Tackle the curse of information overload
What can we learn from China's Mega Cities

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LEADING NEW ICT

What are the challenges of Mega Cities?

Uncontrolled growth leads to population growths in underdeveloped areas (slums) as built up of houses and infrastructure lacks behind demand

overcrowding, traffic congestion, limited parking, **air pollution** and high income inequality

existing **power grids** face challenges such as unsustainably high energy consumption and low efficiency

Water management (surface, fresh, waste). impermeable surfaces account for over 75 percent of a city’s land mass

Dependancy on **smart city** infrastructure creates new vulnerabilities to **cyberattacks**

Failed Urban planning can lead to protests and **brain drain**

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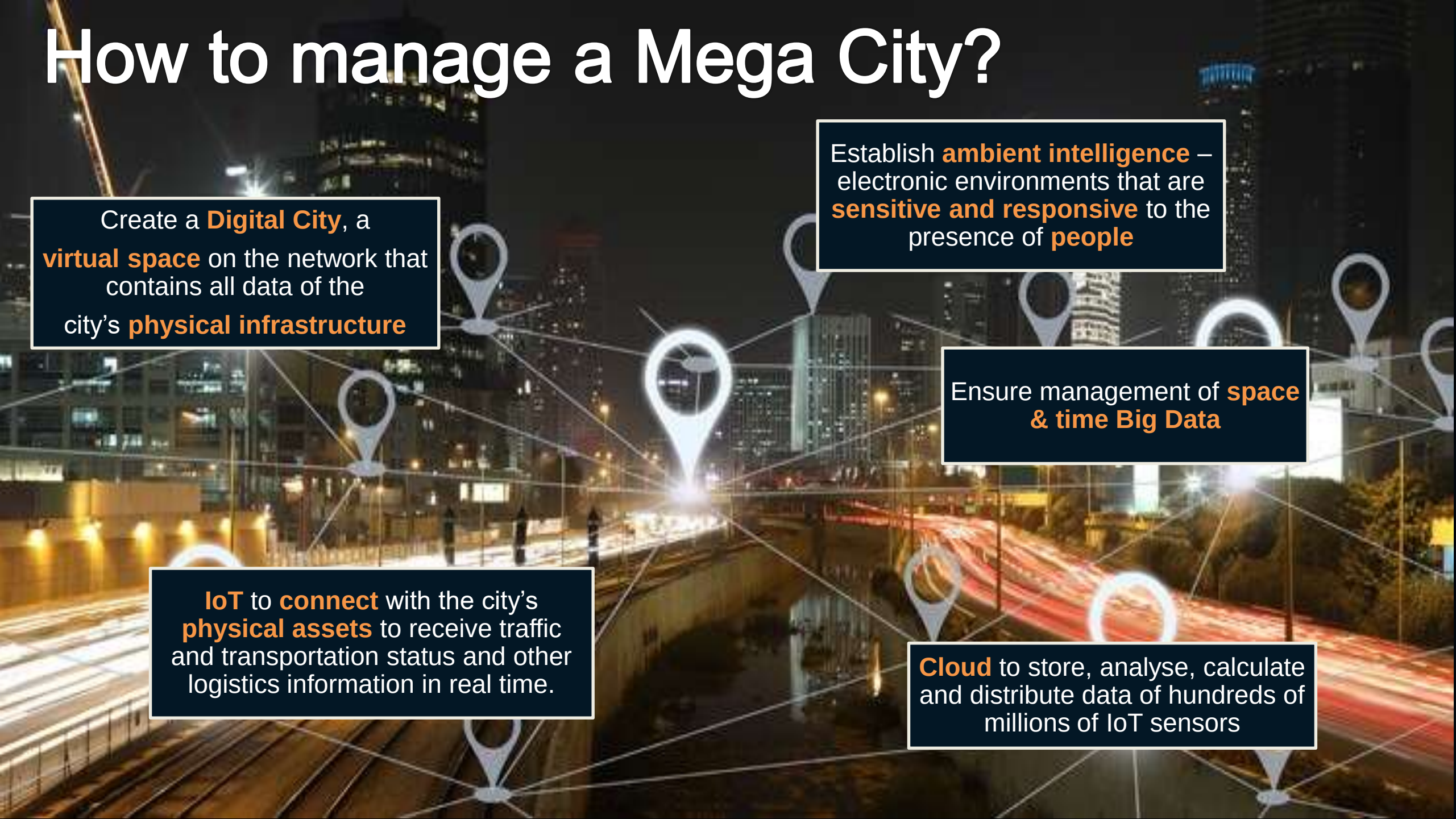
How to manage a Mega City?



Create a **Digital City**, a **virtual space** on the network that contains all data of the city's **physical infrastructure**

Establish **ambient intelligence** – electronic environments that are **sensitive and responsive** to the presence of **people**

Ensure management of **space & time Big Data**

IoT to **connect** with the city's **physical assets** to receive traffic and transportation status and other logistics information in real time.

Cloud to store, analyse, calculate and distribute data of hundreds of millions of IoT sensors

China attracts most Mega Cities globally

33 MC globally

- **6 China**
- 4 India
- 4 Europe
- 9 Asia Pacific (excl.China and India)
- 2 North America
- 5 South America
- 3 Africa & Middle East

WORLD ECONOMIC FORUM

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Shenzhen, China's Tech Mega City

- From fishing village to Silicon Valley of Hardware Megacity in 30 years.
- China's first Special Economic Zone
- Influx of workers from the countryside
- Shenzhen — and the surrounding Pearl River Delta — became world's factory floor
- now a Megacity of over 12 million people
- incubator for cutting-edge design, a bastion of next-gen urbanism, and a cultural capital

Home to

BYD
DJI drones
Huawei
Tencent
...

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How to coordinate transport in a vast economic area?

11 cities
56,000 km²
59.6 mio population
US$ 1.5 trillion GDP

Five major international airports
Five billion-ton ports
210,000 km roads
4,000 km railways

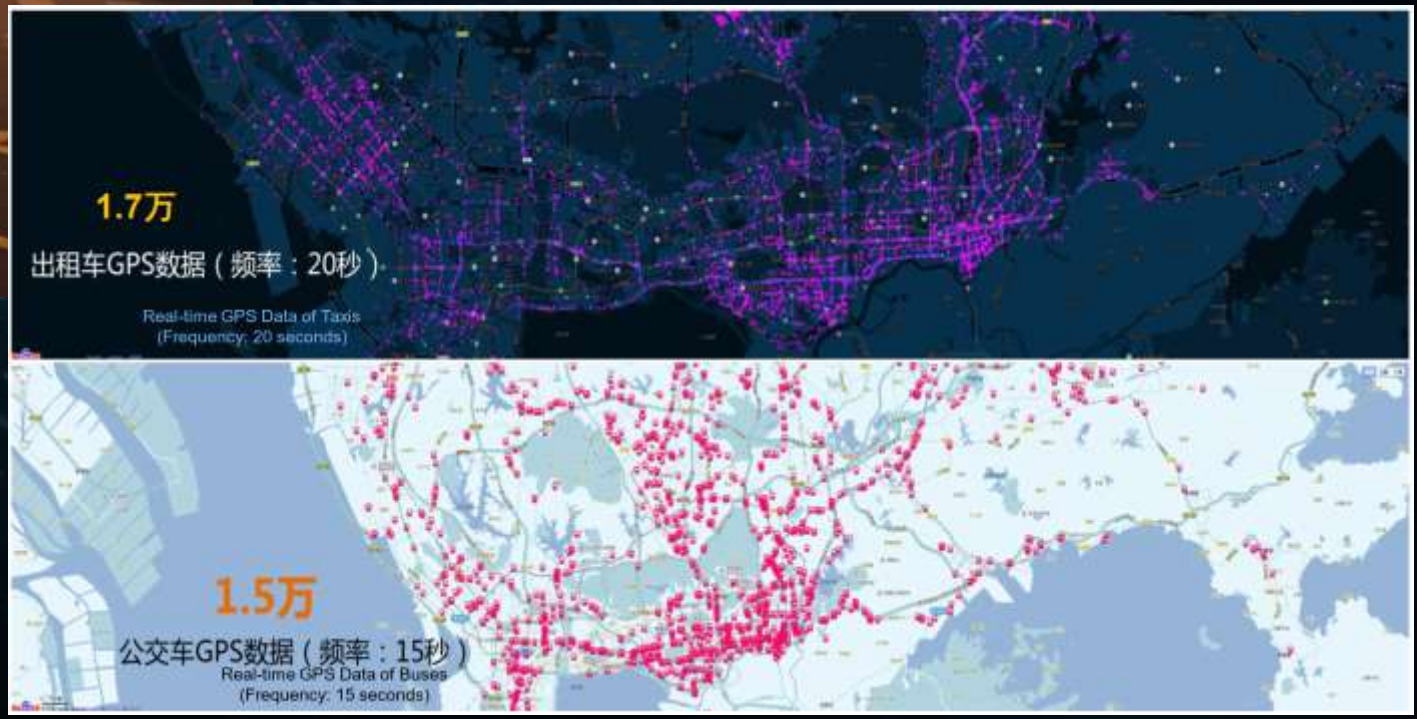
Guangdong - Hong Kong - Macau Bay Area

Ensuring a sustainable development of urban transport in Shenzhen

Municipality setup a Multi-Dimensional Big Data System

- Land Use Data & Building Data GIS
- GPS vehicle trajectories
- Geo-magnetic flow
- Number plate recognition
- Mobile and Internet Data
- GPS location data Baidu
- …

Ensuring a sustainable development of urban transport in Shenzhen



GPS vehicle trajectories

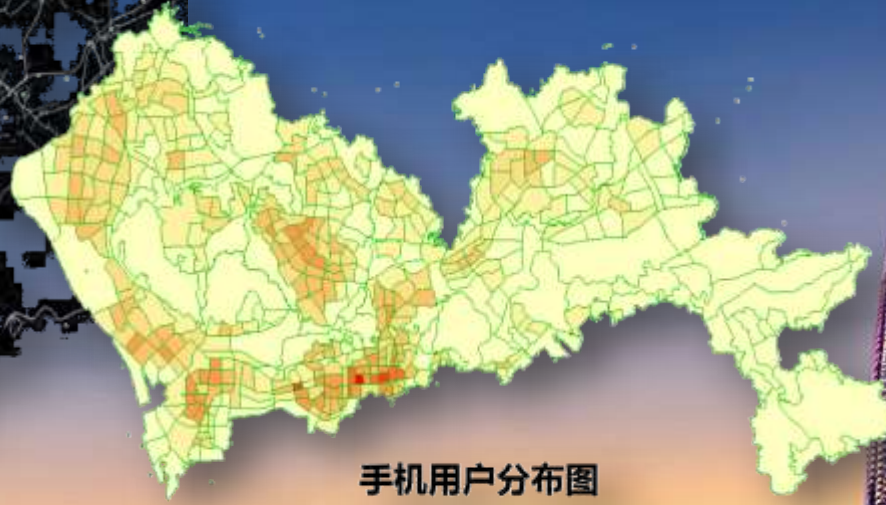
- **Taxis 20 seconds interval**
- **Busses 15 seconds interval**
- **Number plate recognition**

Ensuring a sustainable development of urban transport in Shenzhen

System captures:

- **Mobile phone & internet data**
- **Distribution of Mobile Subscribers**
- **GPS Data from Baidu map**

GPS Data from Baidu



Distribution of Mobile Users

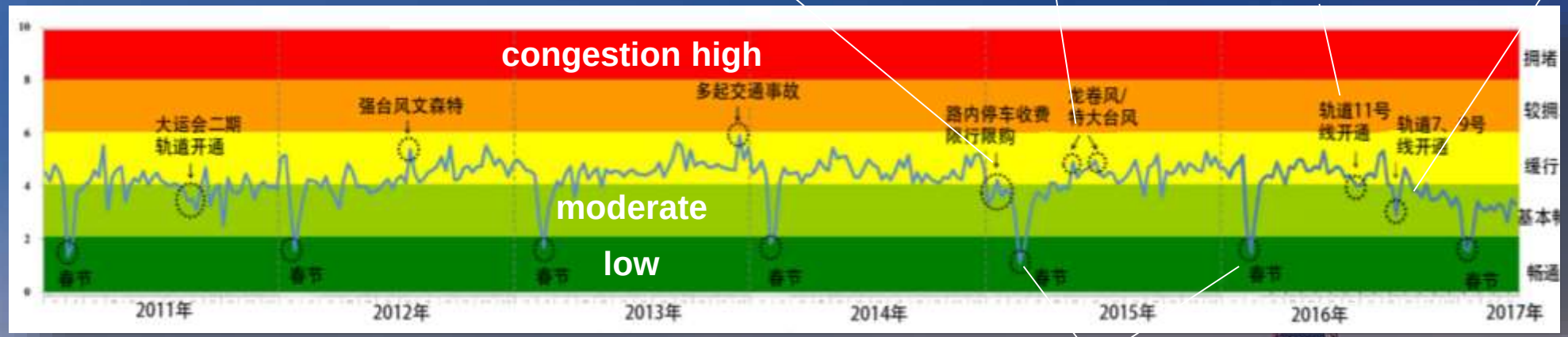
Ensuring a sustainable development of urban transport in Shenzhen

On-street parking charges

Typhoons

Metro line 11 opening

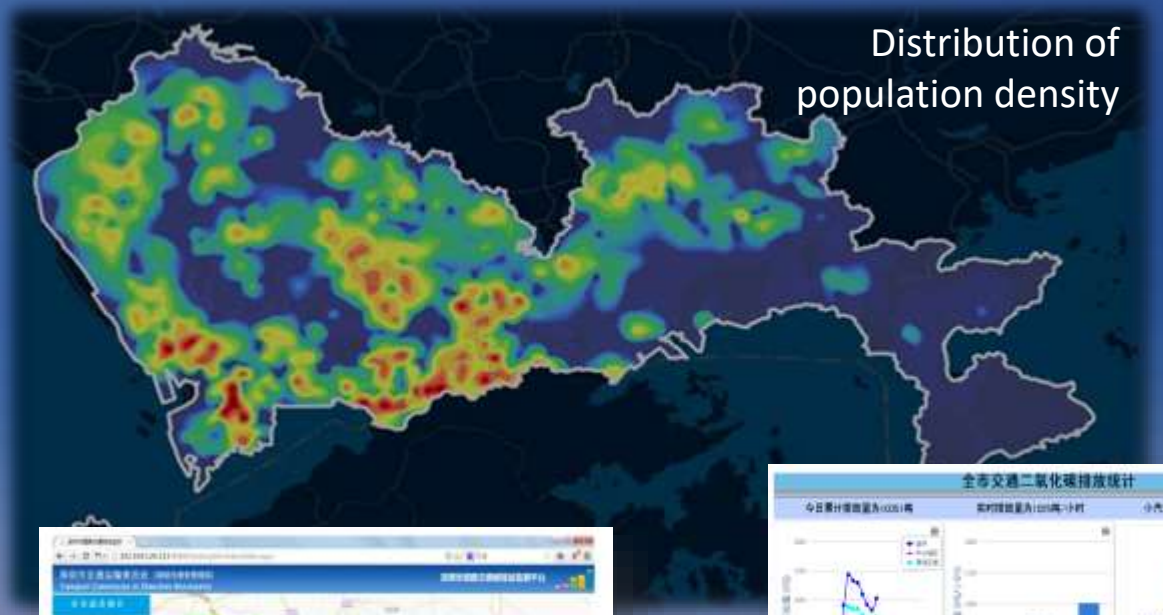
Metro line 7&9 opening



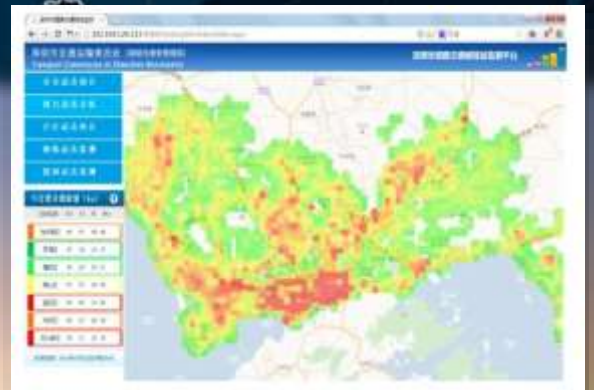
Chinese New Year

- Create histograms (i.e. traffic)
- learn form historic data

Data-driven Transportation Governance for Shenzhen

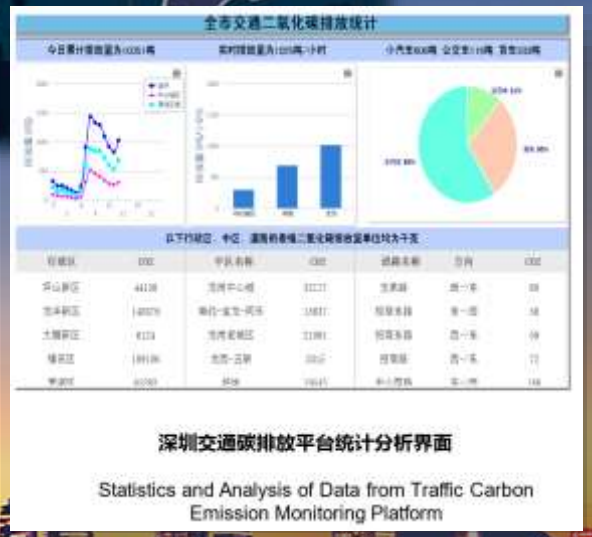


Distribution of population density



深圳交通碳排平台实时展示界面

Real-Time Visualization of Data from Traffic Carbon Emission Monitoring Platform



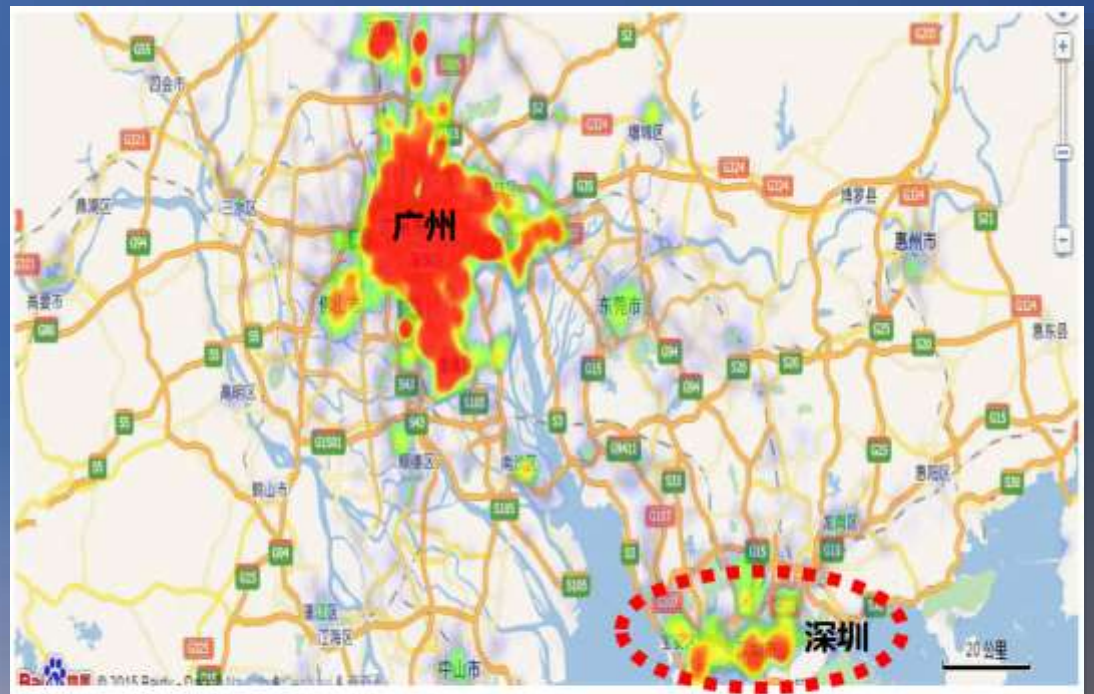
深圳交通碳排放平台统计分析界面

Statistics and Analysis of Data from Traffic Carbon Emission Monitoring Platform

- Tab into multi-dimensional data
  - Traffic performance
  - Weather
  - Carbon emissions
  - Traffic accidents

- Process and evaluate impact
- Build real time view of the city's status
- Support decision-making based on facts for transport operation management

Data-driven Transportation Governance for Shenzhen



广州CBD周末人群活动空间分布

Spatial distribution of crowd activity on weekends in Guangzhou CBD

- **Decision taking** process on traffic hub locations based on **Big Data heat-maps**
- Candidates identified based on analysis of mobile data travel hot-spots
- As a result planning of **Shenzhen Futian HSR Station** was **placed** under Futian CBD **in Central Area**

Data-driven Transportation Governance for Shenzhen

公交运行实时监测
Real-time monitoring of bus movements

人流活动实时监测
Real-time monitoring of pedestrian traffic

出行OD分析
Origin-destination (OD) analysis

共享单车动态监测
Dynamic monitoring of bike sharing

- **Data** Drives transportation department through **facts**
- **Avoids incoherent** transportation services
- Shenzhen built and integrated **intermodal systems** (sea, road, air and rail)
- Established integrated, **intelligent command platform** improving ability of emergency management and service coordination

Data-driven Transportation Governance for Shenzhen

MaaS口岸通关场景示意图

Custom clearance with MaaS

深圳交通中心

Shenzhen Urban Transport Planning Center

- **Big-Data** and **Cloud** based apps provide value add service
- **Real time** data from Metro, Bus, parking, car-hailing…
- Basis for Mobility as a Service (**MaaS**)

How can we apply China’s methodology to Europe?

- Embrace municipal wide command and control structures
- Move from Networking towards Intent driven architecture
- Consider trend of Mega-City clusters
- Study commuting patterns beyond city boundaries
- Setup multi-dimensional Big-Data system
- Collect, Connect and share data between silos
- Embrace data as the new oil

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Writing a New Chapter in Intelligent Operation

Analog and Digital Era

Optical Imaging Technology
Captured video can be collected and stored.

Difficulties:
small scale, small coverage, and unreliable storage

1970~

Network Era

IP and Storage Technologies
Large-scale video networking, long-term video storage, and intra-network sharing

Difficulties:

- Difficult to find clues and low video utilization
- Duplicate and uncontrollable data across the network
- Weak controllability

2000~

Intelligent Era

AI – Cloud - Pipe

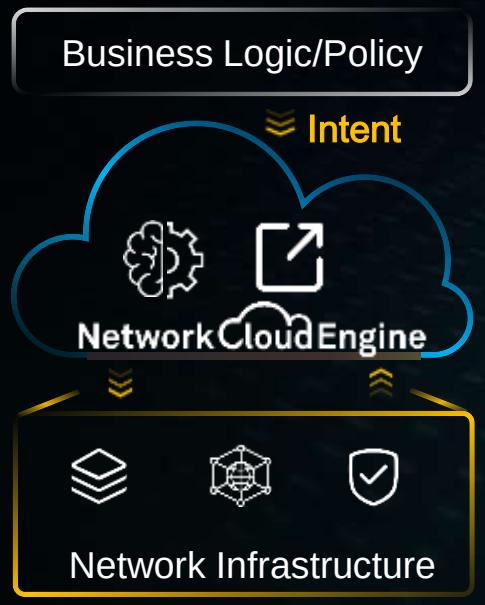
- Manual video Playback => AI recognition
- Post-judgment turns => pre-warning
- On-demand Elasticity Deployment, Global Coordination

2018~

Future mobility strongly depends on New ICT where
Everything Is
Sensed
Connected
Intelligent
Digital Transformation
New ICT
Cloud
Big Data
IoT
AI
5G

Intent-Driven Network Characteristics

monitor, identify and react in real time to changing conditions



Intelligence

Big data and AI powered predictive maintenance

Simplicity

Simplified architecture/protocol/site/O&M

Ultra-broadband

Massive connectivity, low latency, high bandwidth

Openness

Sustainable ecosystem with intent-based APIs

Security

Proactive defense with advanced threat detection

Everything Is **Sensed Connected Intelligent**

Huawei Transportation

Spanning more than 40 countries and regions in 5 continents

120,000+ km
Railway

Germany's DB, Spain's ADIF, China's CRC …

120+ Lines
Metro & Light Rail

London Underground, Amsterdam Metro, Shanghai Metro…

50+ Airports
15+ Airlines

Dubai Airports, Changi Airport, Malta Airport, Heathrow Airport, Shanghai Airport, Thailand Airport…

100,000+ Km
Highway & Roads

Brazil's CCR, France's SANEF...

12+ Seaports

Port of Durban in South Africa, Shanghai Yangshan Port in China …

THANK YOU

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Chairman, eLTE Industry Alliance

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