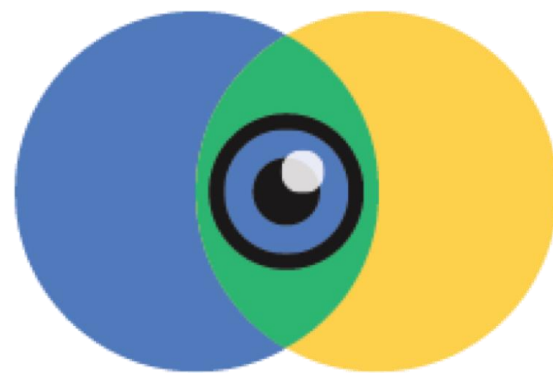




sensennetworks

Making Cities Smarter



Cities 4.0 Presentation

March 2018

ASX: SNS

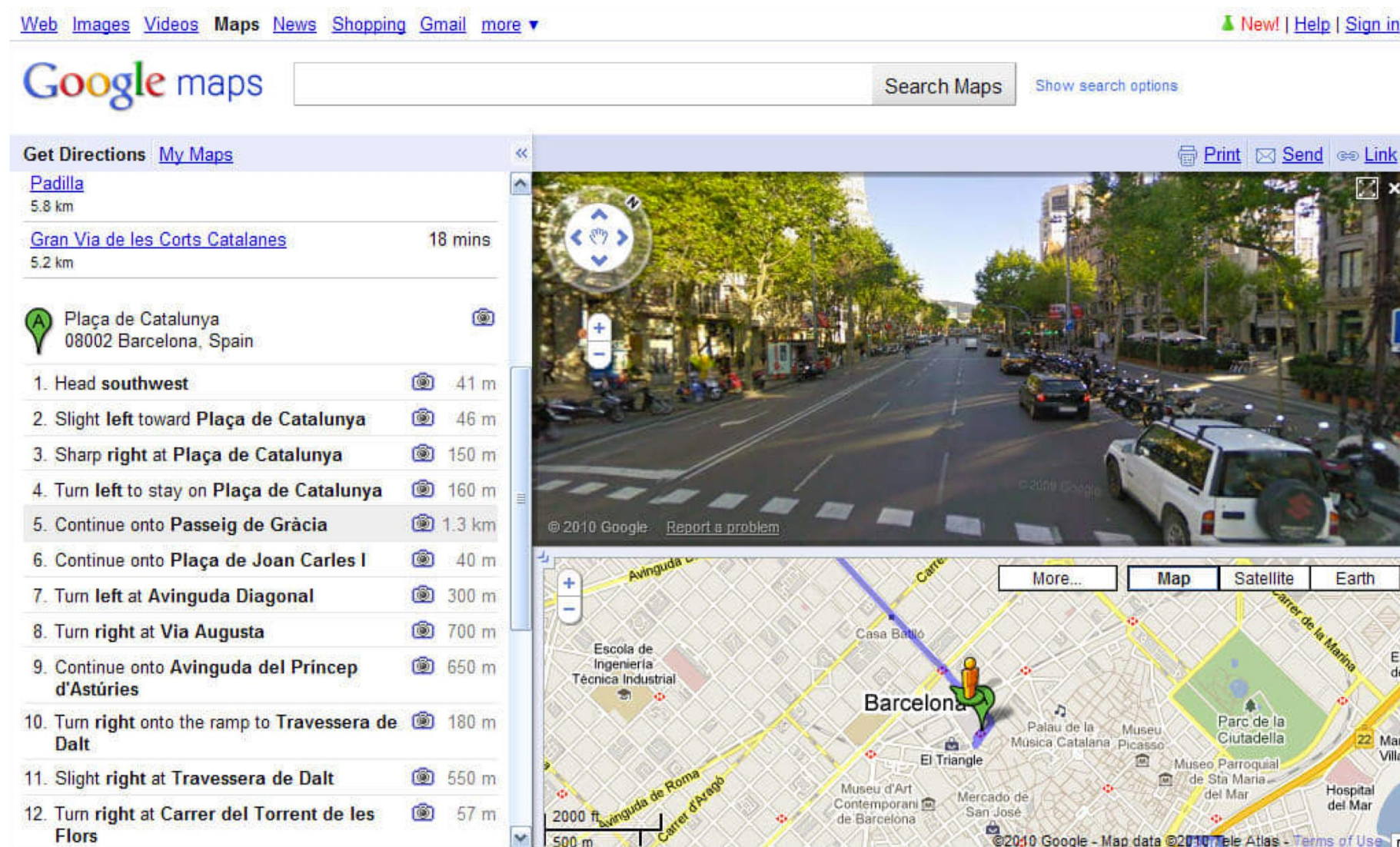
Contrasting Evolution

While we are talking about driverless cars
we still have cities sending officers to streets to manually monitor compliance



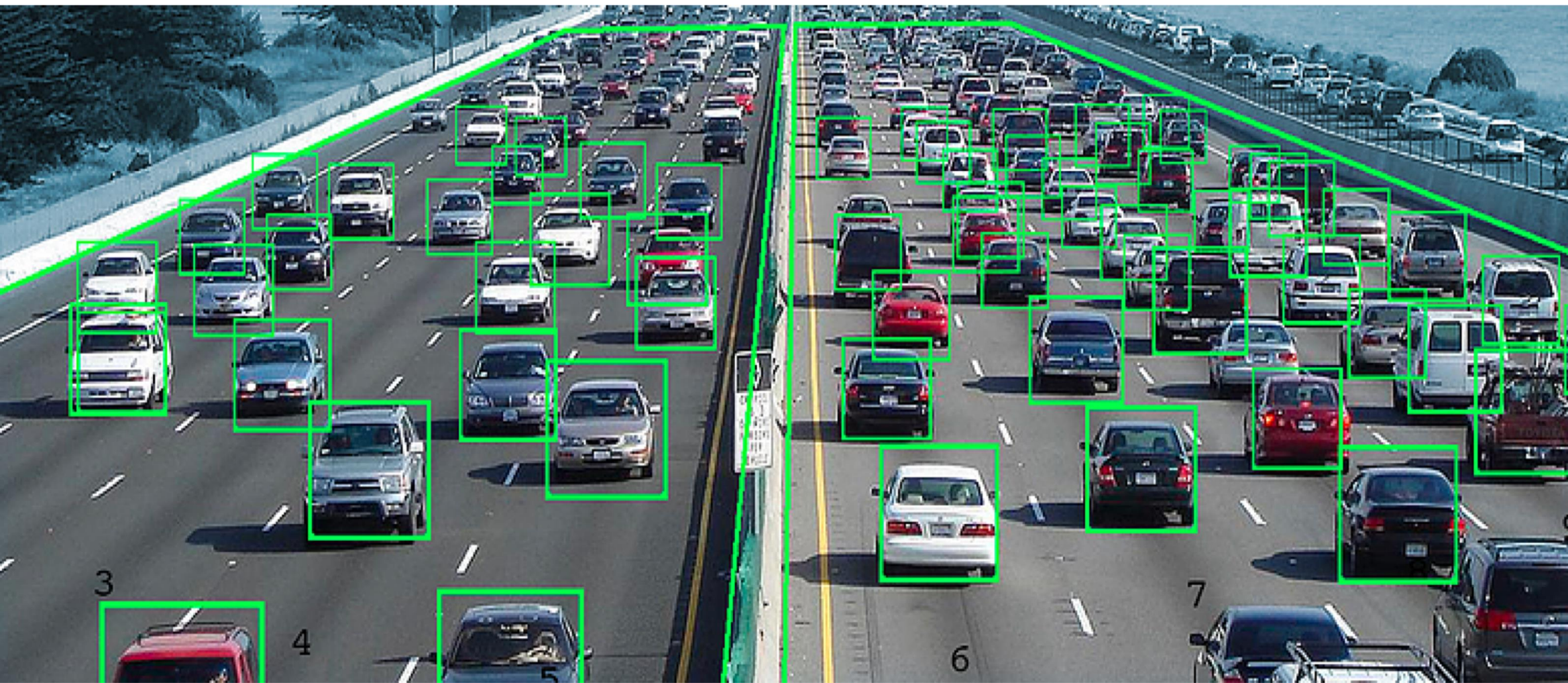
Contrasting Evolution

When we have entire world map at our finger tips
cities' civil surveyors still going to streets to manually survey assets



Contrasting Evolution

When technology can track every object with high precision
we have armies of people sitting behind a video wall watching streaming cameras



While we must have an eye on the future
there is a lot that can be done
with today's technology
to make cities more efficient and
to deliver more bang for the buck for its citizens

Making City Operations Smarter

MAKING CITIES SMARTER BY
ADDING VALUE THROUGH MULTIPLE TOUCHPOINTS

Parking Operations

Access Control

Occupancy
Information

Guidance

Enforcement

Traffic Engineering Operations

Sign & Line Audits

Traffic data collection

Facilities Management Operations

Footfall

Occupancy

Security and Safety Operations

Security Analytics

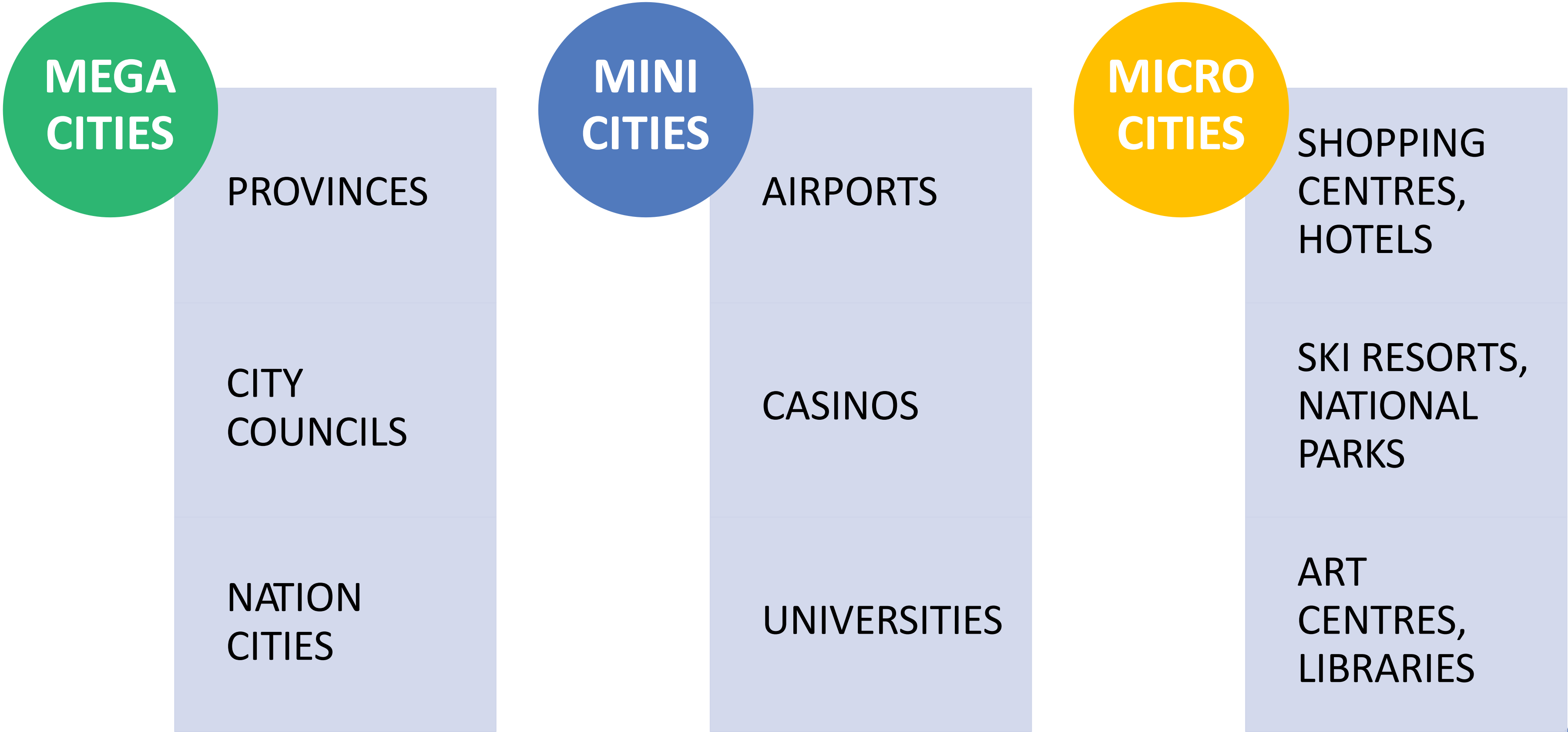
Speed Camera

Bus Lane/Transit Lane

Over dimension
vehicles



Spectrum of Smart Cities



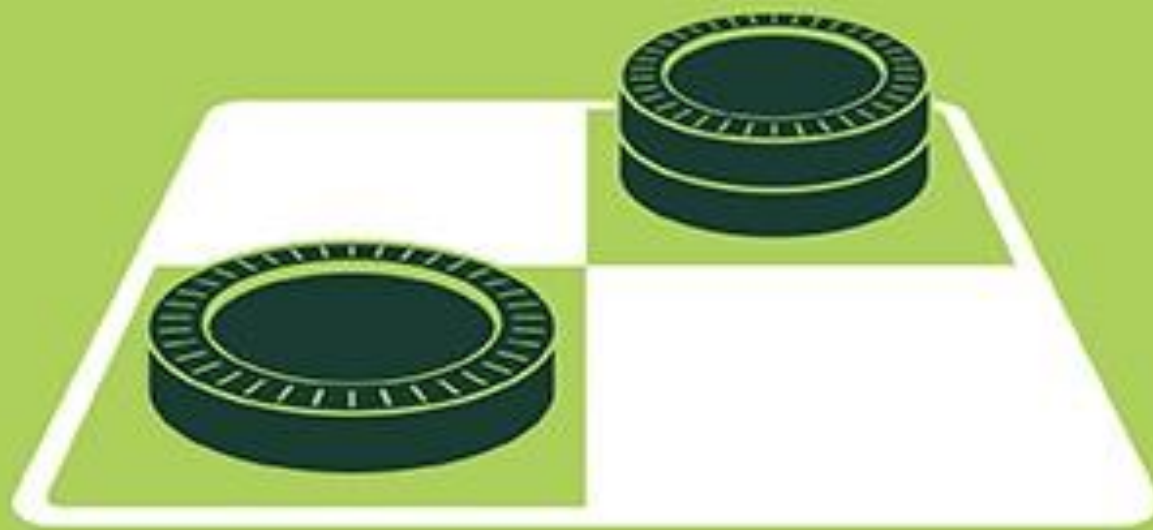
Artificial Intelligence Solutions powered by Deep Learning networks can tap into smart infrastructure of smart cities to Make City Operations Smarter

While this impacts every aspect of city operations, we will focus on
Parking, Transit, Road Safety, Facilities, Security
in this presentation



ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.



Artificial Intelligence and Deep Learning

MACHINE LEARNING

Machine learning begins to flourish.



DEEP LEARNING

Deep learning breakthroughs drive AI boom.



1950's

1960's

1970's

1980's

1990's

2000's

2010's

Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

Artificial Intelligence (AI)

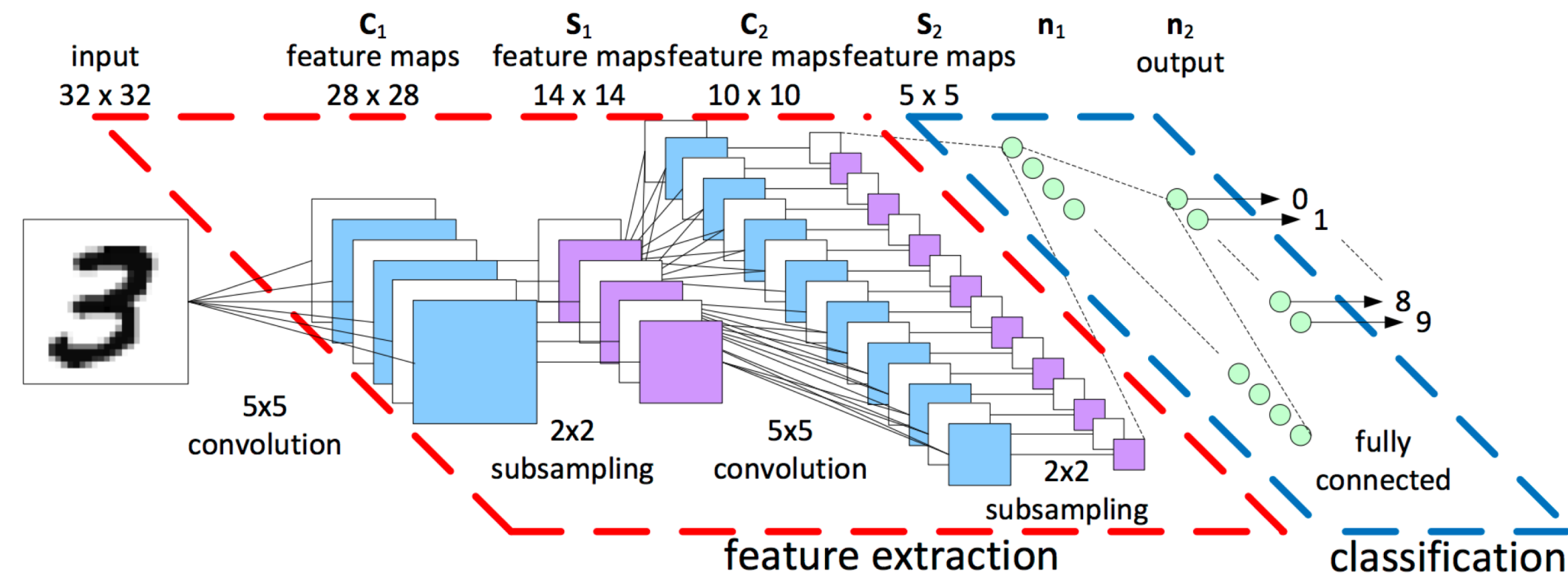
- | **AI involves machines that can perform tasks that are characteristic of human intelligence**
 - It includes things like planning, understanding language, recognizing objects and sounds, learning, and problem solving.
- | **Examples in life**
 - Virtual Personal Assistants: Siri, Google Now, and Cortana (using voice)
 - Google's self-driving car project and Tesla's "autopilot" feature are two examples that have been in the news lately
 - Music and Movie Recommendation Services: Netflix

Machine Learning (ML)

- | **Machine learning is simply a way of achieving AI**
 - You can get AI without using machine learning, but this would require building millions of lines of codes with complex rules and decision-trees.
- | **Machine Learning involves**
 - Training – collects thousands of dog and cat images to train
 - Predict – given an input image, tell if it's a car or dog
- | **ML needs algorithms to train**
 - A lot of them
 - Neural Network (NN) in one of a kind
 - NN is a computer system modeled on the human brain and nervous system.

Deep Learning (DL)

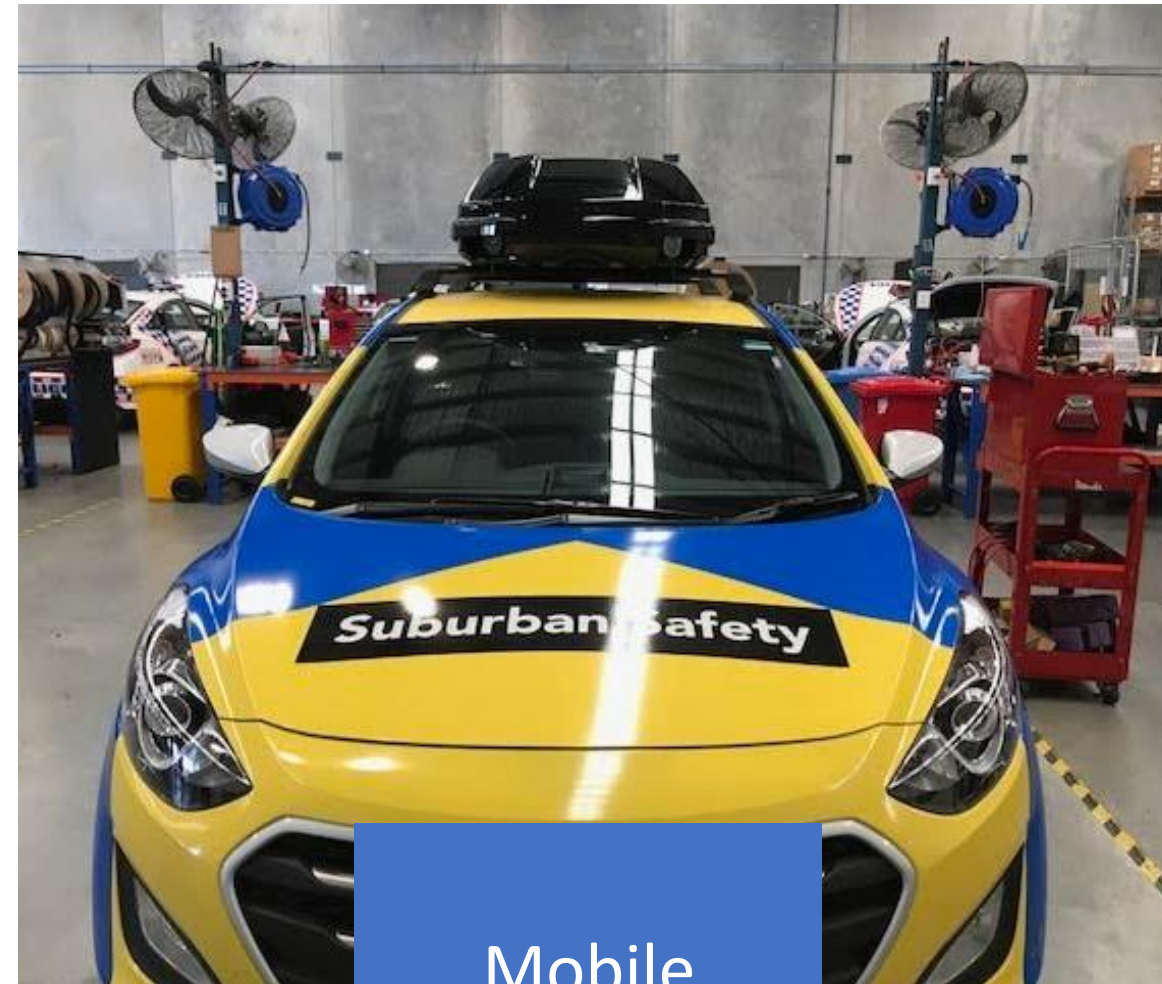
- | Deep learning is one of many approaches to machine learning.
- | DL contains multiple layers instead of 1 or 2, which created its name “deep”.



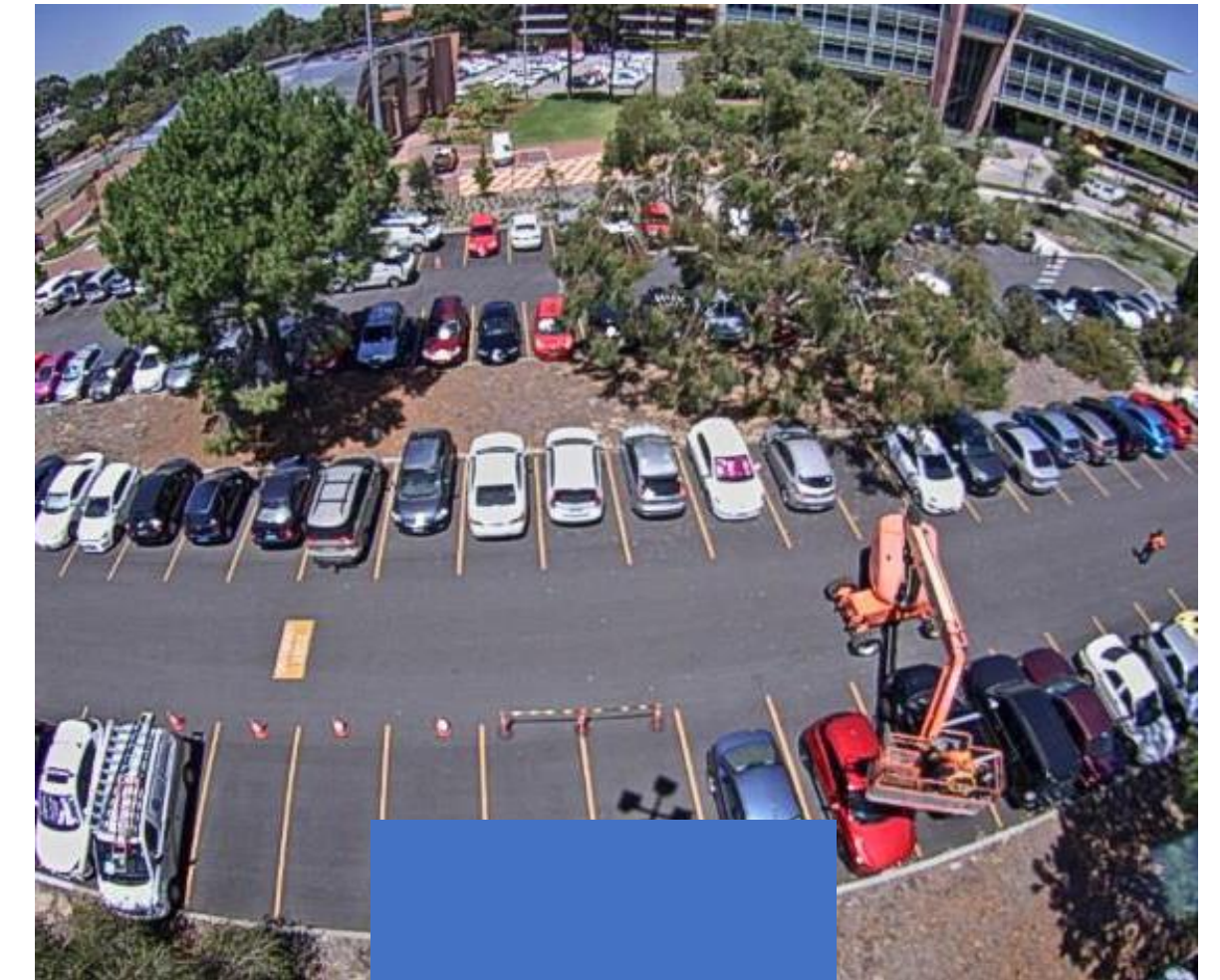
Making Parking Operations Smarter



Detecting
Parking Signs
& Creating
Parking Zones



Mobile
Parking
Enforcement



Parking
Guidance



Making Road Safety Operations Smarter



Making Illegal
Unsafe parking
detection
Smarter



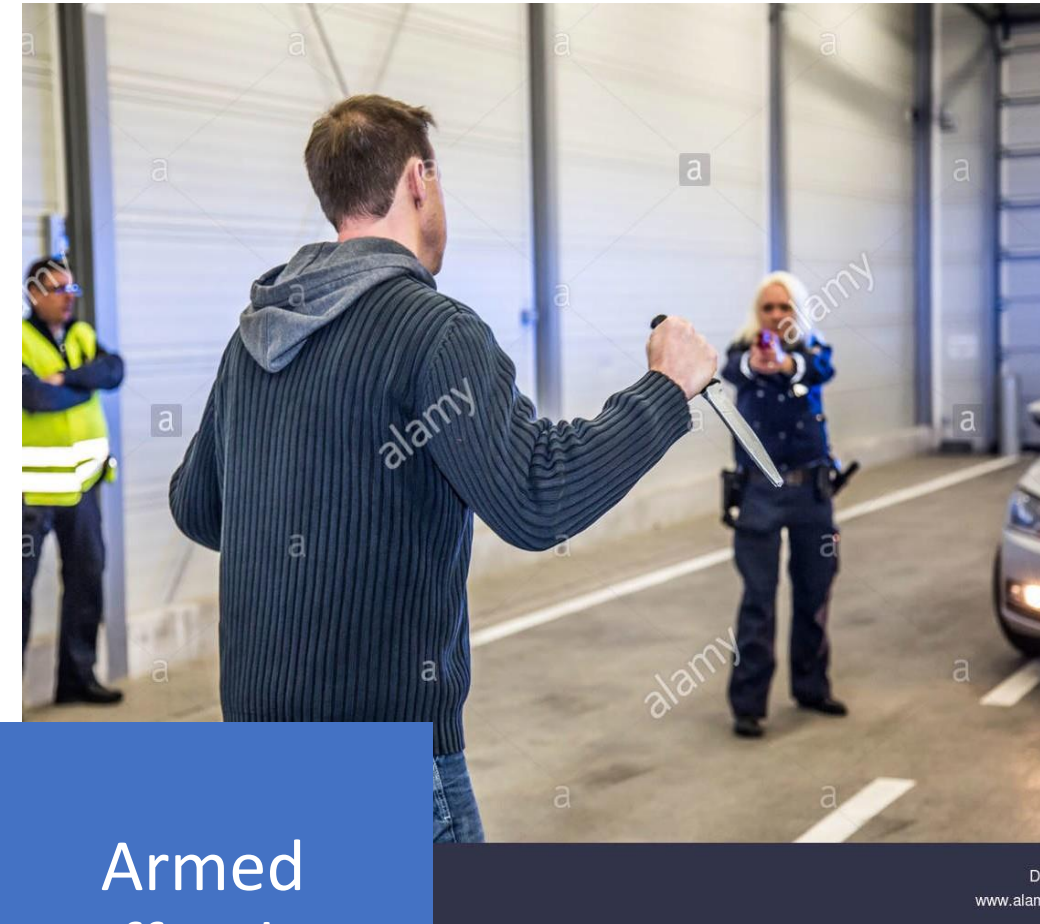
Making
Speeding
Vehicle
Detection and
enforcement
Smarter



Making Security Operations Smarter



Overstay
Vehicles and
Unattended
Object
detection



Armed
Offender
Detection



Smart Cities should not just be about Smart Infrastructure It must also be about Smart Operations

There is a lot to be gained by focusing inwardly at Smart City Operations to become more efficient and deliver more value for the rates communities pay



INDUSTRY RECOGNITION



**2017 Merit Recipient –
Automated Asset
Mapping Solution**



**2018 Global Smart 50 Award
Winner – Intelligent Video Analytics**



**Foundation Partner,
NVIDIA Metropolis Partner Program**





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