RE-THINKING THE SMART CITY
HOW TO BE SUCCESSFUL

SMART CITIES
THE CHALLENGE OF PEOPLE AND PROCESS

SALOMON SALINAS
MANAGING DIRECTOR
GLOBAL LEAD – CONNECTED CAMPUS & CITIES

APRIL 2017

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The What

The How

The Why

The Why Now

The Opportunity for You Is Right Under Your Nose

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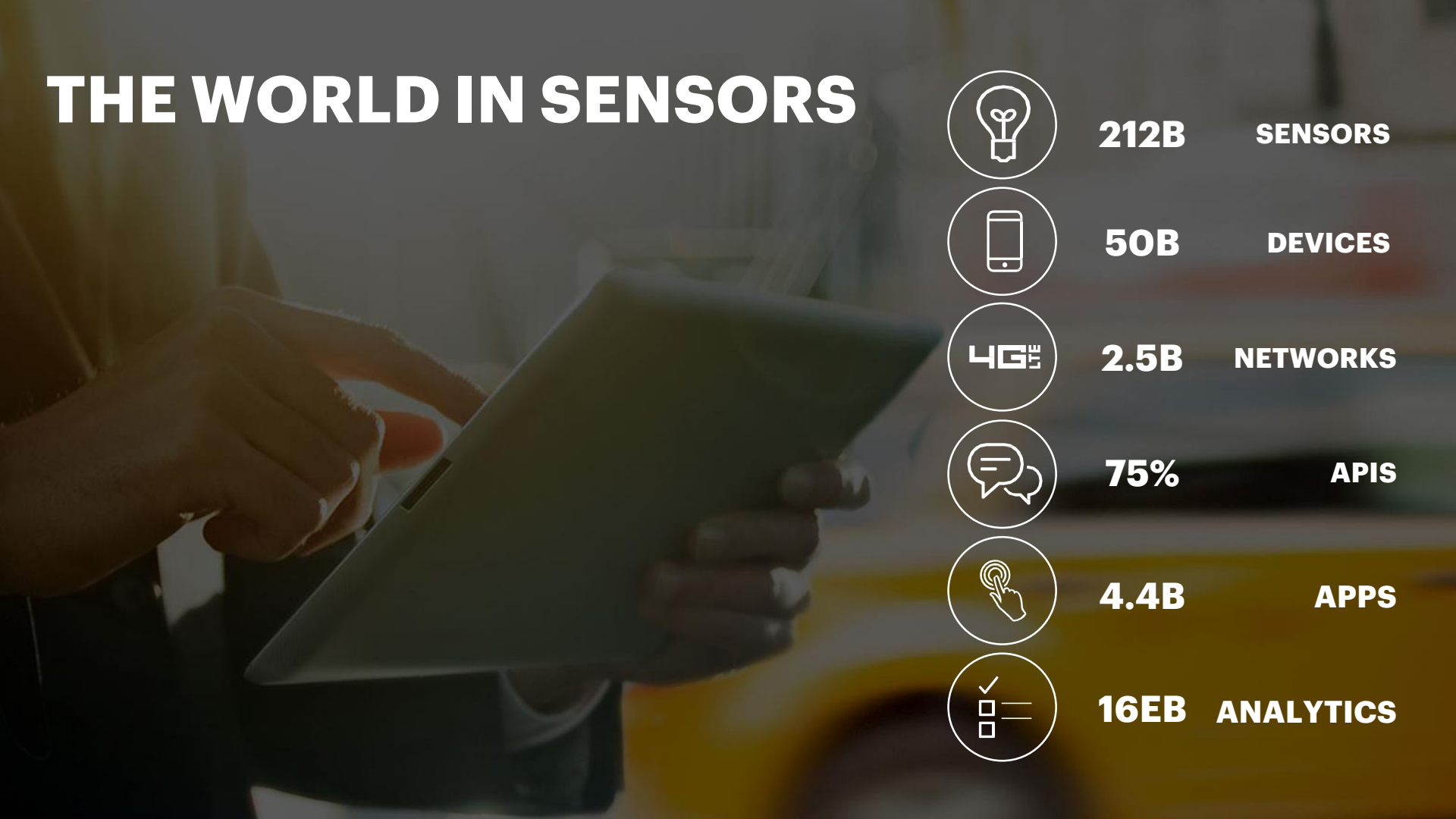
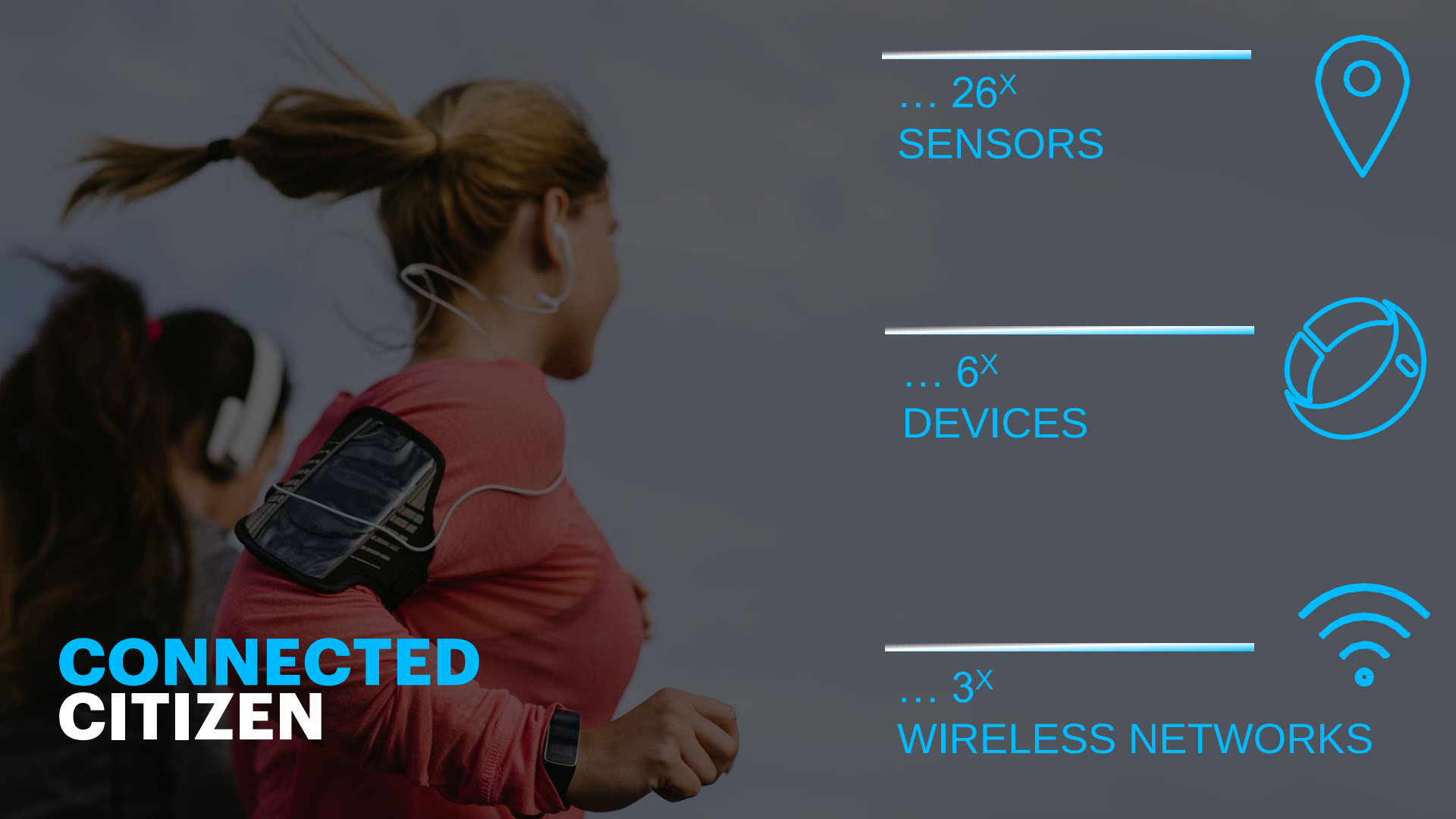
THE WORLD IN SENSORS



212B	SENSORS
50B	DEVICES
2.5B	NETWORKS
75%	APIS
4.4B	APPS
16EB	ANALYTICS



CONNECTED CITIZEN

… 26X
SENSORS

… 6X
DEVICES

… 3X
WIRELESS NETWORKS

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ALL THE SPACE WE OCCUPY

By 2019 - 1.8 Billion devices shipped per year

CONNECTED HOMES

By 2019 – The connected buildings market is estimated to be worth $17 Billion

CONNECTED BUILDINGS

By 2020 – The connected cities market is estimated to be worth $1.1 Trillion

CONNECTED CITIES

$44 Billion retail sales driven by beacons,10X greater than 2015

CONNECTED ‘OTHER’

WILL BE CONNECTED

THE HOW

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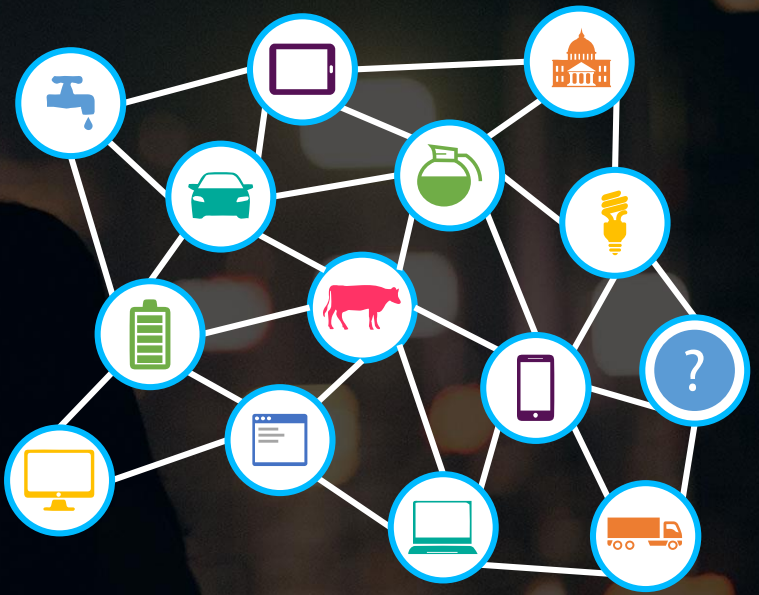
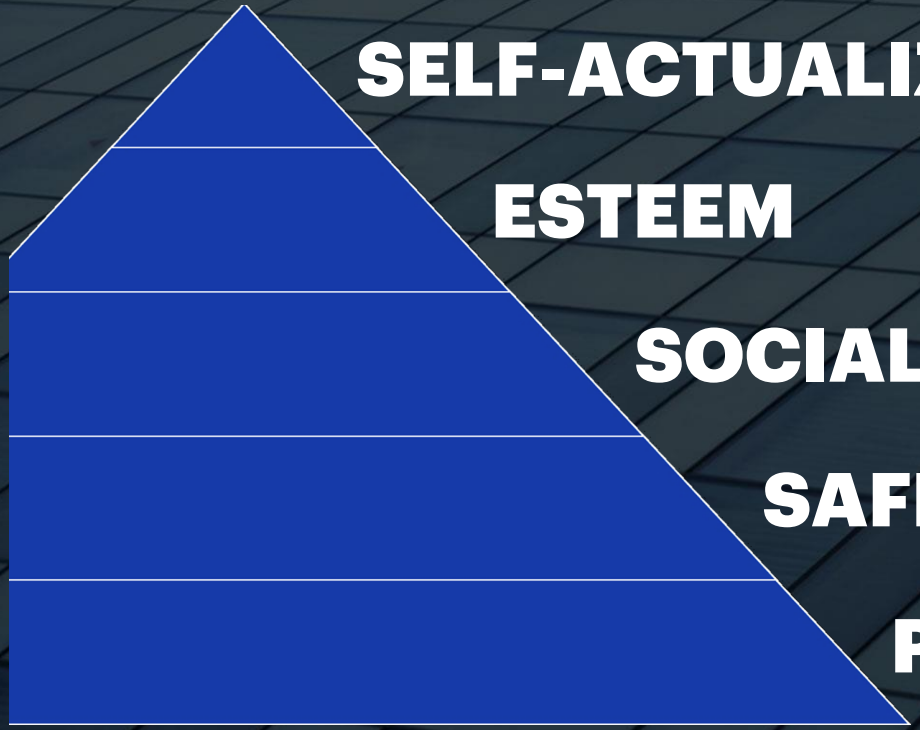
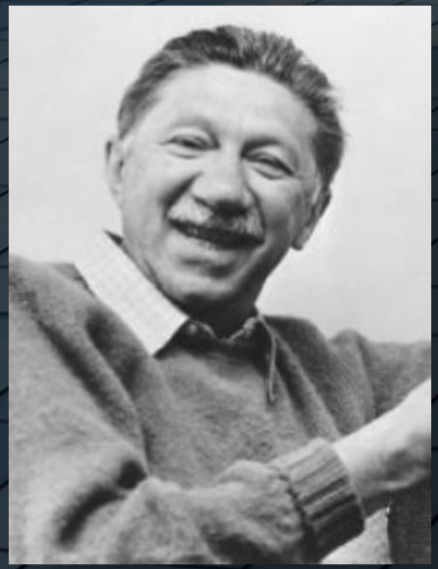
EVOLUTION OF THE INTERNET OF THINGS



DEVICES AND APPLIANCES DRIVING EACH OTHER

ABRAHAM MASLOW





NAKED AND AFRAID

THE INTERNET OF THINGS
now makes it possible
to maximize productivity & happiness
by satisfying people's basic human needs
THROUGH TECHNOLOGY

A City as a...
united
living
productive
-- and, yes, a ‘happy’ organism.

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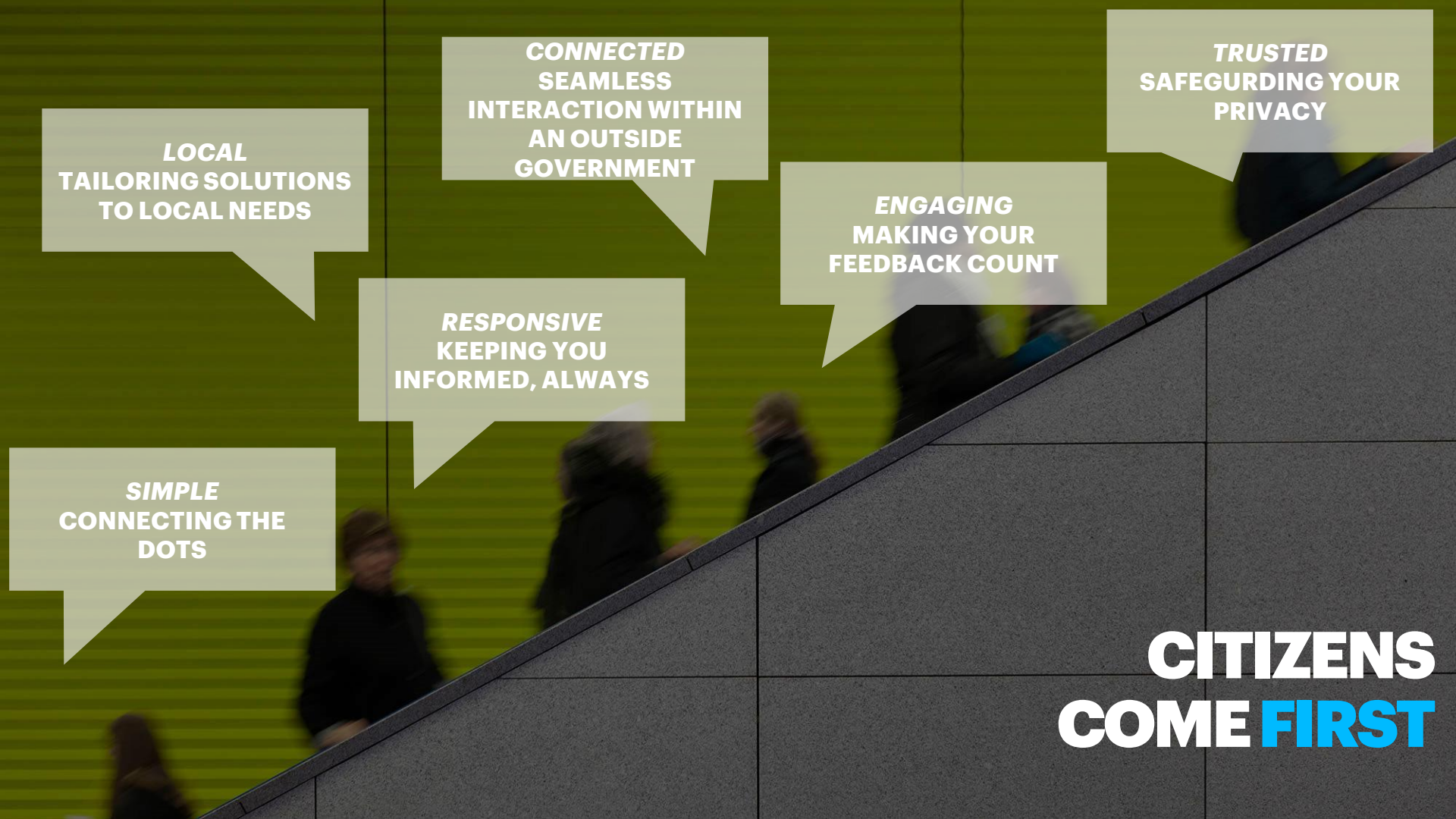
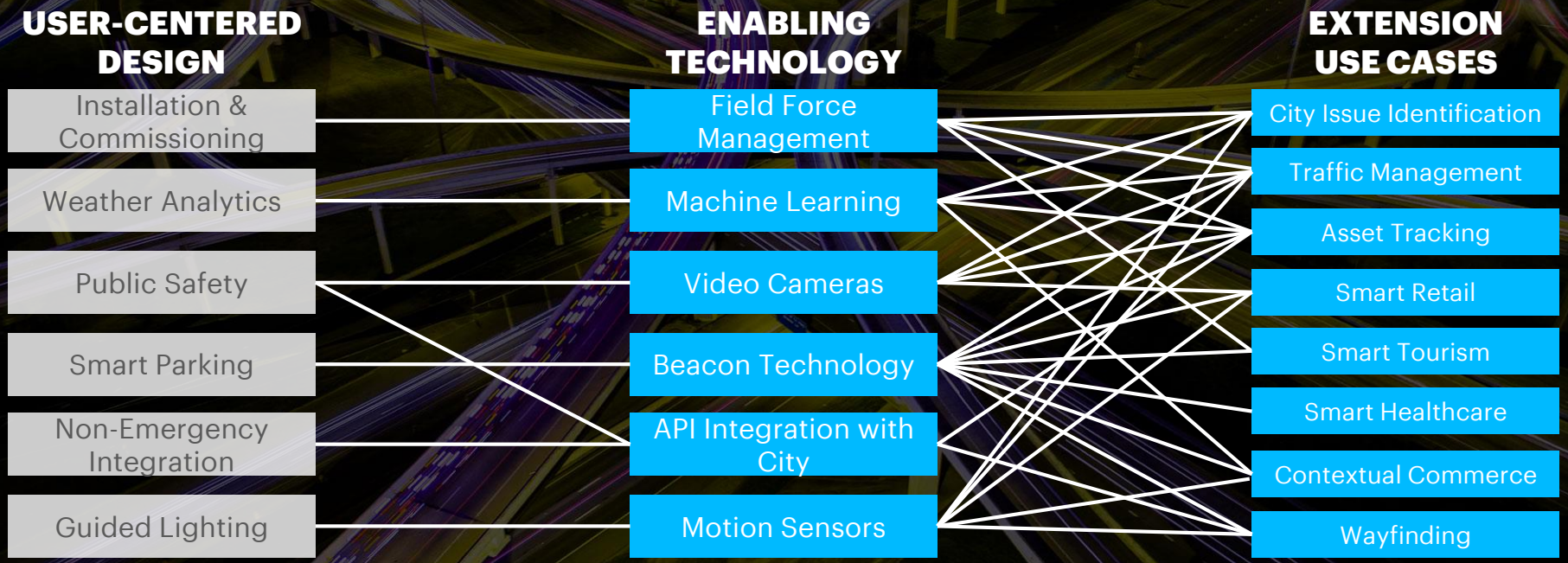

LOCAL
TAILORING SOLUTIONS TO LOCAL NEEDS
CONNECTED
SEAMLESS INTERACTION WITHIN AN OUTSIDE GOVERNMENT
TRUSTED
SAFEGURDING YOUR PRIVACY
ENGAGING
MAKING YOUR FEEDBACK COUNT
RESPONSIVE
KEEPING YOU INFORMED, ALWAYS
SIMPLE
CONNECTING THE DOTS
CITIZENS COME FIRST

USE CASE DESIGN PARADIGM

KEY TO SUCCESS IS LEVERAGING INITIAL USE CASES TO INTEGRATE FOUNDATIONAL TECHNOLOGY THAT WILL ENABLE SCALABILITY, MODULARITY, AND EXTENSIBILITY



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CITIES UNDER PRESSURE...

TRENDS DRIVING OPPORTUNITIES FOR POLICY MAKERS

- POPULATON GROWTH
- BUDGET PRESSURES
- DIGITAL CITIZENS
- COMPLEX SYSTEMS
- INFRASTRUTURE DEGRADATION

... ARE FINDING WAYS TO DELIVER

- FEDERAL GOVERNMENT SEED FUNDING
- HOLISTIC APPROACH
- COMMUNITY COLLABORATION
- NEW FUNDING MODELS

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Making sure that the City of Chicago

WORKS FOR RESIDENTS IN EVERY NEIGHBORHOOD

is critical to the **continued growth of our city and its economy**.

With the **support of academia and the private sector**,

we believe that CityWorks will help us improve upon

Chicago's already world-class infrastructure for

residents in neighborhoods throughout the city.

- RAHM EMANUEL
MAYOR OF CHICAGO

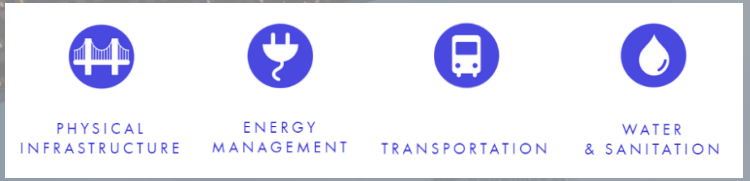
VMC 750
Mastercam

CITY DIGITAL, EST. MAR 2015

INNOVATION AT THE PHYSICAL-DIGITAL CONVERGENCE IN SMART CITIES

City Digital is a collaborative partnership among leading corporations, research institutions, and the public sector that:

- Establishes and prioritizes critical areas of need
- Develops innovative solutions
- Deploys solutions leveraging Chicago as a pilot test-bed
- Facilitates scale-up and global implementation



INDUSTRY LEADERS + **UNIVERSITIES** + **GOVERNMENT & CIVICS**

Microsoft
ComEd
An Exelon Company
mastercard
accenture
Johnson Controls
hbk ENGINEERING
ILLINOIS
UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN
ILLINOIS INSTITUTE OF TECHNOLOGY
UIC UNIVERSITY OF ILLINOIS AT CHICAGO
NORTHWESTERN UNIVERSITY
Argonne NATIONAL LABORATORY
CITY OF CHICAGO INCORPORATED 4th MARCH 1837
cta
Metra
Smart Chicago
clean energy trust
ILLINOIS SCIENCE & TECHNOLOGY COALITION
World Business Chicago
CNT
MetropolitanPlanningCouncil
Chicago Metropolitan Agency for Planning

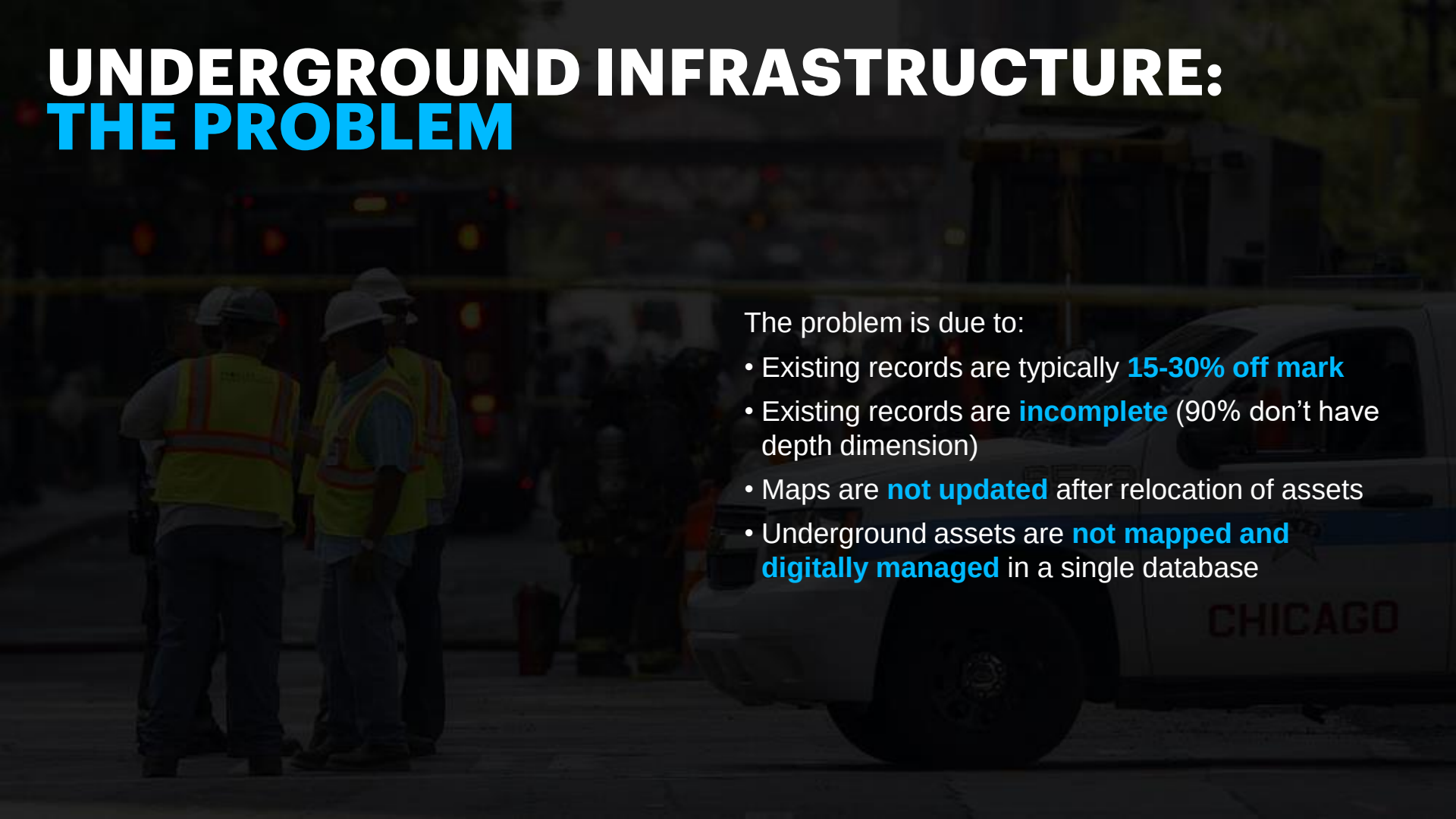
UNDERGROUND INFRASTRUCTURE: CITY OF CHICAGO

- 234 square miles of land
- 5,000 miles of streets and roads
- 27 underground asset owners
- 120,000 permits per year
- 9,000 miles of water and sewer mains
- 5,000 miles of natural gas pipes
- 390 miles of underground circuit miles of electric transmission
- 250,000 manholes and catch basins

UNDERGROUND INFRASTRUCTURE: THE PROBLEM

In the US, an underground infrastructure, such as pipes and cables for water, waste water, power, gas, oil, steam, and telecommunications, is hit on average **every 60 seconds**. The total cost to the national economy is estimated to be in the **billions of dollars.**

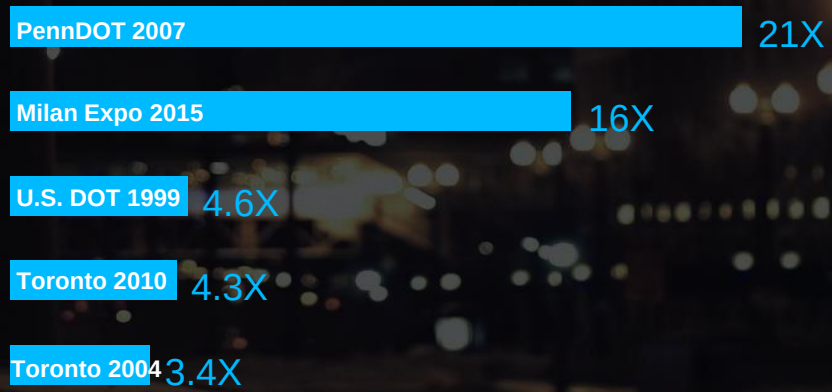
UNDERGROUND INFRASTRUCTURE: THE PROBLEM



The problem is due to:

- Existing records are typically **15-30% off mark**
- Existing records are **incomplete** (90% don't have depth dimension)
- Maps are **not updated** after relocation of assets
- Underground assets are **not mapped and digitally managed** in a single database

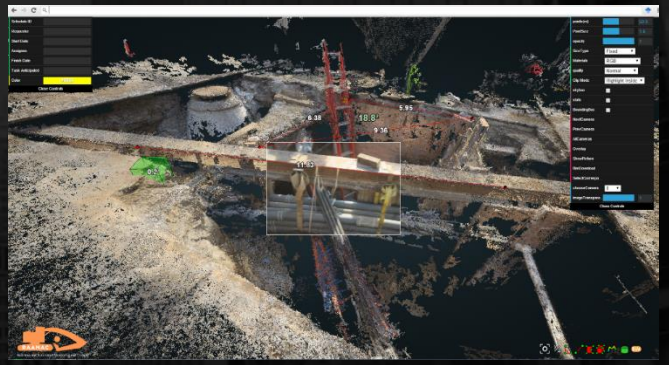
RETURN ON INVESTMENT



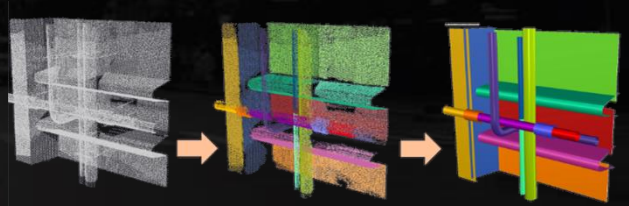
The rate of return for underground mapping projects ranges from 3.4X to 21X

RETURN ON INVESTMENT

SCANNING TECHNOLOGY



Scanning technology to transform regular video or **photos into point clouds** and then transforming **point clouds into 3D objects**



3D MODELS AND VISUALIZATION

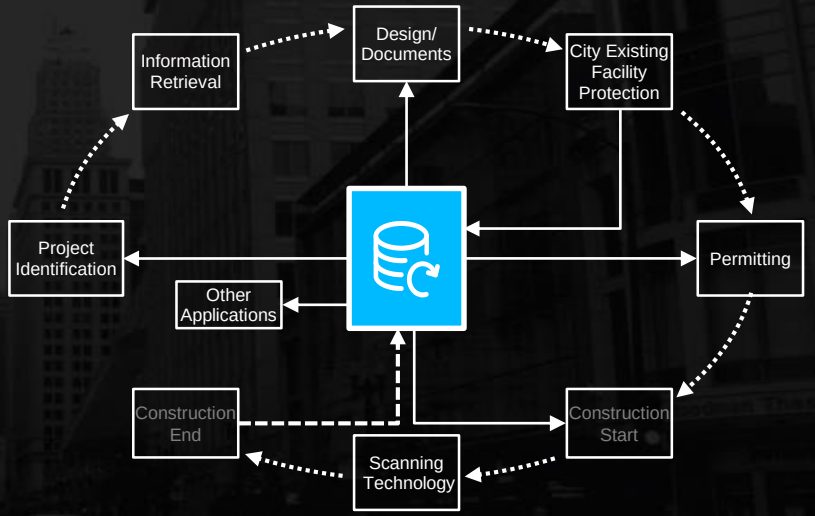
Video Link

MOBILE APPLICATION

Super-impose 3D utility data on the live view from the rear-facing camera on mobile device

Displays **spatially accurate 3D utility data** using mobile device sensors such as GPS, magnetometer, accelerometer and gyroscope

PROCESS & GOVERNANCE



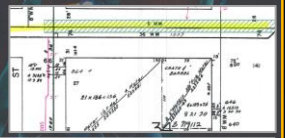
Mapping and scanning technologies are underpinned by new **processes and data governance**

IN SUM

Collect and Verify Data

Coordinate collection and verification of data containing underground structure from disparate sources of information:

- Existing GIS data in Excel, CAD, or other industry formats
- Field tools such as lidar and high-definition cameras

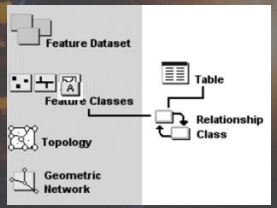


Digitize & Maintain Data

Create virtual mapping and cataloging of underground structures

Continually maintain and enhance data to include available updated asset information

Manage & maintain secure public/private data exchange



Visualize Data

An online portal (for desktop and mobile) provides true underground asset location (x, y, z) information to utilities, government, construction crew

The “Divining Rod” mobile application geolocates the users and displays underground assets at the user’s exact location (or any other location)

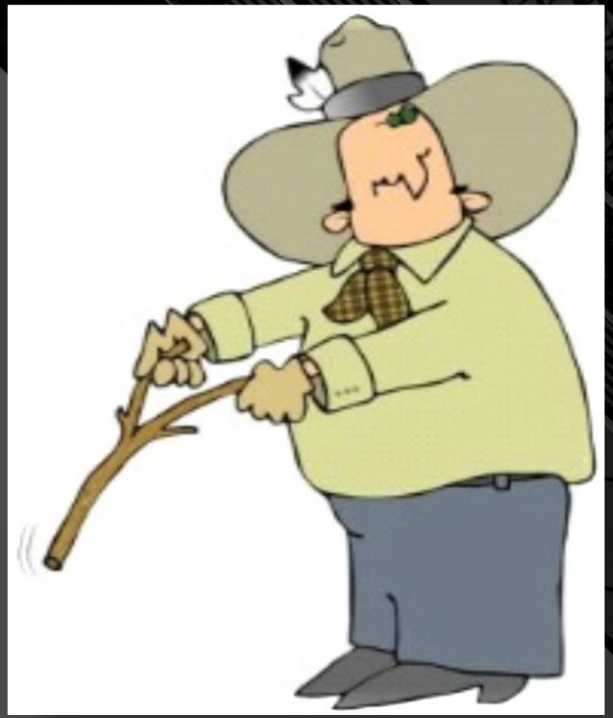
Export data from the database into CAD files for use in design

Open the data to 3rd parties to develop new services and create new revenue streams

accenture
tyco
hbk

Underground Selection

A DIVINING ROD FOR THE FUTURE ROLE OF UTILITIES IN IOT?



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DIGITAL TECHNOLOGY IS SHAPING SMART CITY SOLUTIONS LIKE NEVER BEFORE

QATAR SMART NATION

The Ministry of Information and Communication Technology has a mandate to foster the use of digital technologies. However, the ICT sector is underdeveloped and current policies are not conducive to private sector growth. Accenture thus defined an **overarching Smart Nation vision** for Qatar, including key priorities, a framework, and articulation of the enablement of cross-sector smart services via a nationwide data aggregation & processing platform. This work resulted in **a clear actionable roadmap** to develop a digital cluster, a **Smart Nation Mandate** and Framework, and an outline of Qatar's Smart Nation **governance model**.

CITY OF AUSTIN SMART CORRIDOR

Accenture has partnered with the City of Austin, Cisco, and Nokia to help deliver a transportation Proof of Concept in the Riverside Corridor, an auto-centric arterial with a diverse population. This PoC will utilize **Autonomous Vehicle (DSRC), Crowd Analytics, Video Analytics, and Fleet Management Solutions**. In addition, the initiative will create a **visualization platform** for identifying the areas with the highest payback potential from new investments in retrofits. Looking forward, this work will provide the City of Austin with new insights and data sets that will be utilized in their transportation planning and give the city a blueprint to execute future PoCs.

CITY OF ATLANTA SMART WATER

The City engaged Accenture to implement a **Smart Water Analytics solution** to track Consent Decree project completion, leveraging **predictive analytics to prevent spills and overflows** in the sewer network, and to allow **geospatial visualization** of the City's sewer assets and **real-time sewer flow and level data** to plan both pipe rehab prioritization and preventive maintenance to maintain both smooth operations and successful consent decree closeout. An **analytics platform** was implemented, allowing the City to view a number of data sets for more comprehensive decision making in real-time.

Smart Water Analytics Client Story

City of Atlanta, Department of Watershed Management

Context and Challenge

The department of Watershed Management for one of the largest metro city of US supports the largest & complex water and wastewater utility to support City and adjacent counties with their water needs. The Department has two drinking water plants, four wastewater treatment plants, six combined sewer overflow treatment facilities, and 16 sewage pump stations. There are approximately 1,600 miles of water distribution pipelines lines and roughly 2,000 miles of wastewater and combined sewers. The city's wastewater system serves more than 1.5 million people within Atlanta and the neighboring counties.

The City engaged Accenture in the implementation of a Smart Water Analytics solution to track Consent Decree project completion, leveraging predictive analytics to prevent spills and overflows in the sewer network, and to allow geospatial visualization of the City's sewer assets and real-time sewer flow and level data to plan both pipe rehab prioritization and preventive maintenance to maintain both smooth operations and successful consent decree closeout.

Solution

An analytics platform was implemented, and allowed the City to view a number of data sets: some relatively static (from GIS, hydraulic model results), some changing less frequently (contractor project completion data) and some dynamic (SCADA, flow and level monitoring) to allow more comprehensive decision making in real-time. Predictive analytics, based on large data analysis and statistical regression analysis on sewer level, allow operators to see if there are any actions that need to be taken at specific points in the network, reducing the amount of spills.

Additionally, daily spill information, shown overlaid with completed projects show the effectiveness of completed projects, while also helping prioritize upcoming projects. These types of analytics enable the City to be more proactive, and in some cases, predictive in their analysis of data being produced from their systems, allowing them to make better, more timely decisions.

Value

The potential benefits of the platform include:

- Reduction in sewer overflows and spills using predictive analytics
- Prioritized pipe rehab and maintenance within the sewer network to address recurring and potential issues, thus reducing customer impacts
- More effective capital spending based on analytics using historical data

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THANK YOU

SINGAPORE SAFE CITY TEST BED

Accenture's Safe City Solution integrates advanced analytics into existing sensors and systems to **maximize situational awareness, streamline operations and enhance response** to safety and security concerns

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BARCELONA PLATFORM FOR AN INTELLIGENT CITY

Accenture has partnered with Abertis and GDF Suez to manage the operating system for the city, City Os, over the next 3 years. This integrated urban management system will allow for **improved city management, enriched services for citizens, and enhanced opportunities to build a new economy based on data**. City Os will connect various technical systems in Barcelona, including Sentilo, which manages multiple sensors across the city (like irrigation systems, acoustic management systems and more).

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AMSTERDAM SMART CITY

Accenture is a strategic and long term partner in the Amsterdam Smart City context, helping in the development and running of the program. Alliander, a local electricity grid operator, the City of Amsterdam and the Amsterdam Innovation Motor (AIM) needed to come together **to meet Amsterdam's ambitious sustainable energy and carbon reduction goals**. Accenture was a strategic partner in the development of the ASC program by providing the vision and strategy, concept development, value delivery and execution.

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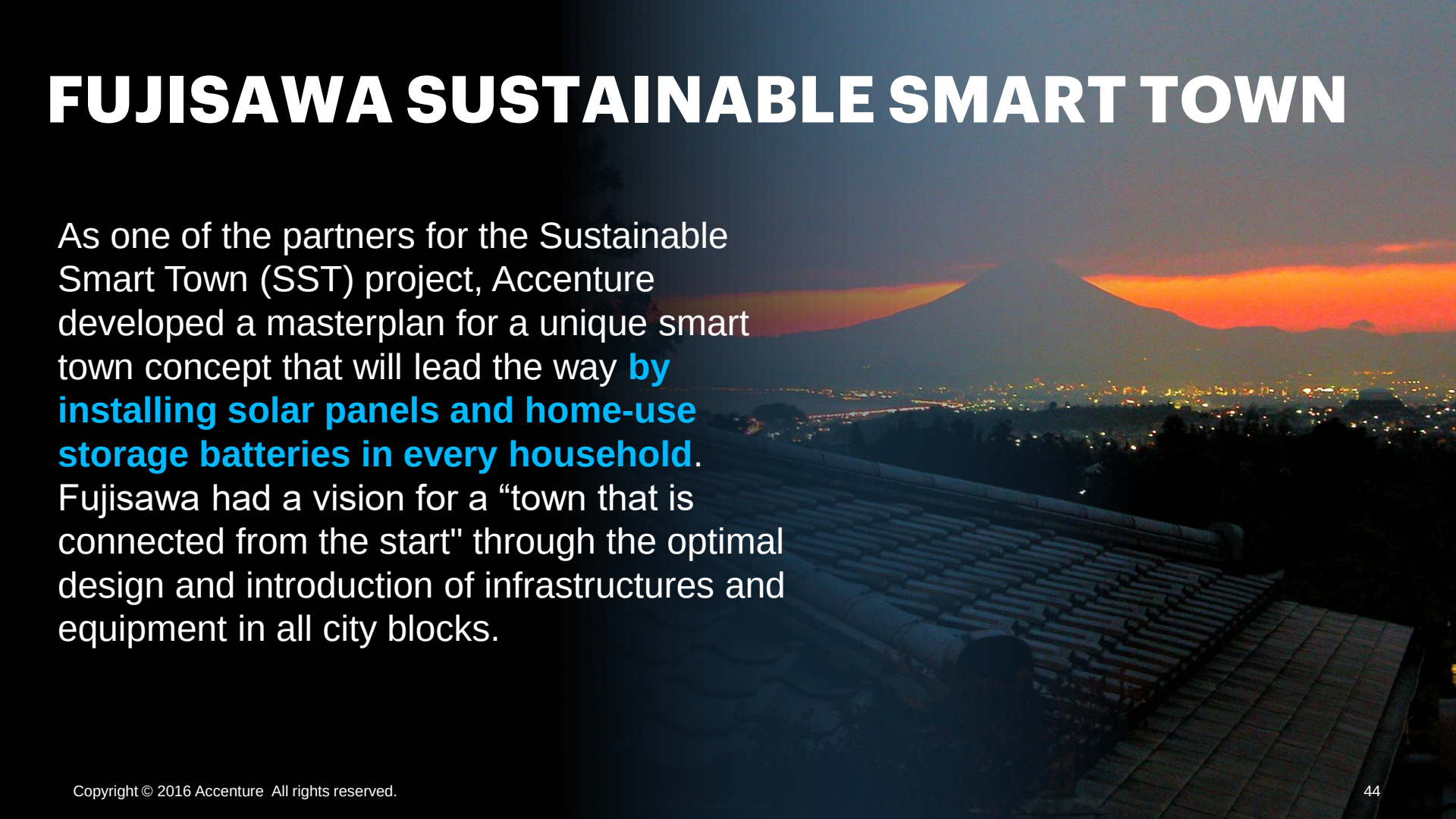
FUJISAWA SUSTAINABLE SMART TOWN



As one of the partners for the Sustainable Smart Town (SST) project, Accenture developed a masterplan for a unique smart town concept that will lead the way **by installing solar panels and home-use storage batteries in every household**. Fujisawa had a vision for a “town that is connected from the start" through the optimal design and introduction of infrastructures and equipment in all city blocks.

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