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Enabling an Intelligent Planet

Progressing Smart City & Industry 4.0 with Transformative Technology

Agenda & Speakers

- AI: Transformation Through Intelligence
  - Mr Tony Lin (THI Consultants Taiwan)
- Time Sensitive Networks
  - Mr Jason Chiou (Director ICG Advantech - Taiwan)
- New business models + Technology driving change in Industry 4.0
  - Mr Maarten Wijffelaars (CEO & Founder Cool Industries - Netherlands)
- Device to LTE: The critical element of Solution Integration
  - Mr. Jose Beltran (R&D and IT Manager ITS Saudi Arabia)
- Q&A

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Why!

Cities going Smart with Industry 4.0 technologies

- Occupy 3% of the worlds Surface Area
- Consume 75% of the global energy consumption
- Produce 80% of the global green house gasses
- 3 Million people migrate to cities each week
- 54% of the global population live in cities
- 70% estimated to live in cities by 2050
- 60% of the worlds cities are coastal
- New York
  - 8.5 Million People
  - Operating Budget $86 Billion / year
  - GDP $1.75 Trillion

Source: SecDev Foundation

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How!

- Investing in Renewable Energy
  - Estimated 300 cities with complete energy autonomy
- Investing in new technologies
  - ITS (Rail, Road, Air)
  - Camera and Vision systems
  - Smart Lighting
  - BMS
- Collaborating and sharing technology and knowhow
  - C40 Cities

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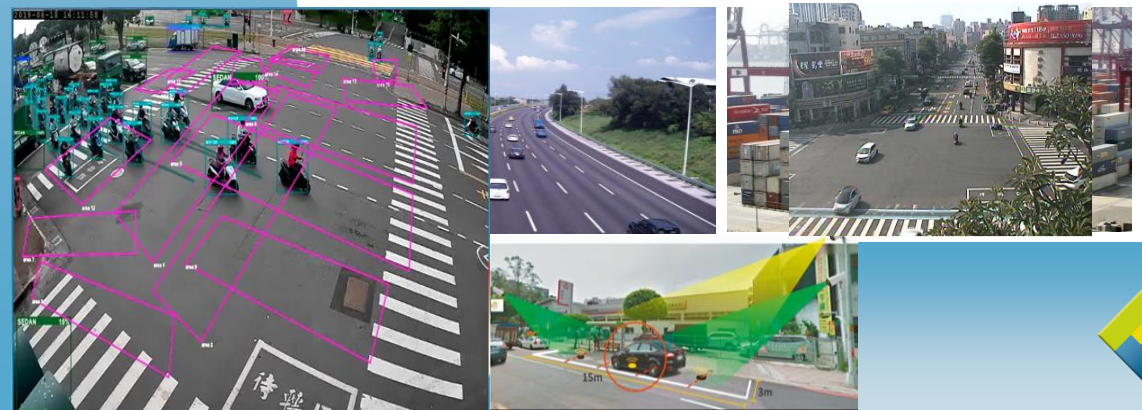
Enabling an Intelligent Planet

AI: Transformation Through Intelligence

Mr. Tony Lin (THI Consultants - Taiwan)

THI's Traffic Solutions using AI Image Recognition Technology

12/06/2019



Tony Yi-Dar Lin
Vice President
Head of ITS Department

鼎漢 國際工程顧問股份有限公司
thi consultants inc.

Outline

01 Introduction

02 Solutions

03 Case Studies

01
Introduction

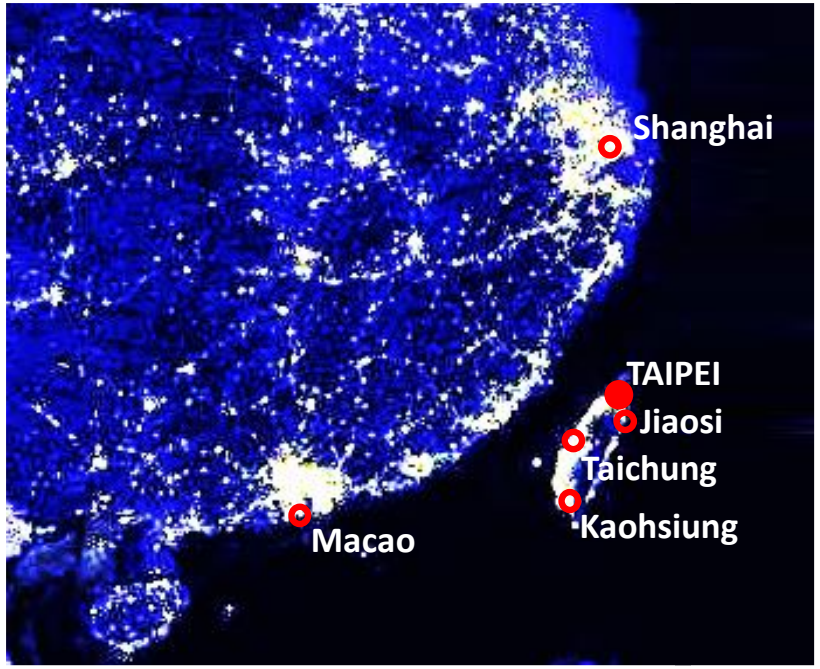
THI Company Profile

鼎漢 國際工程顧問股份有限公司 thi consultants inc.

- Established in 1989
- Over 170 employees
- Received the National Award of Outstanding Small and Medium Enterprises in 2011
- Provide professional services
  - Transportation planning, engineering, operation and management
    - Intelligent Transportation System
    - Transportation Planning
    - Traffic Engineering
    - Modeling and Simulation
    - Civil Engineering
    - Operations and Management
    - Sustainable Transportation
    - Big Data and BI

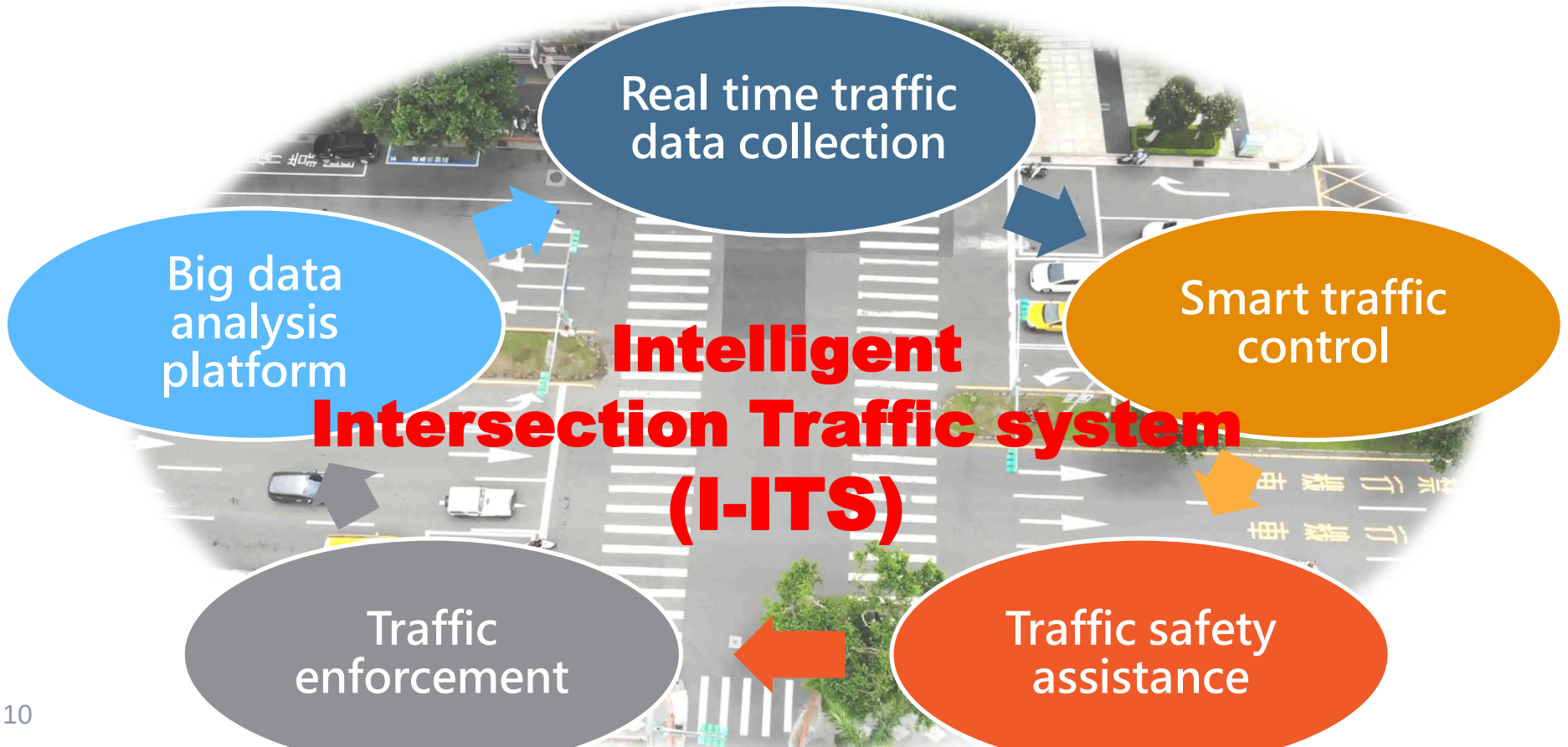
National Award of Outstanding SME, Taiwan 2011

- Head Office – Taipei



THI's Goals

- Using AI image recognition technology to strengthen the urban smart transportation infrastructure
  - To relieve traffic bottleneck
  - To improve road safety at intersection



THI's Traffic Solutions using AI Technology

1 Traffic data collection

(1)Turning movement
(2)Queue length
(3)Traffic flow
(4)Travel speed/time
(5)Traffic trajectory
(6)Vehicle types
(7)Headway/Stops
(8)Traffic conflict

2 Smart signal control

(1)Adaptive control
(2)Dynamic TOD
(3)Semi-actuated control
(4)Preemption control

3 Traffic flow control

(1)Dynamic reverse lane control
(2)Regional total quantity traffic control
(3)Alternative route guidance information

4 Traffic safety assistance

(1)Dilemma zone
(2)Dangerous zone warning
(3)Event detection
(4)Violation warning

5 Technology enforcement

(1)Bus stop illegal parking
(2)Illegal parking
(3)Illegal speeding
(4)Illegal entry
(5)Wrong direction
(6)Other violation detection

6 Traffic hotspots monitoring

(1)Parking garage overflow monitoring
(2)Critical intersection flow monitoring
(3)Highway ramp traffic jam monitoring

7 Other applications

(1)Counting flow of parking area
(2)Efficiency Evaluation of improvement
(3)Calibration of other vehicle detectors

02
Solutions

I-ITS AI Applications

Data Collection

Video stream from IP cameras at intersection

AI Processing Units

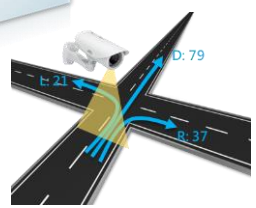
ADVANTECH

MIC-720AI

SKY-6100

AI edge computers or AI center servers

Object recognition trained by deep learning



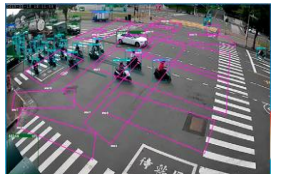
Advantech SDK analyzes video data to AI models

Platforms

IPCs and center servers (cloud service)

Application Platforms to solve problems and to control traffic devices

Scenarios



Traffic analysis

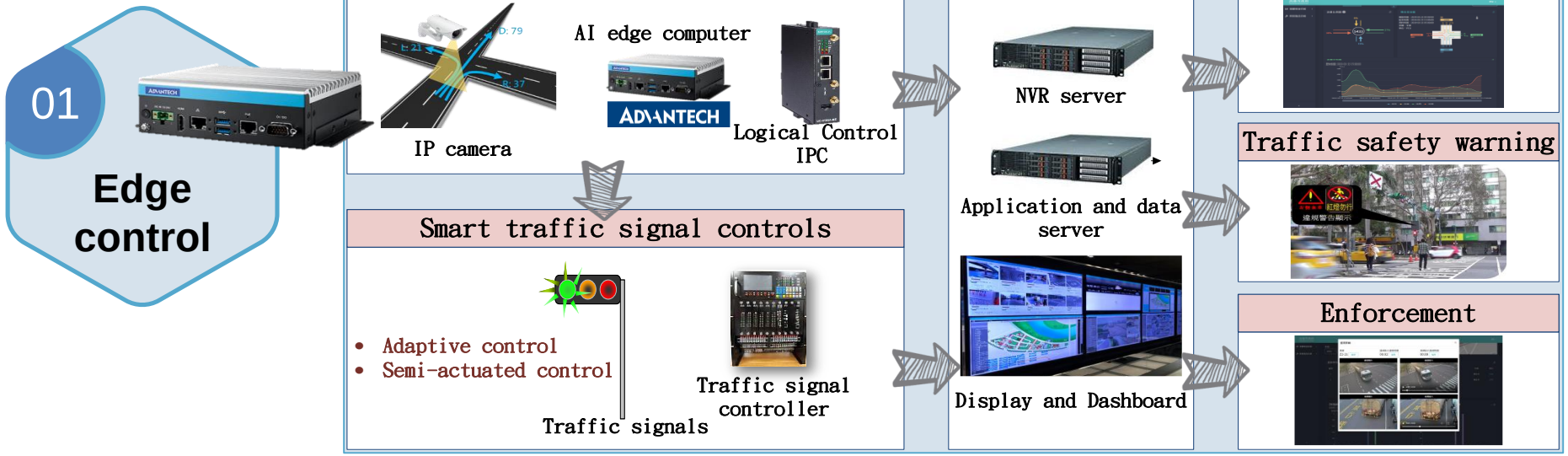
Traffic control

Safety warning

Enforcement

Application scenarios

I-ITS System Architecture



Principles

UGI software

Video SDK + Application platform

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Traffic parameters

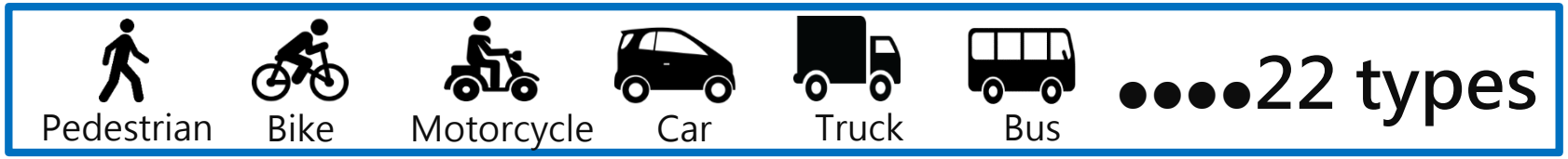
01 Turning movement
02 Traffic flow
03 Queue length
04 Travel speed/time
05 Traffic trajectory
06 Vehicle types
07 Headway/Stops
08 Traffic conflict
09 Parking/dwell time
10 Violation time
11 Direction of flow
12 Signal timing plan
13 Pedestrian
14 Coordinate

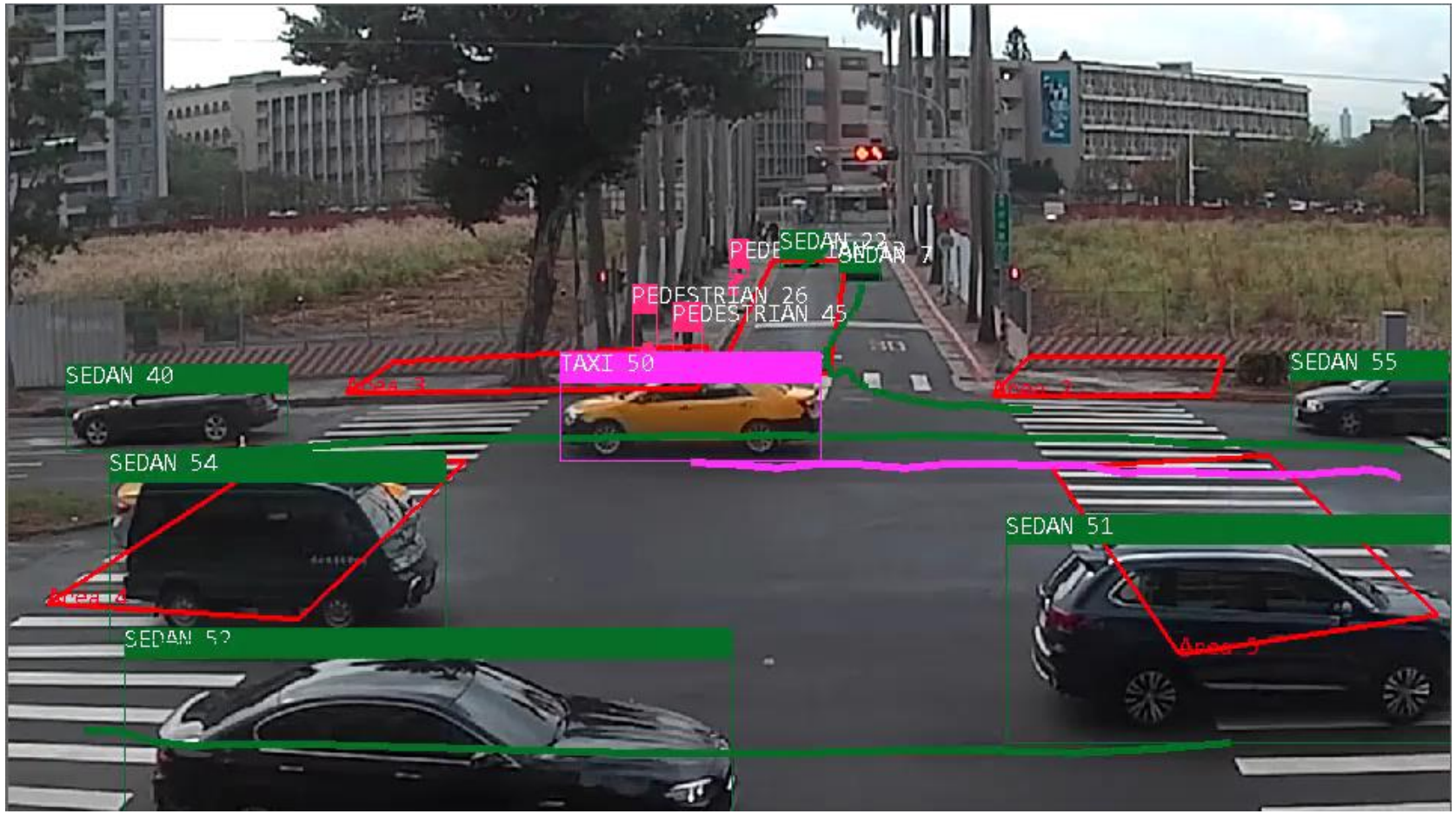
Traffic Parameters of Applications

AI SDK	Traffic analysis	Smart traffic signal control	Traffic safety warning	Enforcement
1.Turning movement	O	O	O	O
2.Traffic flow	O	O		
3.Queue length	O	O		
4.Travel speed/time	O			O
5.Traffic trajectory	O		O	O
6.Vehicle types	O	O	O	O
7.Headway/Stops	O	O		
8.Traffic conflict	O		O	
9.Parking/dwell time	O		O	O
10.Violation time	O		O	O
11.Direction of flow	O		O	O
12.Signal timing plan	O	O	O	O
13.Pedestrian	O	O	O	O
14.Coordinate	O		O	O

AI Image Recognition

- Vehicle types





03

Case Studies

Case Sites

◆Locations

Taoyuan
•Semi-actuated control

Chiayi
•Traffic survey

Tainan
•Traffic survey

Kaohsiung
•Traffic survey
•Technology enforcement

Taipei
•Semi-actuated control

Taitung
•Traffic survey
•Technology enforcement
•Adaptive control

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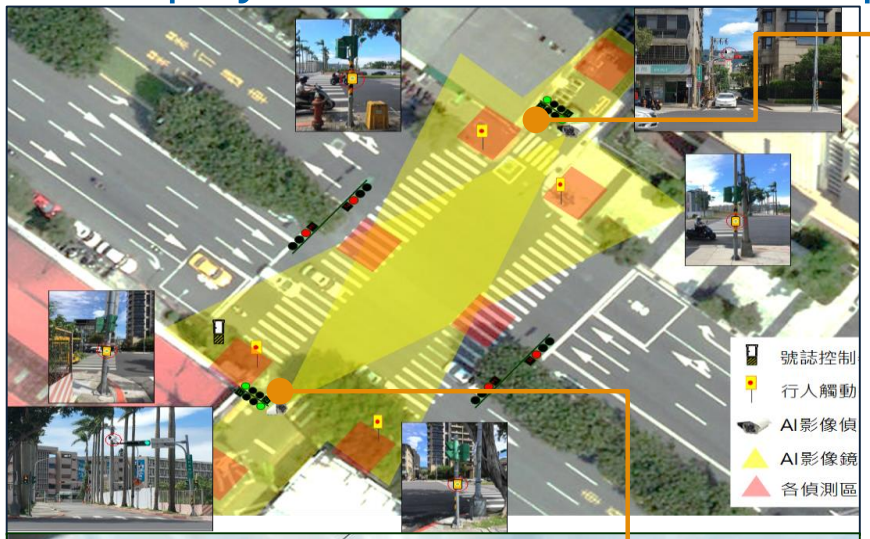
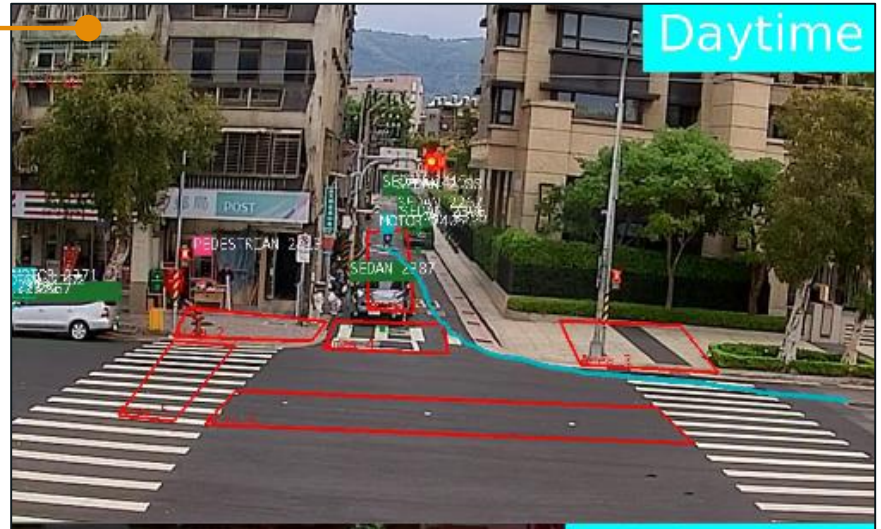
Taipei Project (1/2)

- Semi-actuated signal control
  - The intersection of Wenlin North Rd./Zhong-zheng senior high school deployed with 2 cameras and 4 pedestrian push buttons

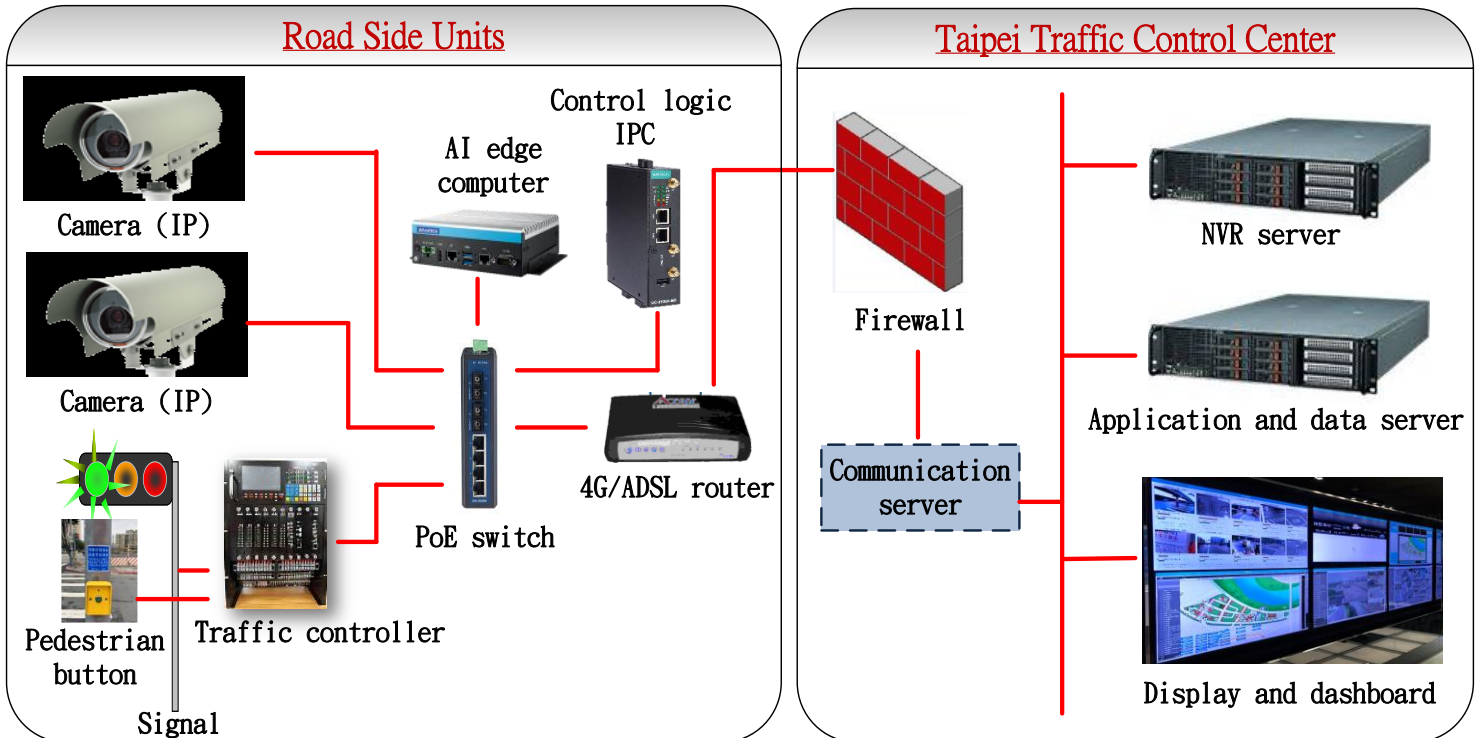


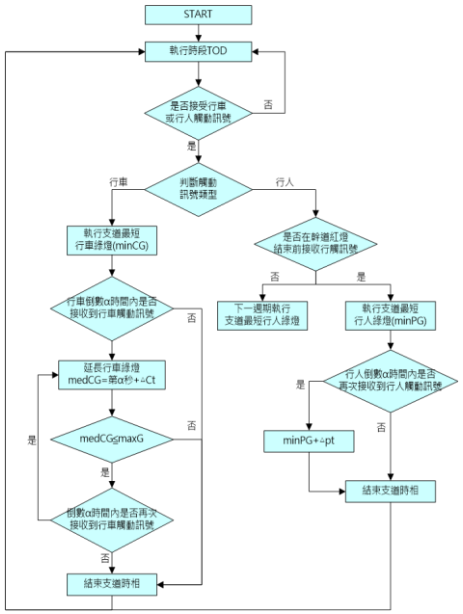


Taipei Project (2/2)

- Collecting pedestrian buttons information and video data of pedestrians and vehicles
- Recognizing data by on-site AI edge computer (Advantech)
- Analyzing signal timing plan by control logic IPC (THI)
- Directly changing signal timing plan of Traffic controller

AI edge computer by Advantech

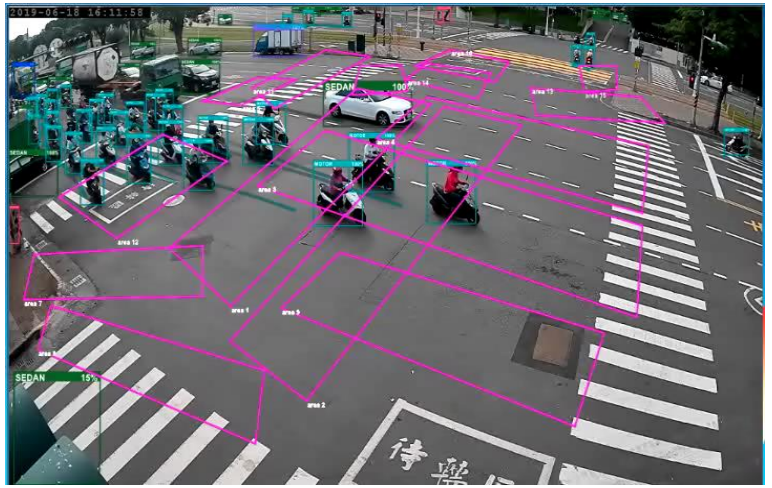




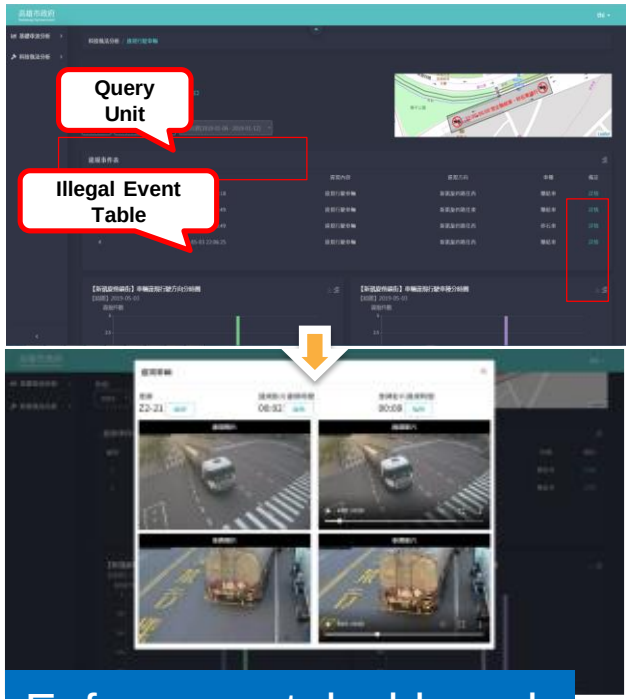
Control logic by THI

Kaohsiung Project (1/2)

- Traffic survey + Enforcement
  - The intersection of New Kaixuan 4th Rd./Qianzhen St. deployed with 4 cameras
    - 2 cameras for traffic survey (traffic flow, turning movement, LOS, PHF…)
    - 2 cameras for enforcement (illegal truck driving through)



Traffic survey dashboard



Enforcement dashboard

Kaohsiung Project (2/2)

◆Application Platform _ Demo

Thank You for Your Attention!

For more information

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THI Consultants Inc. Tel:(886) 2-2748-8822

Co-Creating the Future of the IoT World

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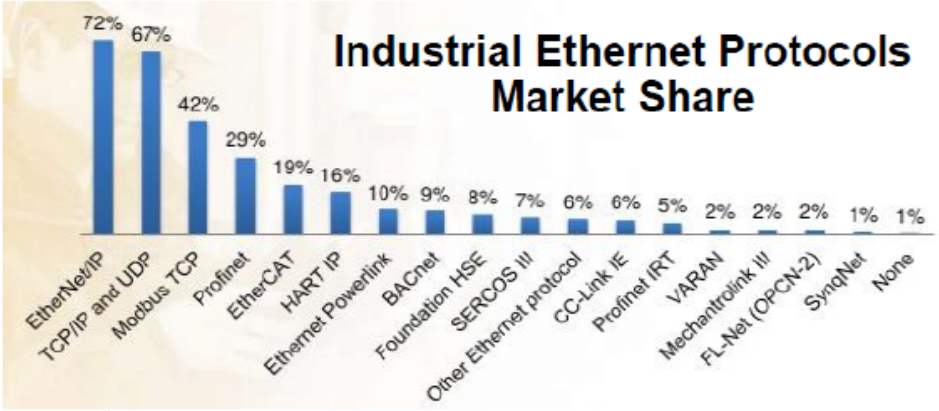
TSN - Time Sensitive Networks

Jason Chiou, Director, Advantech IIoT Group

Industry 4.0 Communication and Interoperability

- Current industrial market is extremely fragmented
  - 20+ Protocols including Bus & Ethernet
  - More than 50 Industrial Control System (PLC) vendors
  - Complicate manufacturing automation environment, challenge for integration and management
- Interoperability is the key for transition to Ethernet
  - Required complex solutions to achieve deterministic high-quality communication



Source: "Industrial Ethernet technologies, part 1" ; Control Engineering; April 2014

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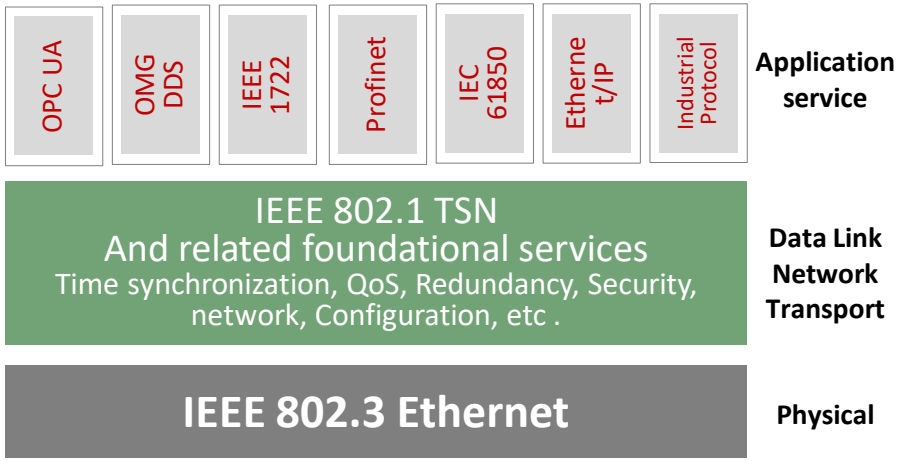
What is Time Sensitive Networking (TSN)

- Set of standards developed by the TSN task group of IEEE 802.1 working group
- Enhanced on previously defined AVB (Audio-Video Bridging) standards
  - Reduced worst case delays (4µs or less per hop @ 1Gbps speed)
  - Extend use cases from audio/video applications to control systems
- Interoperable, low latency, deterministic, Ethernet communication
- L2 technology – more is needed to achieve interoperable environment

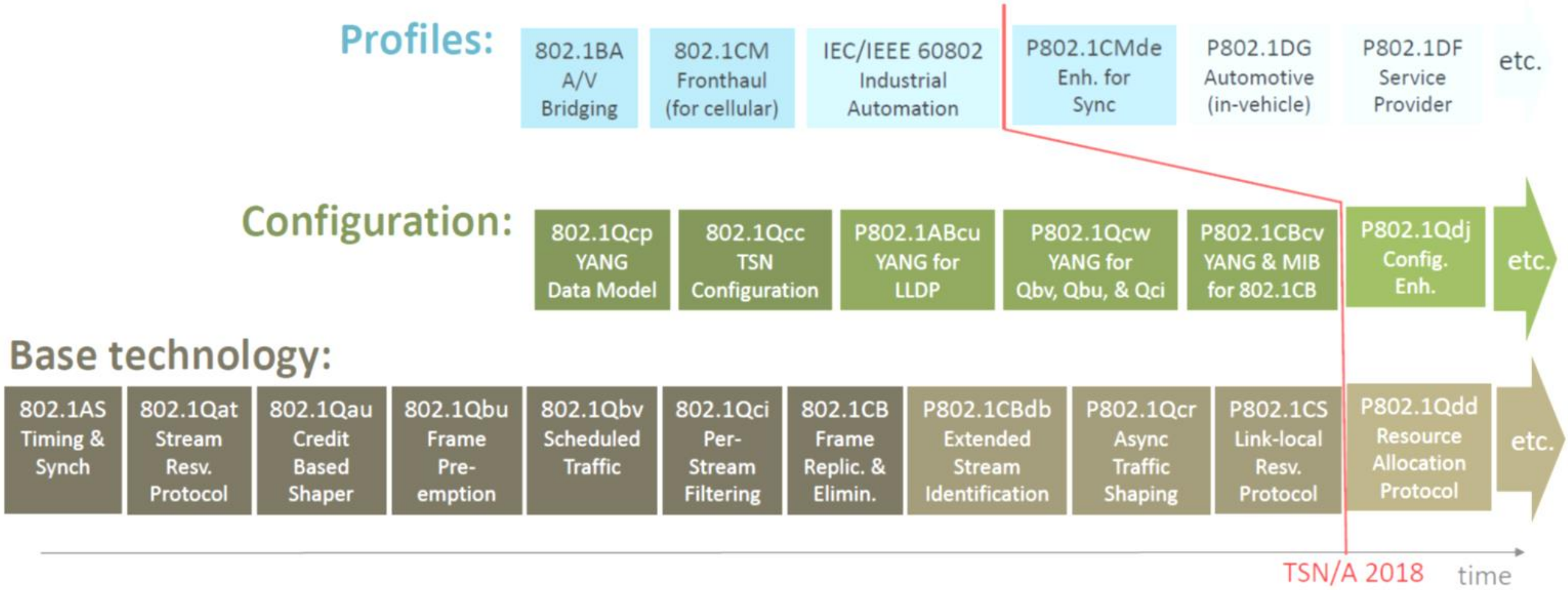
Converge the Traffic from OT and IT

Time Sensitive Networking Basic

- TSN Applications
  - Transport for OPC UA, Profinet, EtherNet/IP and more
    - Traffic between industrial controllers
    - Improved observability of the factory status
    - Cyclic, low jitter, predictable latency
  - Convergence of industrial and enterprise traffic
- Advantage over legacy industrial Ethernet
  - Vendor independent
  - Flexible distribution of services
  - Less Operational Expenses because of less networks



IEEE 802.1 TSN Progress



Major Specifications for TSN

Time Sync	Time Synchronization	802.1AS
Low latency	Time-Aware Traffic Shaping	802.1Qbv
	Preemption	802.1Qbu
	Cyclic Scheduling	802.1Qch
	Asynchronous Scheduling	802.1Qcr
Reliability	Frame Replication & Elimination	P802.1CB
	Path Control & Reservation	802.1Qca
	Per Stream Filtering & policing	802.1Qci
	Reliability For Time Sync	P802.1AS-Rev
Resources & APIs	Stream Reservation Protocol	802.1Qat
	TSN Configuration	802.1Qcc
	YANG	P802.1Qcp
	Link-Local Registration Protocol	P802.1CS

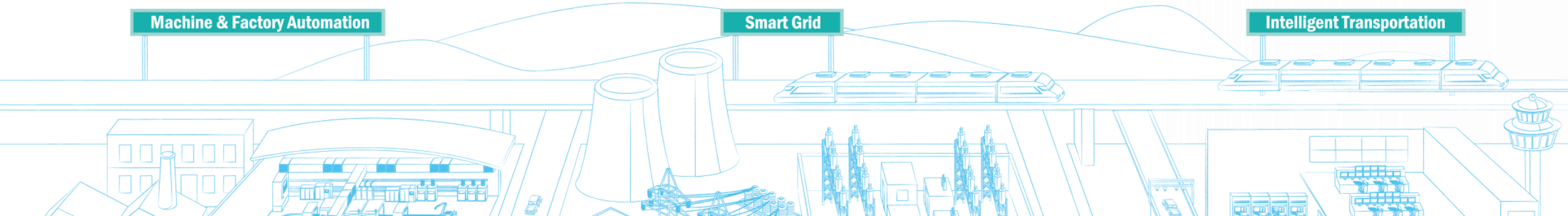
TSN Product Portfolio

IEEE 802.1AS
IEEE 802.1Qbu
IEEE 802.1Qbv
IEEE 802.1Qca
IEEE 802.1CB
IEEE 802.1Qcc
IEEE 802.1Qch
IEEE 802.1Qci

TSN End Device — TSN Switch — TSN IPCs

Existing Terminal Device

TSN Gateway — TSN Switch — TSN IPCs



Advantech First TSN Switch

EKI-8500
Industrial TSN Ethernet Switch

Time Sensitive Network

Guaranteed data transport with bounded low latency, low delay variation and extremely low loss.

Latency

Prioritizing low-latency communication for instant system response to demanding applications

- IEEE802.1Qbu
- IEEE802.1Qbv

Synchronization

Achieving deterministic microsecond transfer times and synchronization between nodes in only tens of nenoseconds

- IEEE802.1AS

Reliability

Ensuring robust communication with frame replication and elimination

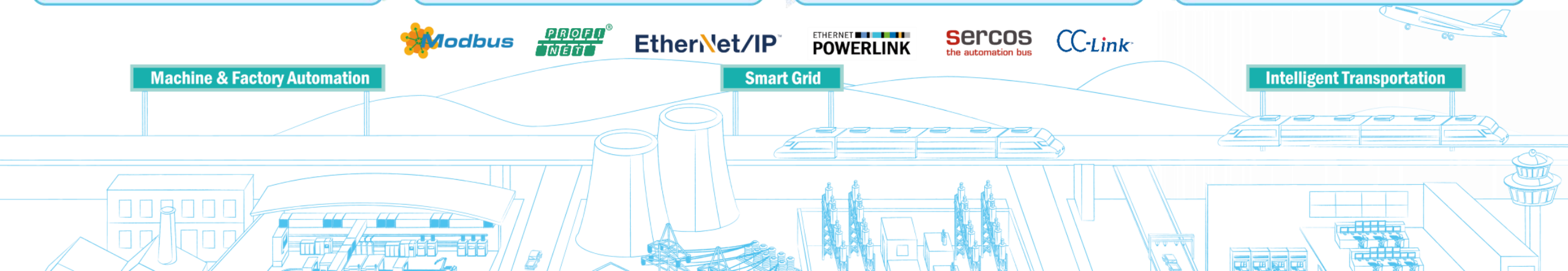
- IEEE802.1CB

Resource Management

Comparable to creating dedicated lanes with guaranteed bandwidth reservation for traffic

- IEEE802.1Qci

Modbus · PROFINET · EtherNet/IP · ETHERNET POWERLINK · sercos the automation bus · CC-Link



Co-Creating the Future of the IoT World

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New business models + Technology driving change in Industry 4.0

Mr Maarten Wijffelaars (CEO & Founder Cool Industries - Netherlands)

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IN CONTROL
What if your tool equipment is:
Sustainable
Energy-efficient
100% reliable
Low operational cost

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What if, your cool-equipment is:

- ✓ Sustainable
- ✓ Energy efficient
- ✓ 100% reliable
- ✓ Low operational cost

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COOL INDUSTRIES

We believe in
Simplicity and Quality

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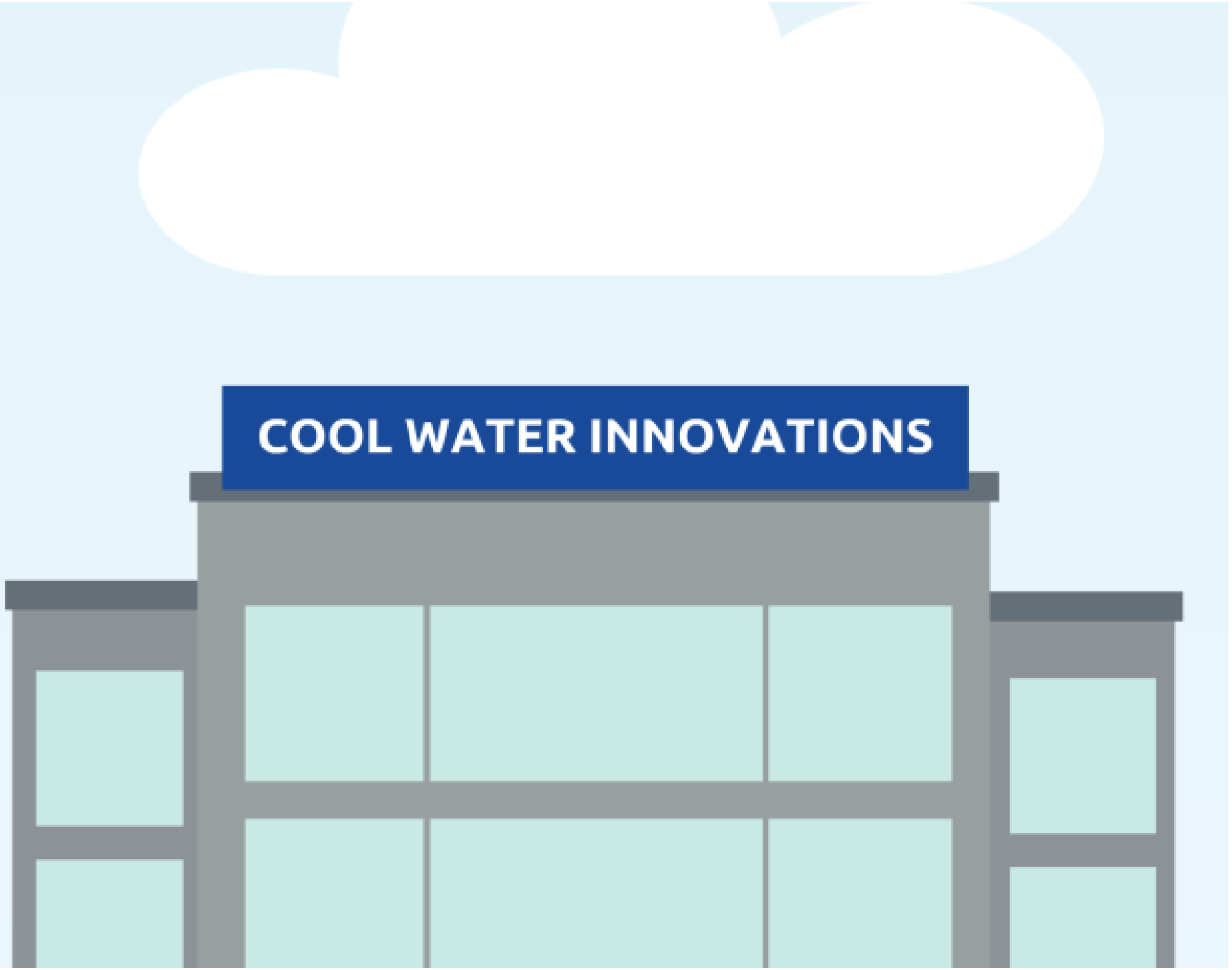
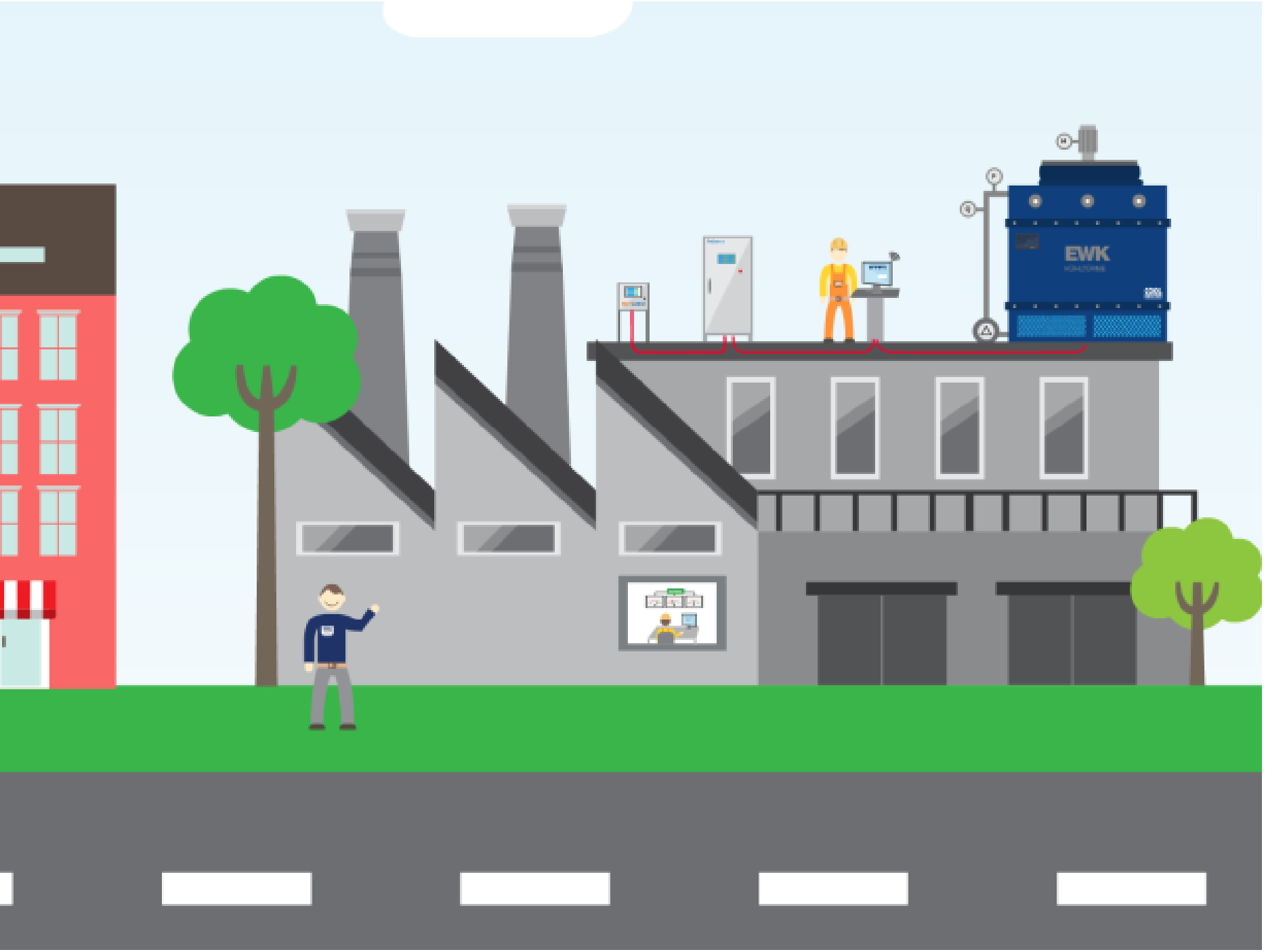

COOL WATER INNOVATIONS



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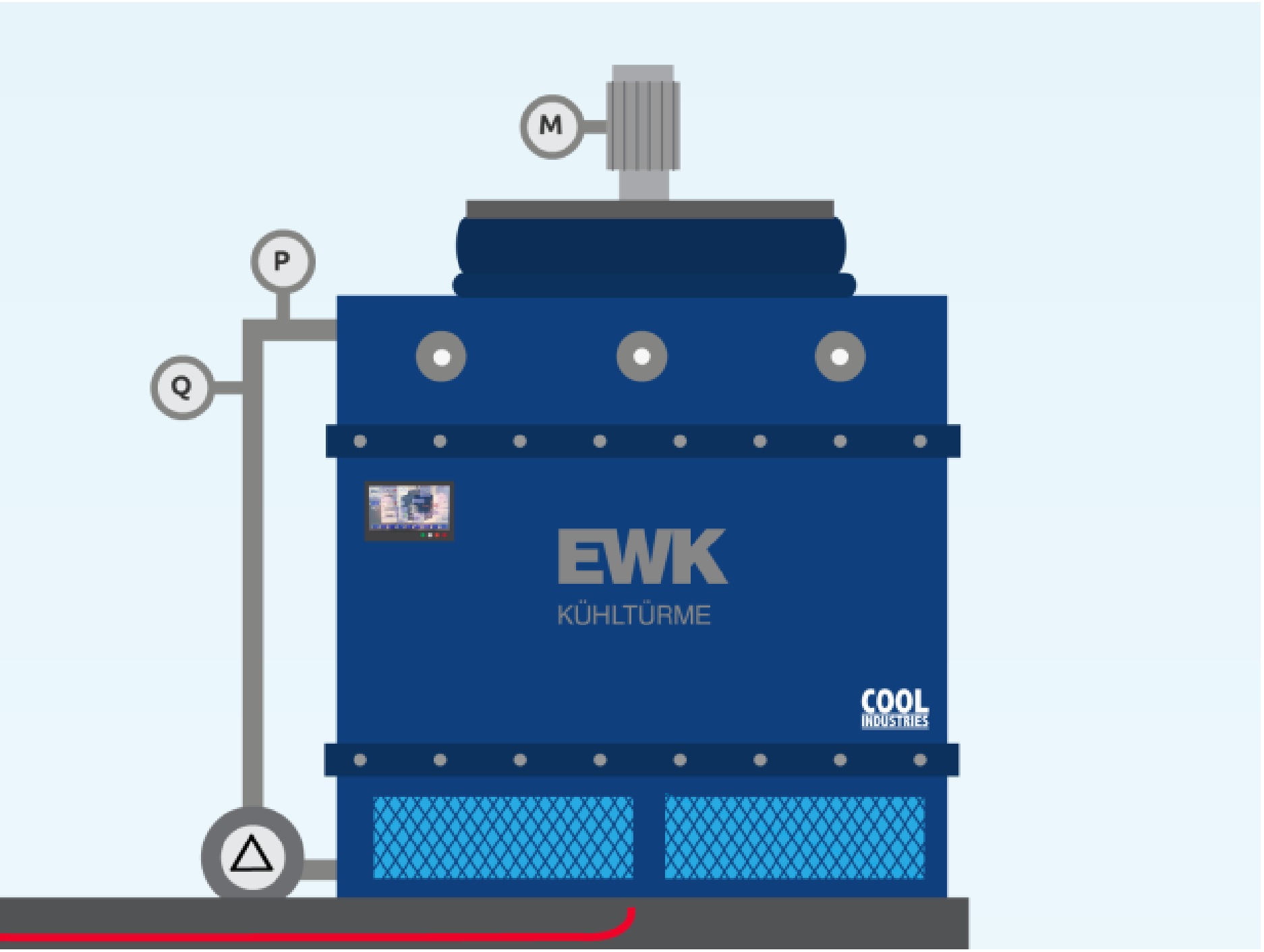
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EWK
KÜHLTÜRME
COOL
INDUSTRIES


EWK
MAIN
LOG IN
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SP 26.0
100.0
OFF MAN AUT
PUMP
SP 100.0
OFF MAN AUT
TEMP PRESS
BASIN
T 12.9
HL
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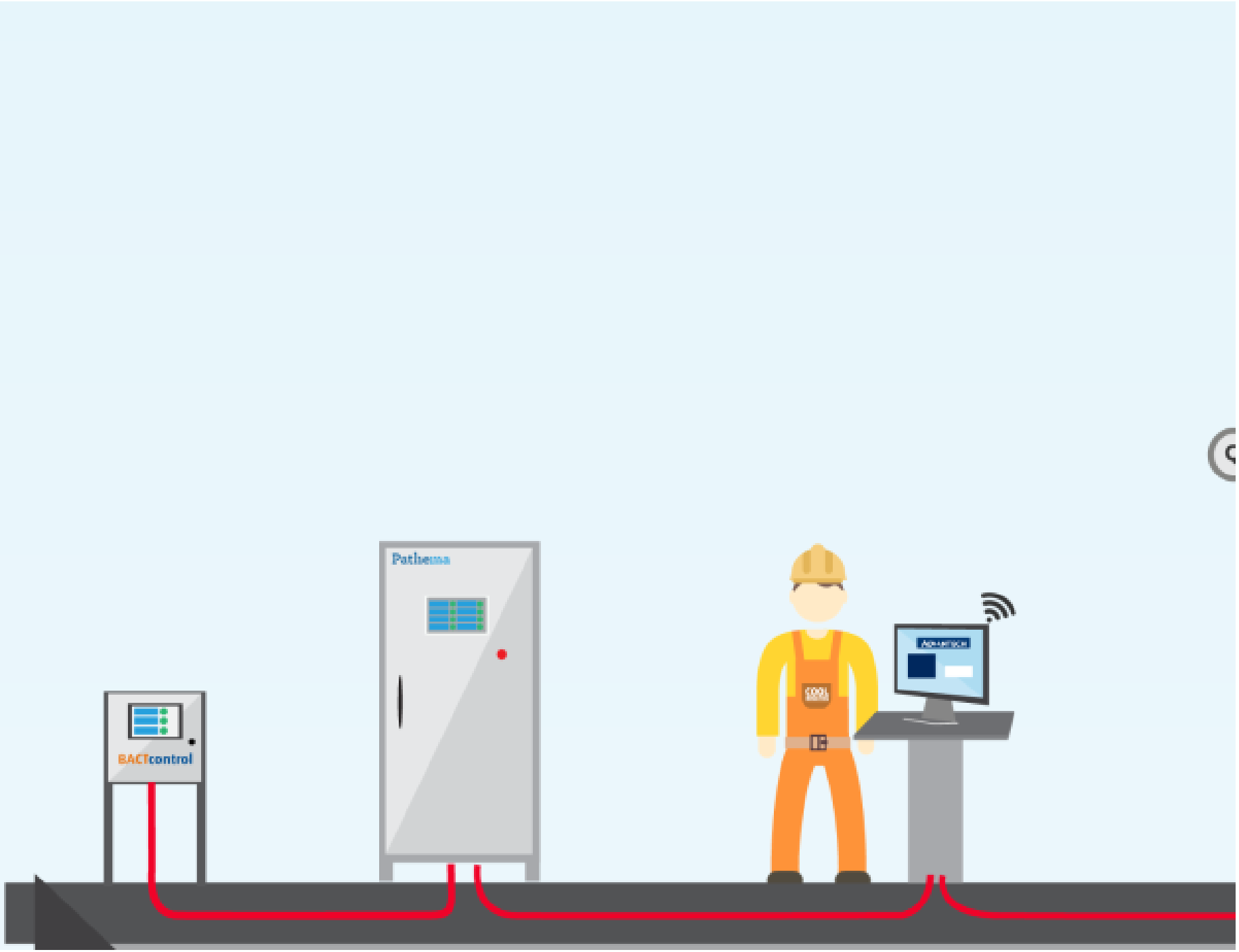
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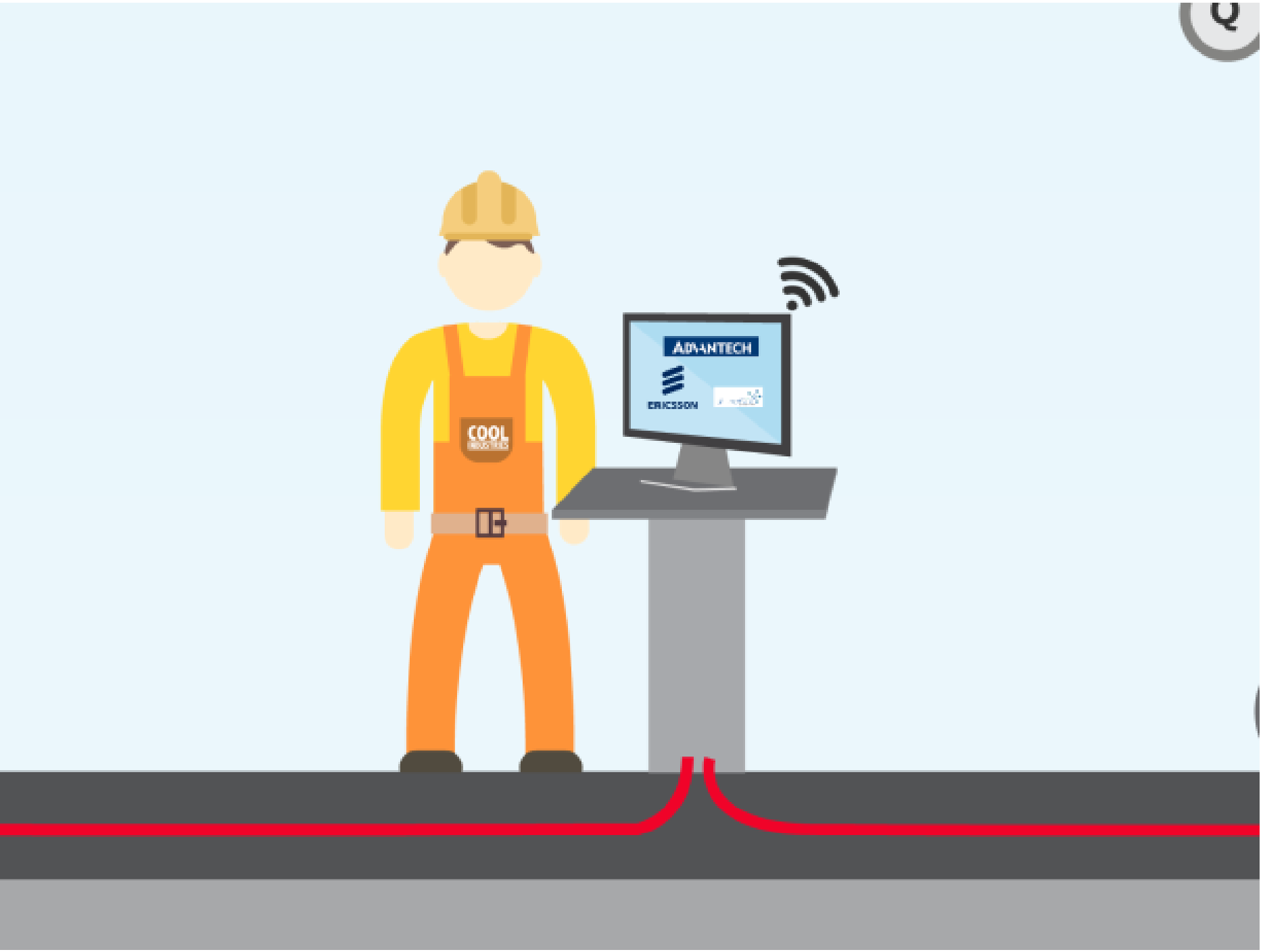
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ERICSSON
COOL

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ENERGY
WATER
VIBRATIONS
EWK
IN CONTROL

EWK smartcare

Maarten Wijffelaars
Normal User

Jardin - Rijen NL - EWK_C

CONTACT

Jardin - Rijen NL - EWK_C 225
ERICSSONSTRAAT 17, 5121 MK RIJEN, GPS: 51,581 4,934

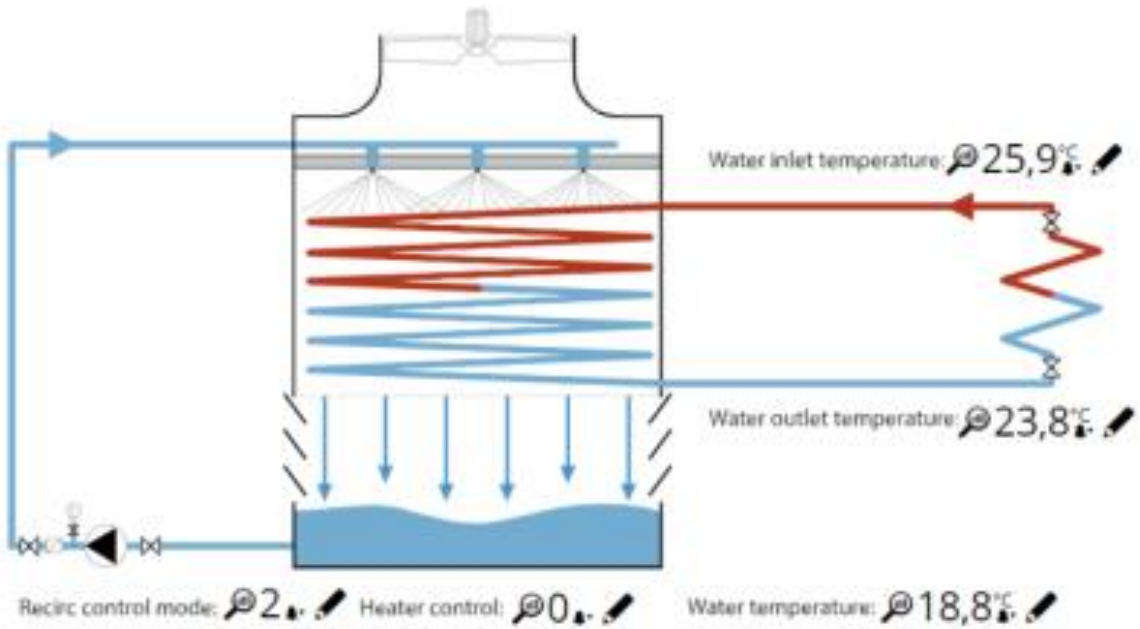
Maarten Wijffelaars
LOCATION

Ronald Boon
LOCATION

OUTSIDE

18 °C | 82 % | 15 km/h | SW °

COOLING TOWER



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IN CONTROL

- ✓ Sustainable
- ✓ Energy efficient
- ✓ 100% reliable
- ✓ Low operational cost

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REGULAR SALES CHANNEL

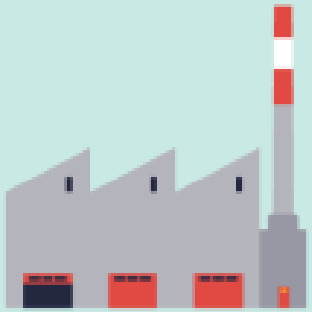
EWK

Producer of industrial cooling equipment

COOL INDUSTRIES

Local area representative

Industrial Installer



Factory

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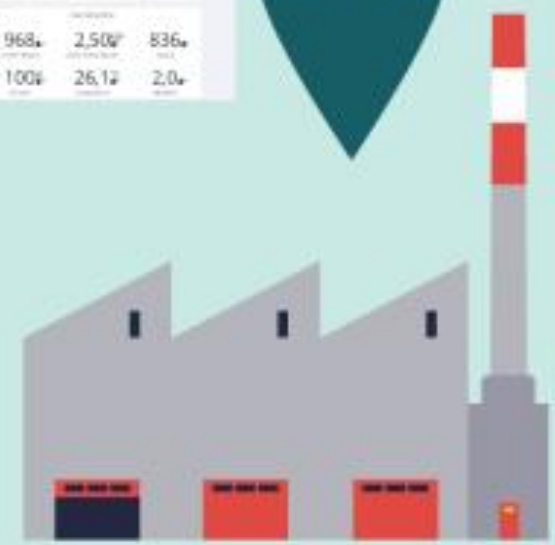
NEW BUSINESS MODEL

EWK → COOL INDUSTRIES



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Device to LTE: The critical element of Solution Integration

Mr. Jose Beltran (R&D and IT Manager ITS Saudi Arabia)

ITS
SMARTER SOLUTIONS

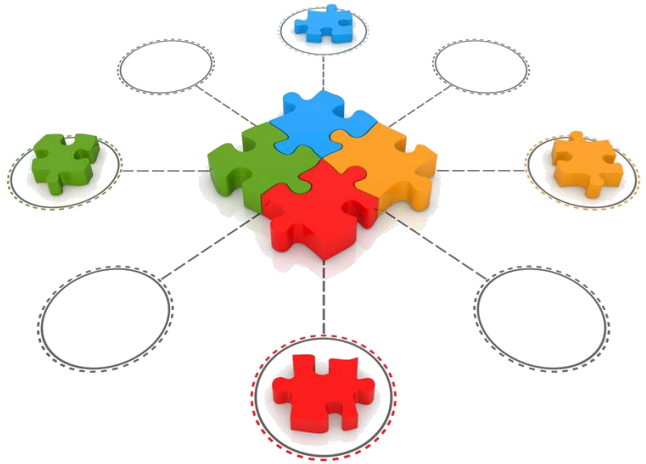
SMARTEX

Advantech World Partner Conference
2019

WHAT WE DO

PRODUCTS SUPPLY

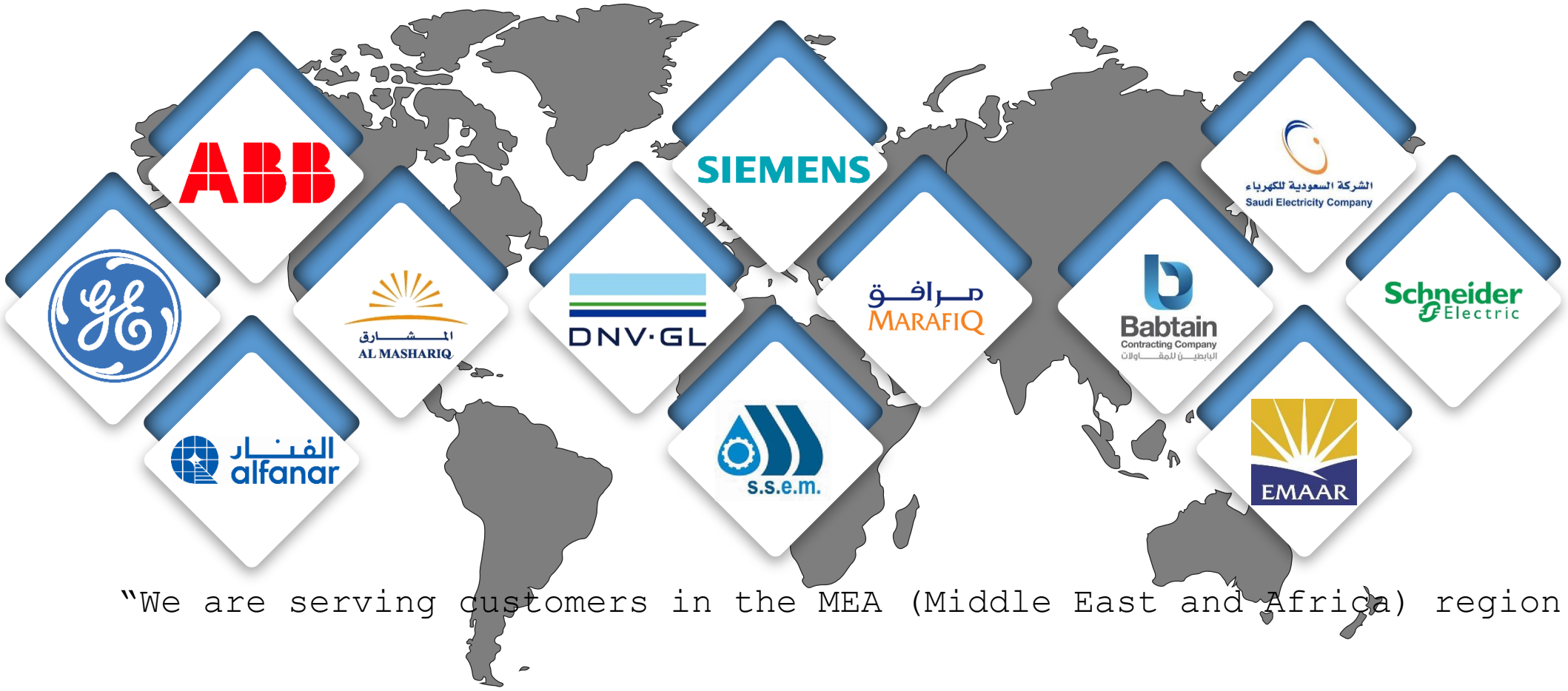
We supply products in the area of Smart Grid Solutions including Smart Meters, communication devices and accessories.



SOLUTIONS INTEGRATION

We provide different solutions built on our customers requirements and needs.

SMARTEX CUSTOMERS



"We are serving customers in the MEA (Middle East and Africa) region."

FACTORY SITE

Energy and Utilities

Generation → Transmission → Substation → Distribution → Secondary Connection → Electric Meter → Subscriber

Data Analytics and Visualization

WISE-PaaS

Billing System

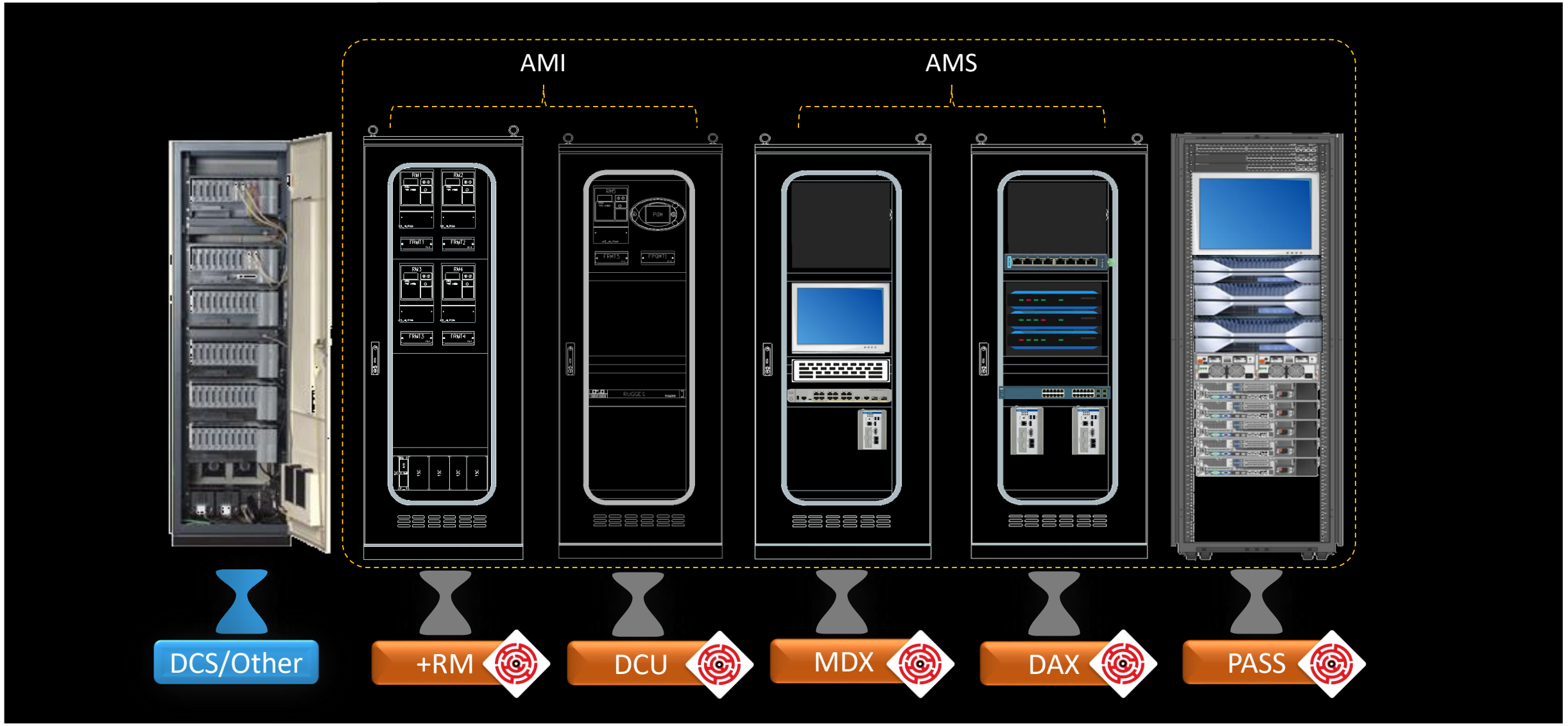
Data Management

Data Acquisition

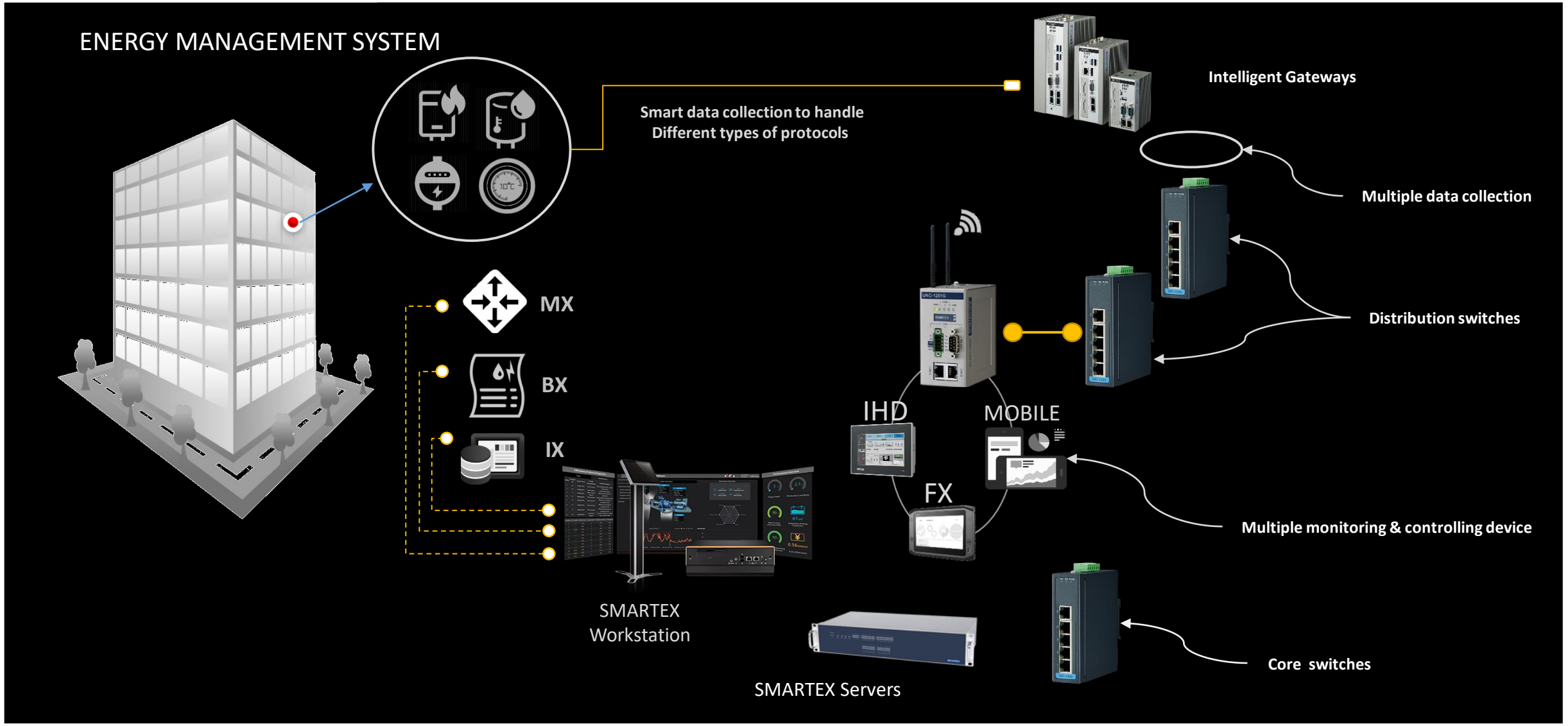
Energy Management

Data Humanism

BUSINESS APPLICATION GENERATION



BUSINESS APPLICATION SUBSCRIBER



THANK YOU

SMARTEX

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