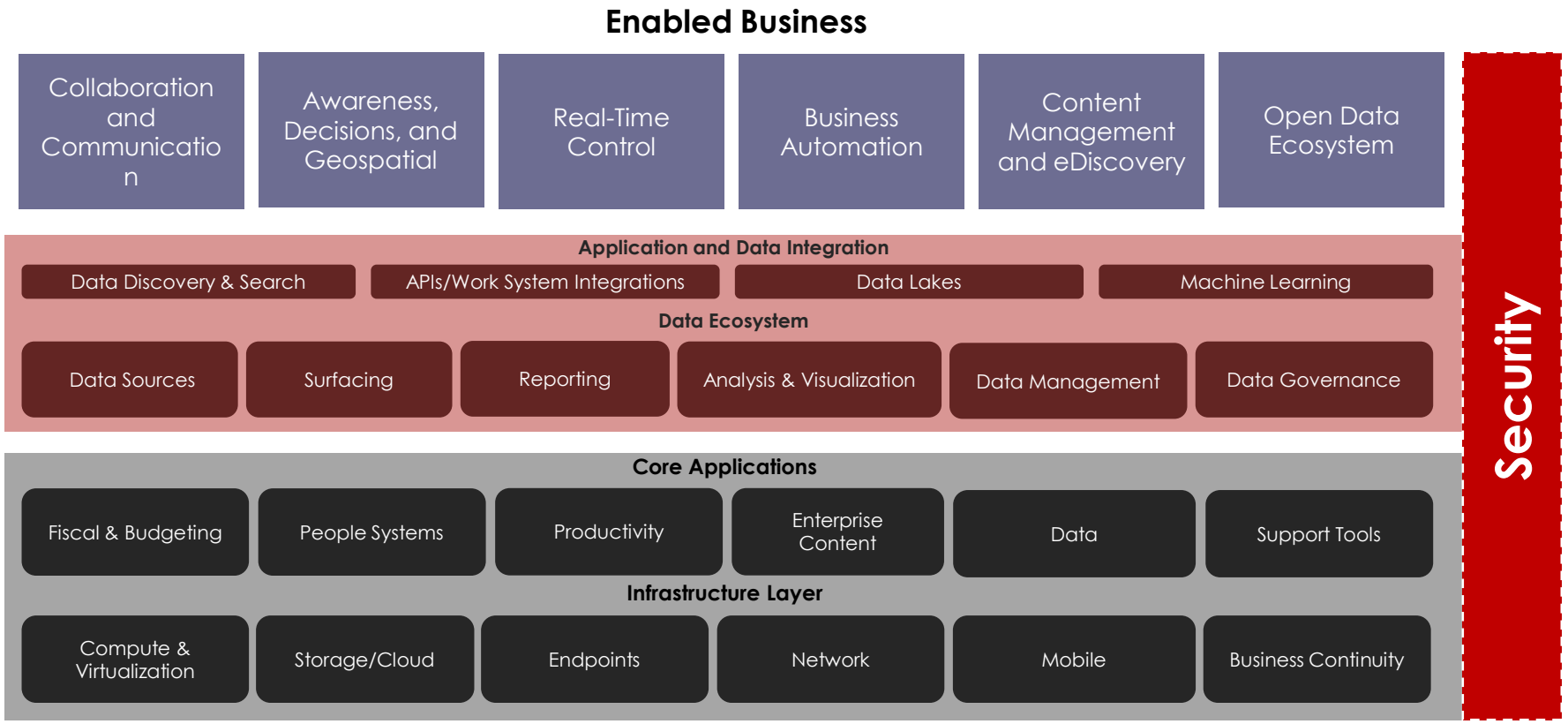
LEARN FROM THE DATA

ITERATE TO IMPROVE

CREATE NEW VALUE

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

Enabling Technology Blueprint



Open Data Community Architecture

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CAPITAL OF SILICON VALLEY

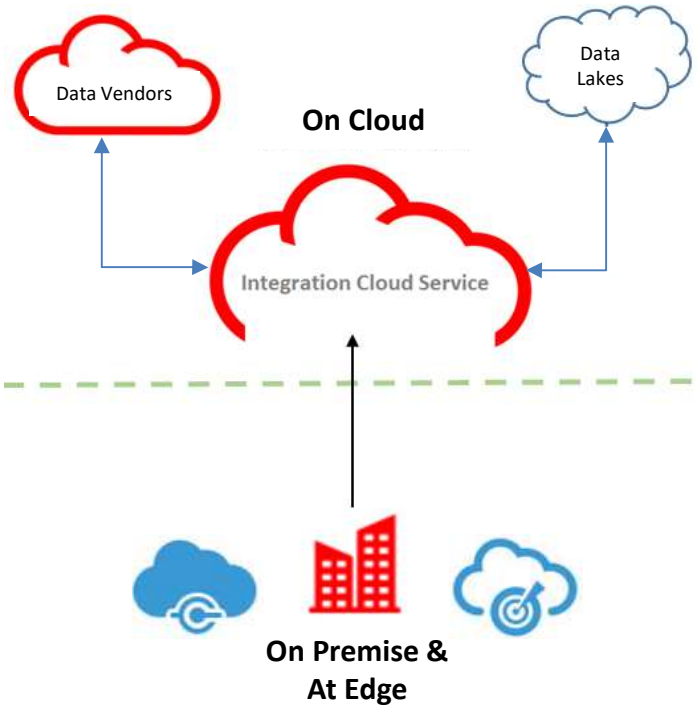
DELL EMC

Ecosystem
- Standards: Vendors, Data Lakes
- Use: Gov, Academia, Private
- Governance: Data Rights, Reconciler
- Monetization: Access + Use

Platform
- Tools: Analytics, Integrations
- Sustain: Skills + Community or Practice
- Governance: Rules, Records, Access
- Risk: Loss Prevention, Perception

Data Architecture
- Highly Adoptable: Open Source
- IoT Scale: Hadoop, HIVE + Spark
- All-Purpose: On Prem/Edge and Cloud
- Sharing: Catalog + Publish

Analytics
- Dashboards
- Data Assembly
- Data and Map Visualizations
- Joint Models
- New IP
- Target Data Lakes
  - Disasters
  - Crime
  - Traffic
  - Homelessness
  - Housing



Data Uses

Engage

9-1-1 & Prediction

My San Jose (Service Requests)

Airport

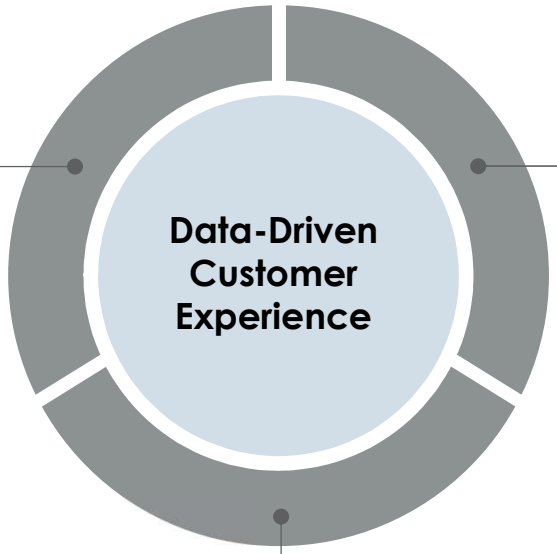
Traffic

Parking

Autonomous Vehicles

IoT

Data Journalism



Empower

Fiscal Management

Disaster Data

Housing Bots

Route and Request Prediction

Analytics Tools

Auditing

Exception Detection

Iterate

My San Jose Products

Skills

Regional Partnerships

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

Into the Future

Data Architecture as a Hub

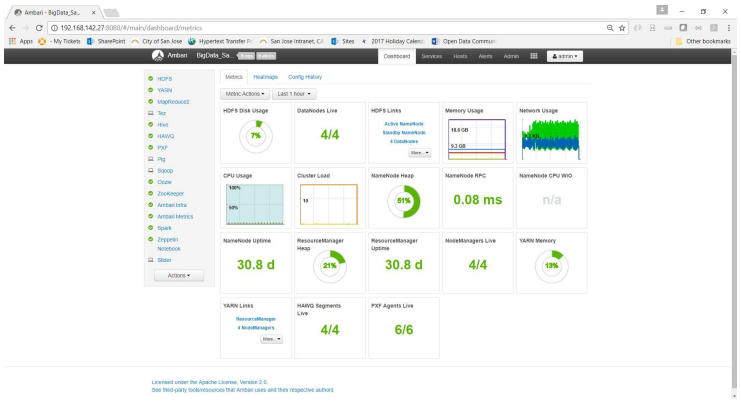
- Data Management
- Data Scale
- Risk, Skills, & Funding
- Data Lakes/Data Oceans

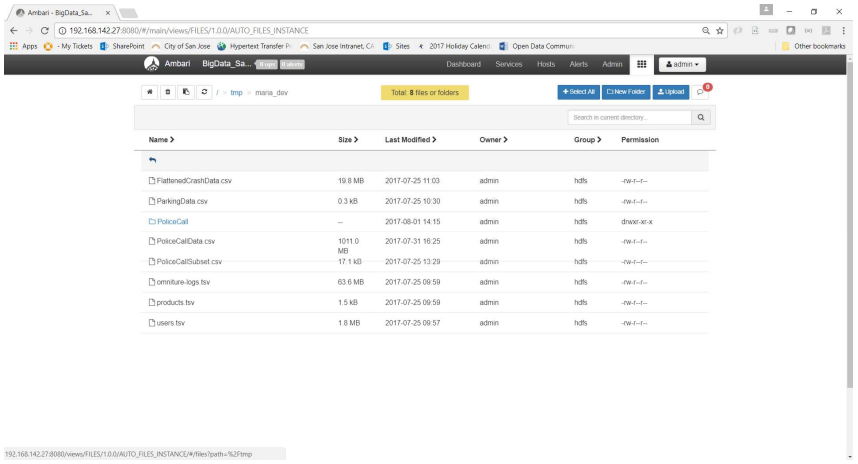
Work Remains…

- Shared Standards
- Monetization
- Data-Action Maturity
- Vendor Support
- Data Rights Management
- Community Engagement

Leveraging an Improved Data Lake Architecture

Data Lake environment built on Hortonworks HDFS (Big Data), and Pivotal HAWQ (Real Time Data Engine)

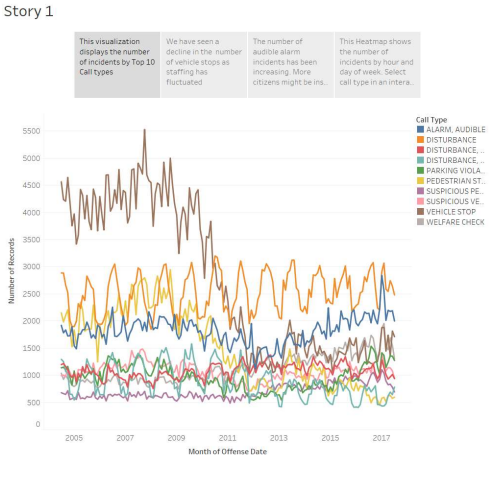


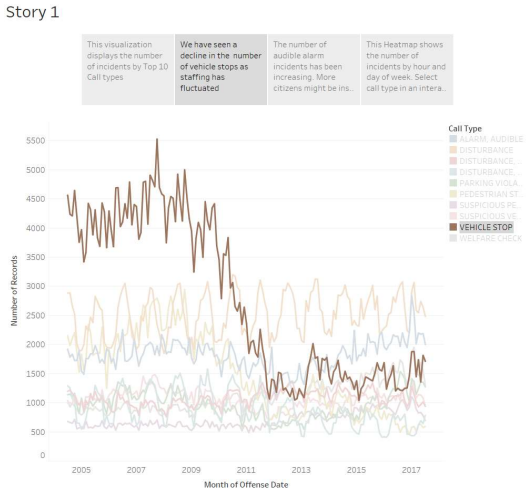


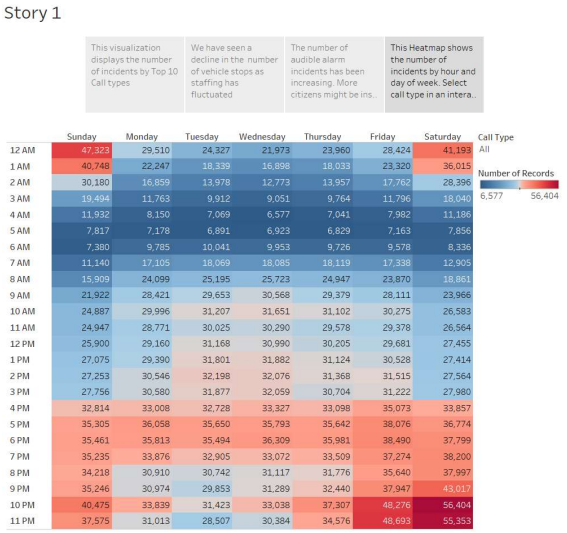
Multiple Data Ingest Paths and Use Cases

Data Visualizations

Data story telling through Tableau or Microsoft Power BI

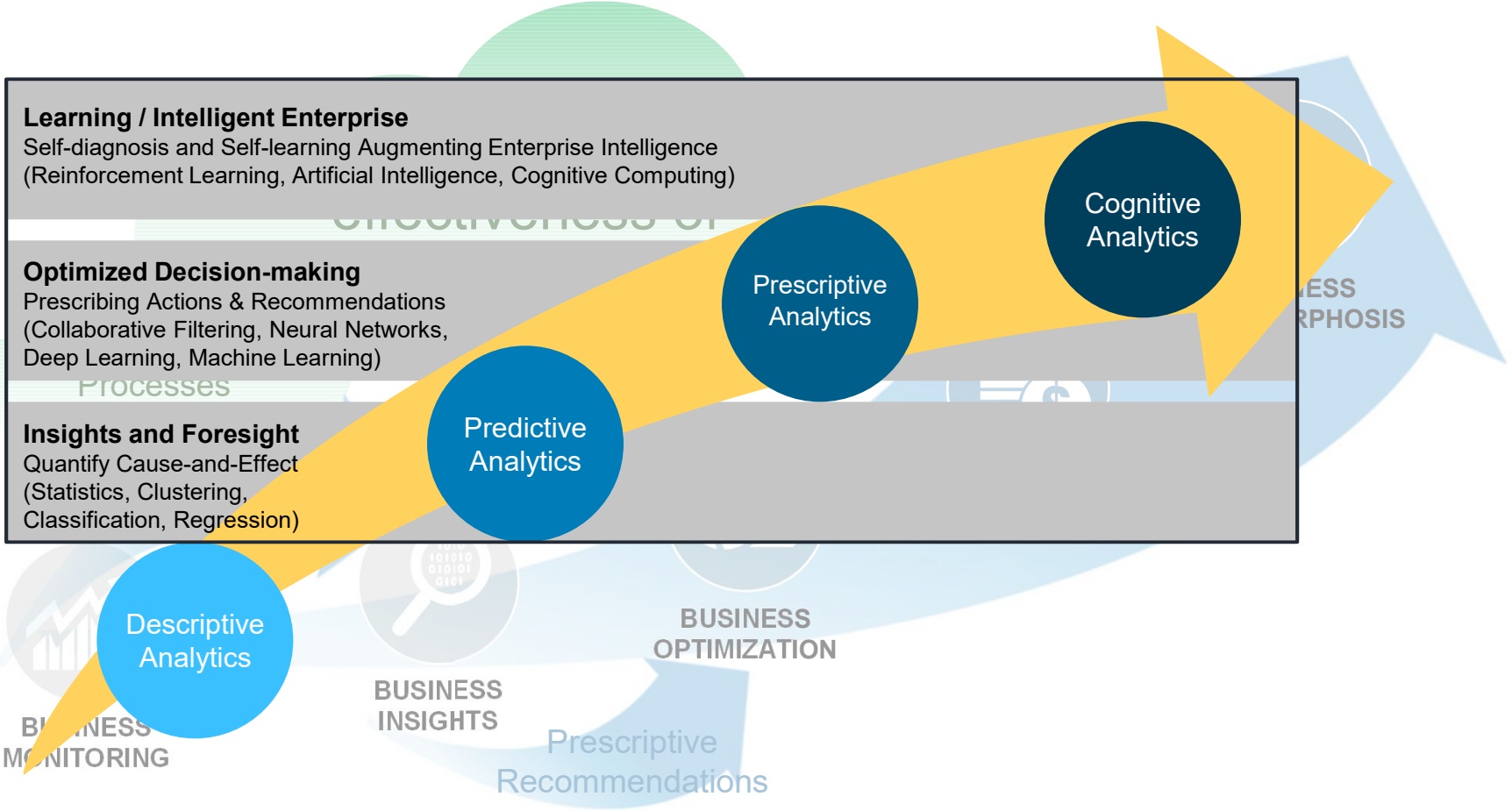




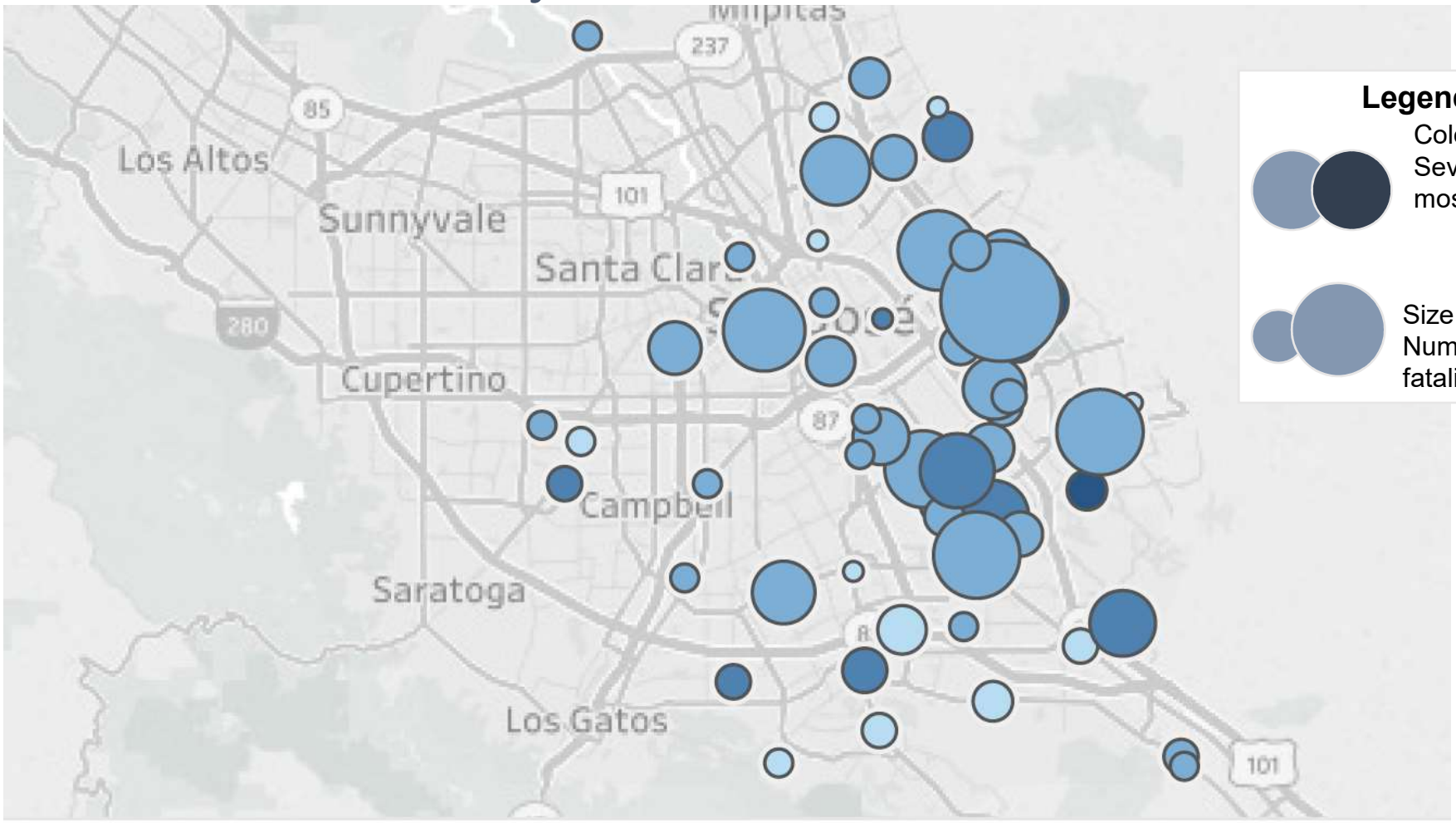


	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
12 AM	47,323	29,510	24,327	21,973	23,960	28,424	41,193
1 AM	40,748	22,247	18,339	16,898	18,033	23,320	36,015
2 AM	30,180	16,859	13,978	12,773	13,957	17,762	28,396
3 AM	19,494	11,763	9,912	9,051	9,764	11,796	18,040
4 AM	11,932	8,150	7,069	6,577	7,041	7,982	11,186
5 AM	7,817	7,178	6,891	6,923	6,829	7,163	7,856
6 AM	7,380	9,785	10,041	9,953	9,726	9,578	8,336
7 AM	11,140	17,105	18,069	18,085	18,119	17,338	12,905
8 AM	15,909	24,099	25,195	25,723	24,947	23,870	18,861
9 AM	21,922	28,421	29,653	30,568	29,379	28,111	23,966
10 AM	24,887	29,996	31,207	31,651	31,102	30,275	26,583
11 AM	24,947	28,771	30,025	30,290	29,578	29,378	26,564
12 PM	25,900	29,160	31,168	30,990	30,205	29,681	27,455
1 PM	27,075	29,390	31,801	31,882	31,124	30,528	27,414
2 PM	27,253	30,546	32,198	32,076	31,368	31,515	27,564
3 PM	27,756	30,580	31,877	32,059	30,704	31,222	27,980
4 PM	32,814	33,008	32,728	33,327	33,098	35,073	33,857
5 PM	35,305	36,058	35,650	35,793	35,642	38,076	36,774
6 PM	35,461	35,813	35,494	36,309	35,981	38,490	37,799
7 PM	35,235	33,876	32,905	33,072	33,509	37,274	38,200
8 PM	34,218	30,910	30,742	31,117	31,776	35,640	37,997
9 PM	35,246	30,974	29,853	31,289	32,440	37,947	43,017
10 PM	40,475	33,839	31,423	33,038	37,307	48,276	56,404
11 PM	37,575	31,013	28,507	30,384	34,576	48,693	55,353

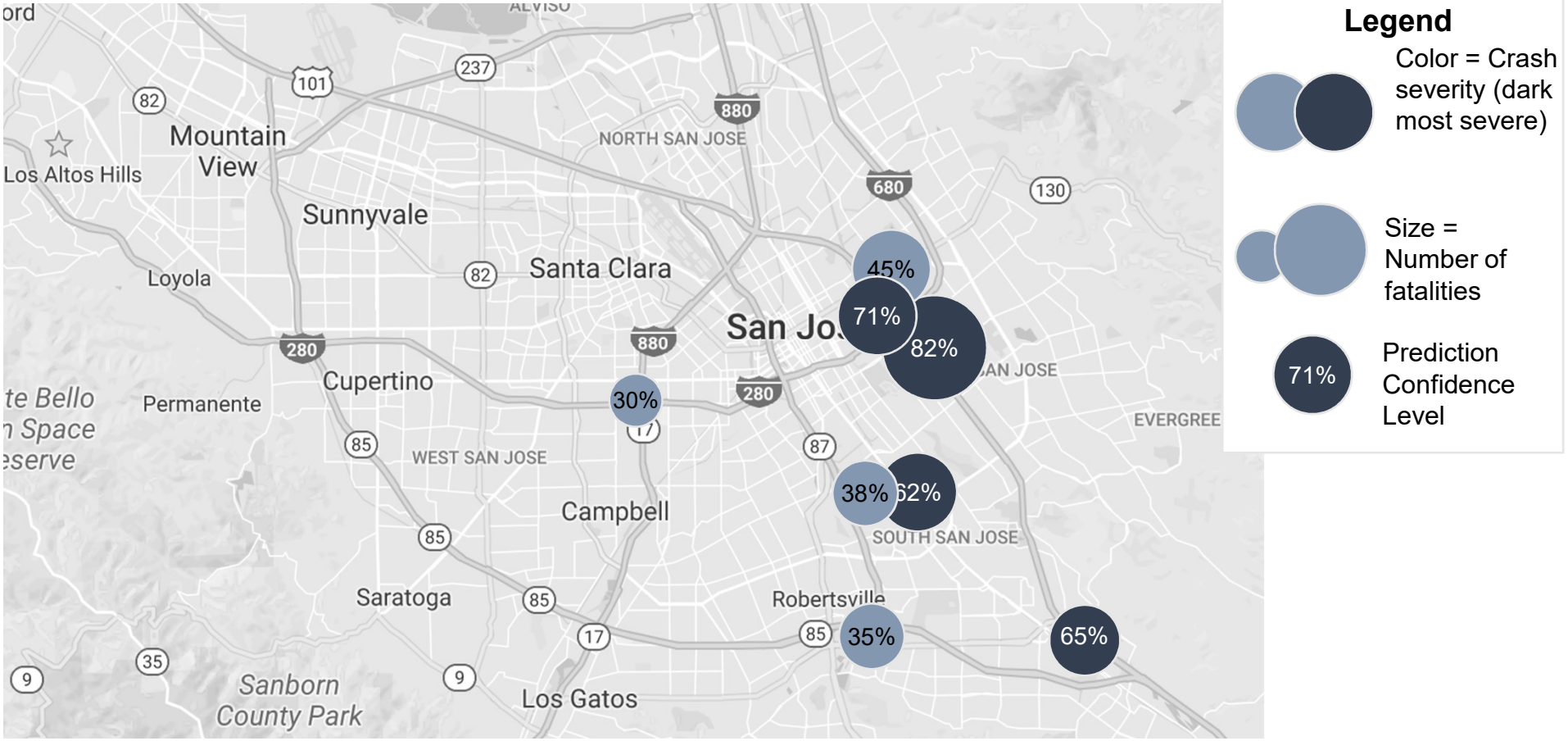
Advanced Analytics Supporting Digital Transformation



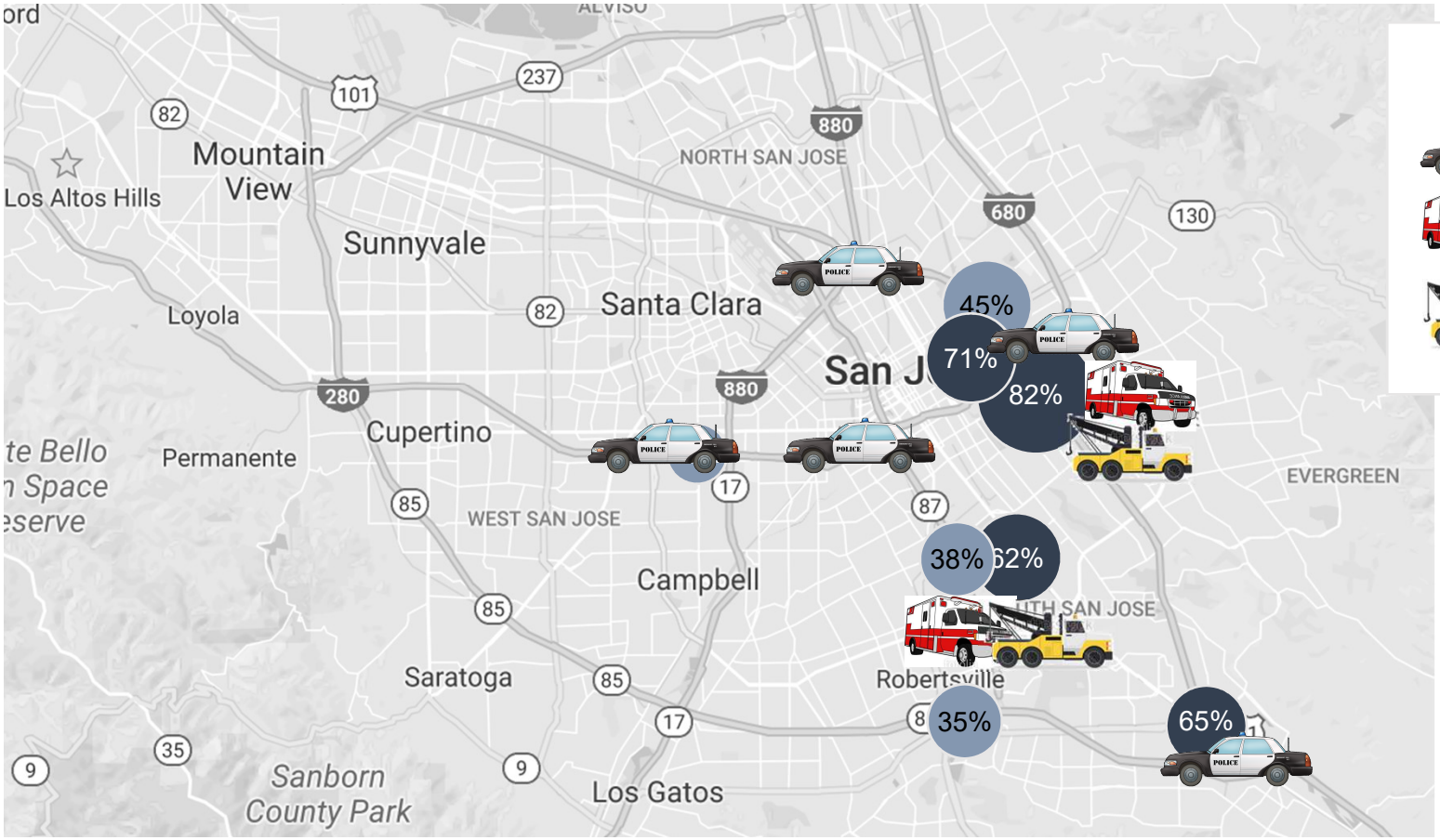
Number and Severity of Traffic Accidents Over Past 6 Months



Predicted Number and Severity of Traffic Accidents Over Next 2 Weeks



Recommended Location of Police And Emergency Equipment On Tuesday September 5 from 6:00am to 9:00am



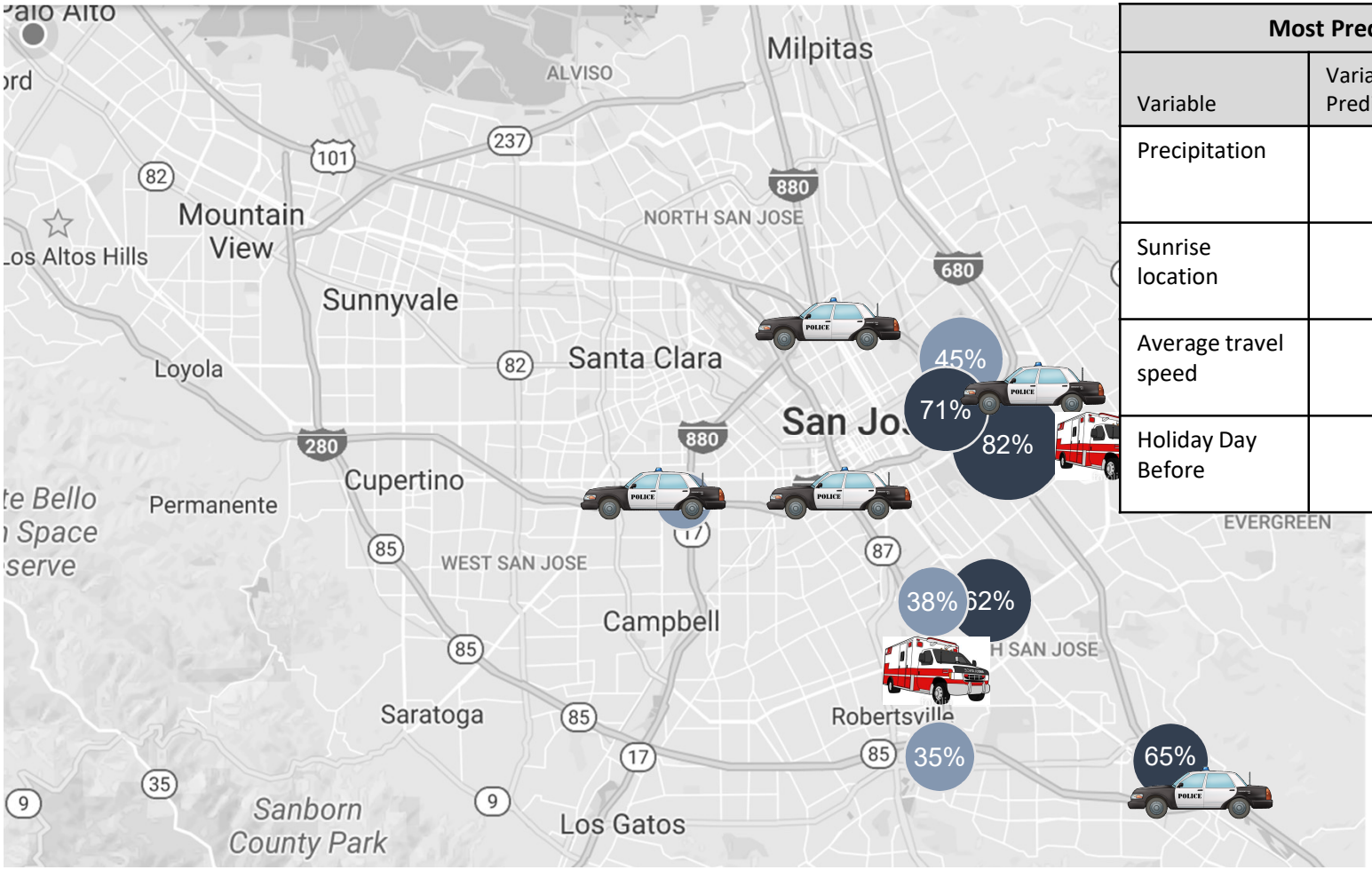
Legend:

Police Car

Ambulance

Tow Truck

Continuously Learning to Reduce Traffic Accidents



Most Predictive Variables		
Variable	Variable Predictability	Change in Predictability
Precipitation	55%	h
Sunrise location	47%	h
Average travel speed	45%	i
Holiday Day Before	42%	h

Convergence of major trends

Incremental computing reaching near zero marginal cost

Internet of things

Exponential technology advances every 5 years

Cloud

Big data analytics

Social

Mobile

How do you begin?

Solve a specific problem

Immediate benefits today with compounding benefits in the future

Start small, but architect for the future

Partner with the best


DELL Technologies