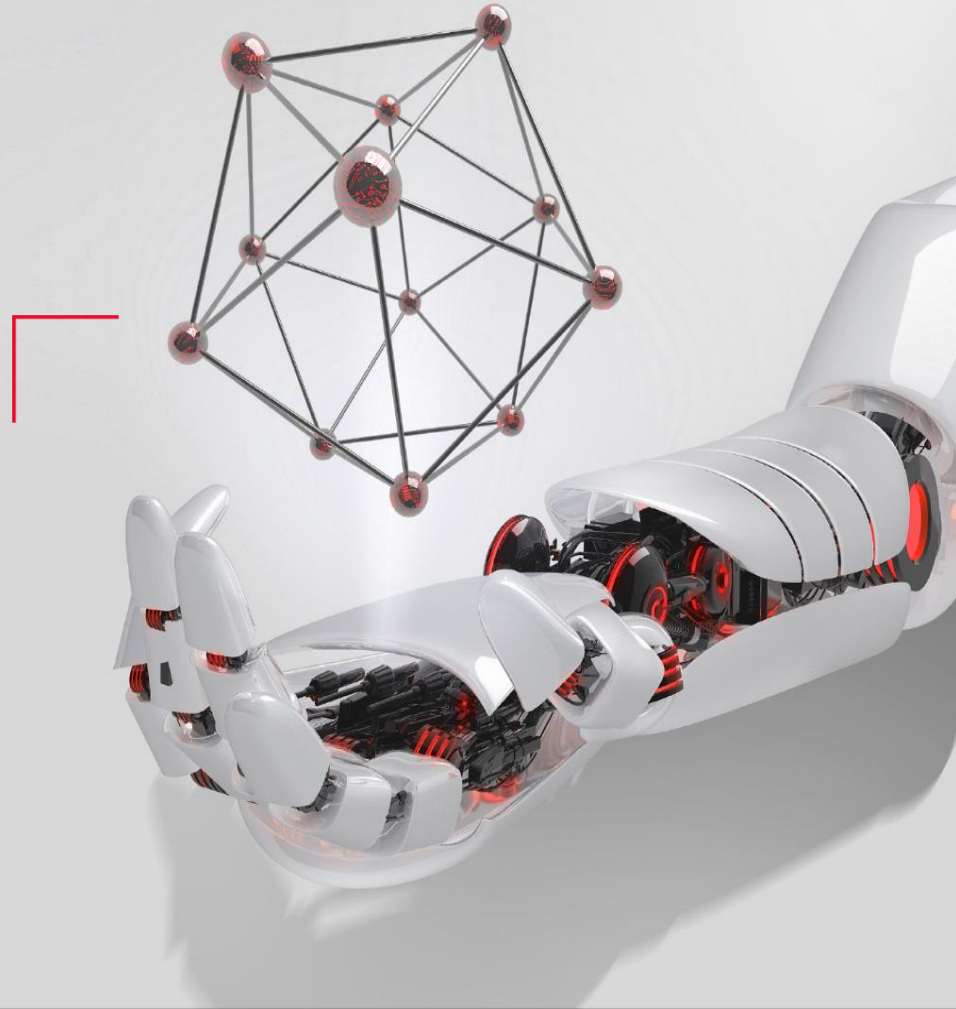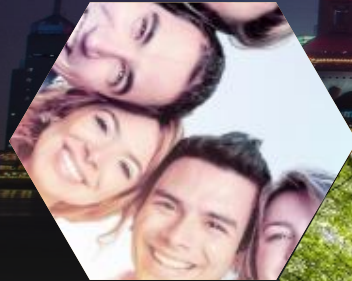# AI, the Engine Powering Development of Smart Cities

Oleg Logvinov

Chairman, IEEE P2413 Working Group

Smart City as a Unique Multi-Domain Environment

Smart **Environment**

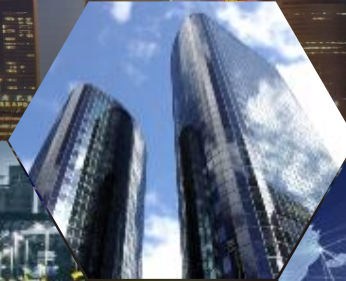Smart **Mobility**

Smart **Governance**

Smart **People**

Smart **Living**

Smart **Economy**

Smart City Applications and Requirements

Vivid Service   **Green** Living   **Safe** City   **Efficient** Manufacturing

Artificial Intelligence

Connected City, Better Life

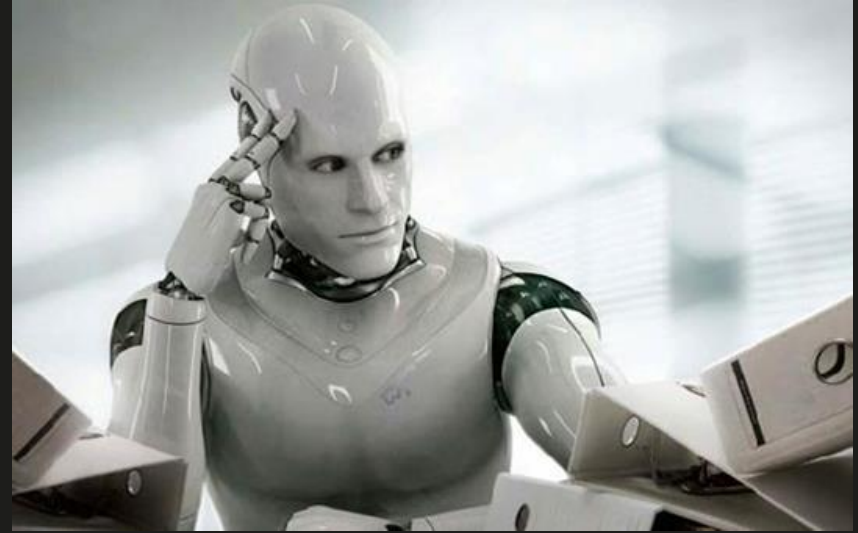E-Mobility   Sharing Economy   Security&Protection   Smart Factory

AI Makes Cities Smarter

AI generated Business Insights drive New Business Models and Economic Growth

AI Learns Patterns

AI Optimizes Infrastructure

AI Improves Public Safety

Data Explosion in Big Data Era

100TB - PB lists/signal data GB work orders data
100TB-PB statistical data TB alarm data
100TB-PB performance data GB resource data
TB internet data TB fault data …

Network Data

PB, structured, ARPU, demographic information,
User consumption habits, order information, group,
User preference, terminal information

User Data

TB assets information TB finance information
TB HR information TB project information
TB purchase information TB inventory information

Business Data

PB, structured, network access signaling
Base station, map, Regional access numbers
Regional population flow trajectory…
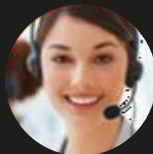
Location Data

Volume

Velocity

Variability

Variety

Veracity

Complexity

What is AI and what can AI do ?

- Artificial Intelligence
- Machine Learning
- Deep Learning
- IoT
- Big Data
- Blockchain
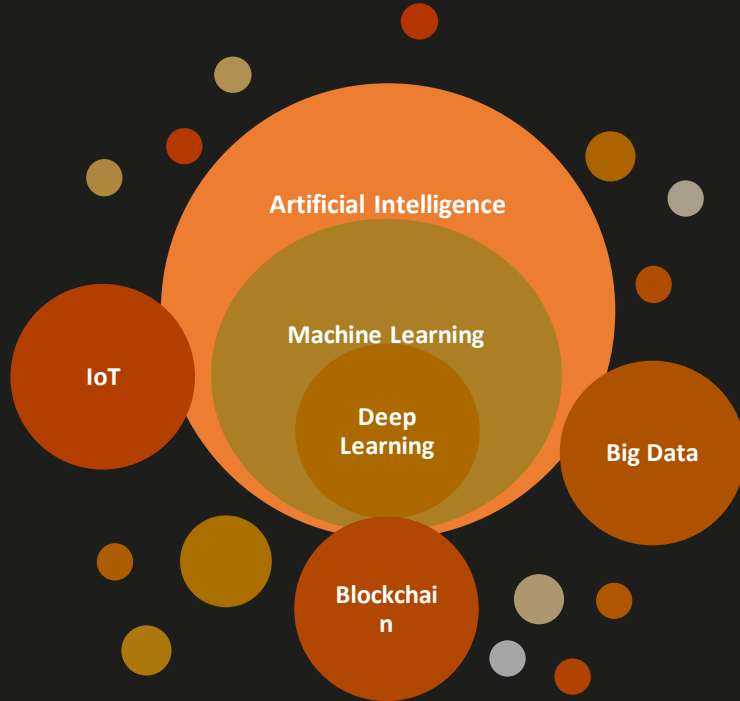
- Autonomous Drive
- Facial Recognition
- Speech Recognition
- Classification
- Play Chess
- Diagnosis

Building Smart City "Nervous System"

DIKW Pyramid

Wisdom — Central Nervous System – AI 'Brain'

Knowledge

Information — 'Peripheral Nervous System'
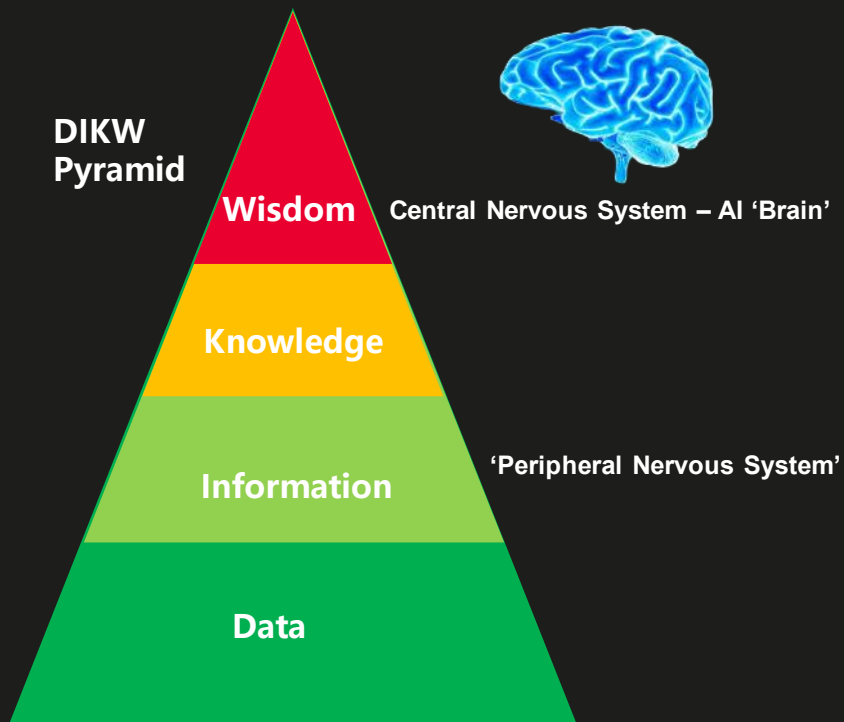
Data

City Operations Center   **Cloud Data Center**

+

Internet of Things   **Communications Network**

+

AI for City Planning
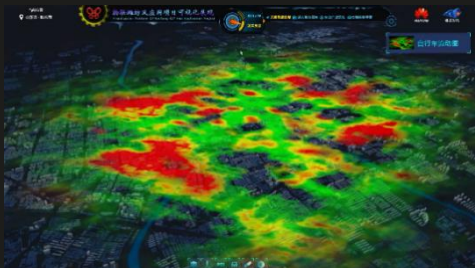
Bicycle Thermodynamic Chart

Bicycle Storage Planning
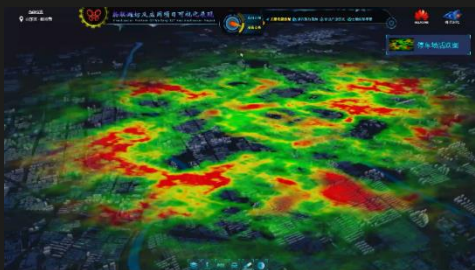
Vehicle Thermodynamic Chart

Parking Lot Planning

AI Video Cloud Analysis for Safe City

Practical applications

| General video management | Video investigation | Video command | Case-associated video management | Releasing for public benefit |

Video analysis algorithm warehouse

- Facial recognition
- Check point recognition
- Crowd analysis
- Machine learning
- Vehicle analysis
- Face track
- Transportation and accommodation analysis

AI Machine Learning

AI + Smart Traffic

Platooning
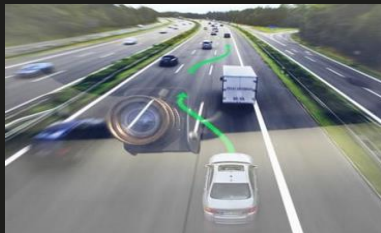
Cooperated Drive

Real-time Information Sharing

Autonomous or Remote Drive

3 Phases for Autonomous Drive

AI in Vehicles

Single Vehicle

AI in network

Cooperated Vehicles

AI in Cloud

Cloud

Edge

Cloud Connected Vehicles
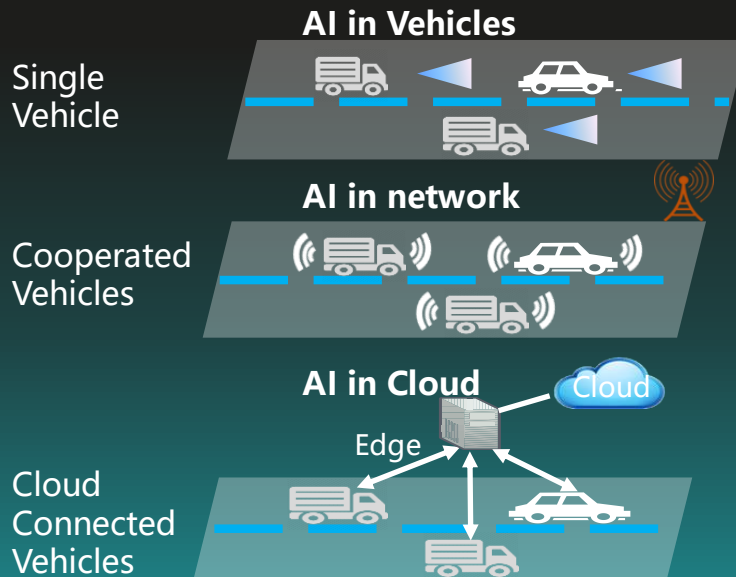
AI + Transportation Electrification

Renewable Sources

Bidirectional Power Transfer

Smart Parking as a Grid Resource

New Business Models

Power and Transportation Domains Working Together
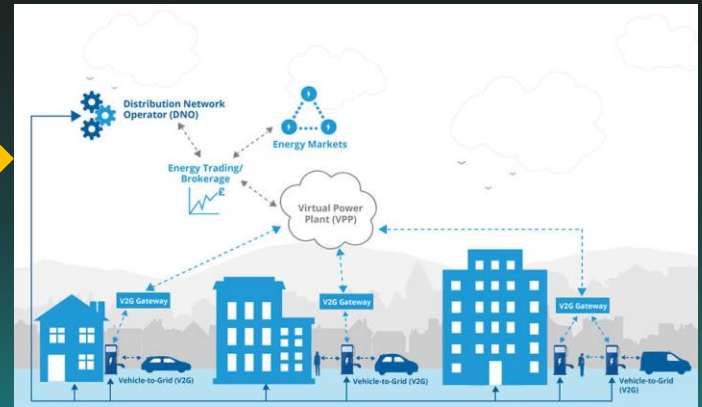
AI based Digital Transformation Architecture

IoC (Intelligent Operation Center)

City Governance	Livelihood Service	Industry Development

Smart City Applications

Top-Level Design

Service Flow Design

Data Flow Design

ICT Planning Consultation

ICT Detail Design

Digital Enablement Platform

Application Enabler	AI Enabler	Data Enabler

Multi-Function, Eco-System, Industry Enabler

Video	IoT	Big Data	ICP	GIS

ICT Infrastructure

ICT Infrastructure: Cloud Data Center

Transportation Network

Terminal Devices: Full Sensing, Pre-Processing, Front-End Intelligence

IEEE P2413.1 Standard for Smart City Architecture

Huawei Initiated the IEEE P2413.1 New Standard project for Smart City Architecture：

Q1 P2413 working group agreed

Q2 IEEE-SA CAG, NesCom, SASB Approval

Q3 started off standardization work

IEEE P2413.1 Standard for a Reference Architecture for Smart City

March
Canada Meeting
HuaweiProject Proposal

IEEE-SA CAG Shenzhen Meeting
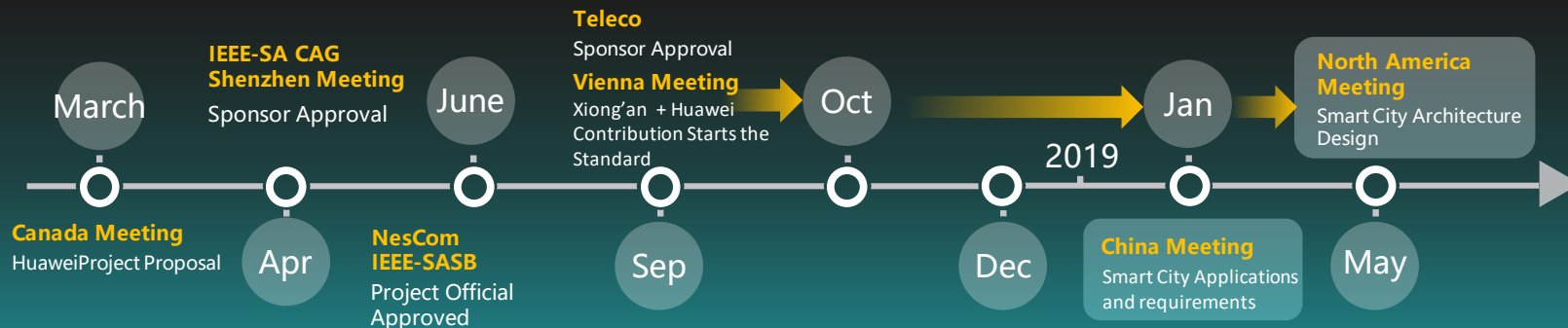Sponsor Approval

Apr
NesCom IEEE-SASB
Project Official Approved

June

Sep

Teleco
Sponsor Approval
Vienna Meeting
Xiong'an + Huawei Contribution Starts the Standard

Oct

Dec

2019

China Meeting
Smart City Applications and requirements

Jan

North America Meeting
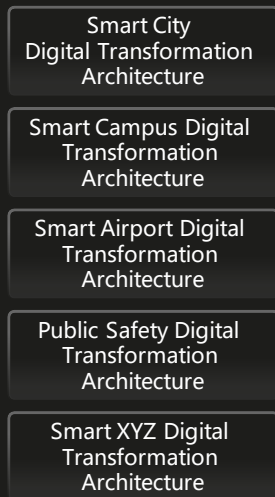Smart City Architecture Design

May

Industry Ecosystem Strategy and Standards

Based on the IEEE 2413.1 standard, refine specific industry architectures in relevant SDOs
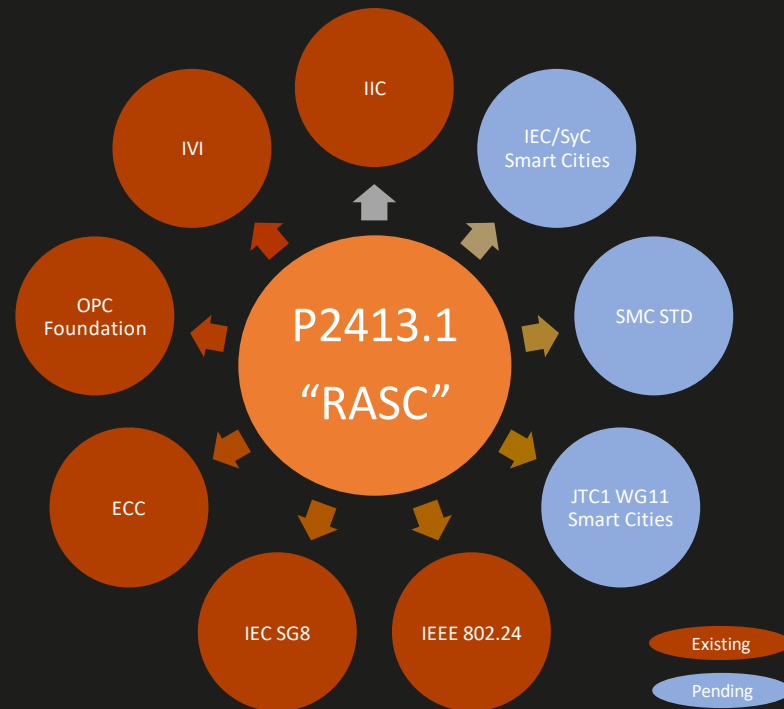Gather industry partners and build our ecosystem leveraging specific standards and SDOs

Industry Digital Transformation Architecture Standard

Specific Industry Ecosystem Organizations

Industry Digital Transformation Architecture Standard	Specific Industry Ecosystem Organizations
Smart City Digital Transformation Architecture	XX SDO
Smart Campus Digital Transformation Architecture	XX SDO / Smart City Council
Smart Airport Digital Transformation Architecture	IATA / IEEE-SA IC
Public Safety Digital Transformation Architecture	ONVIF / IEC TC79
Smart XYZ Digital Transformation Architecture	IIC / XYZ SDO

Collaboration with Industry Leading Organizations

P2413.1 "RASC"

- IIC
- IVI
- IEC/SyC Smart Cities
- OPC Foundation
- SMC STD
- ECC
- JTC1 WG11 Smart Cities
- IEC SG8
- IEEE 802.24

Existing
Pending

Thank you !