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Industrial AI Route to the Next Stage of IoT

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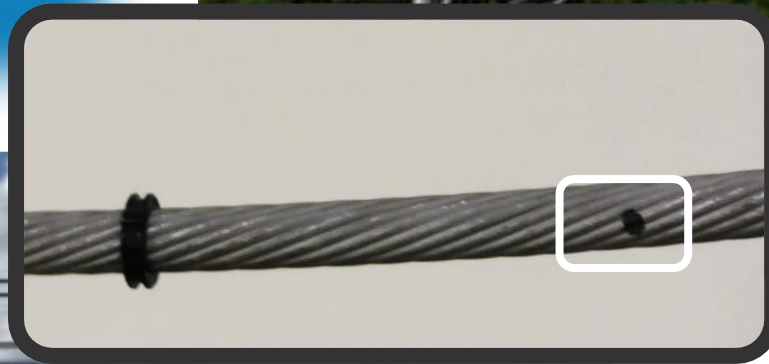
**IEEE World Forum
on Internet of Things**

IEEE 4th World Forum on Internet of Things
05-08 February 2018 – Singapore

IoT Case: Failure Prediction



IOT Case: Operator Assistance



Sports IoT

■ Ball detection / tracking

Design specific features for rugby ball



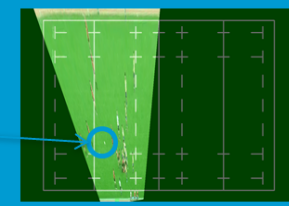
Extract field area



Extract foreground



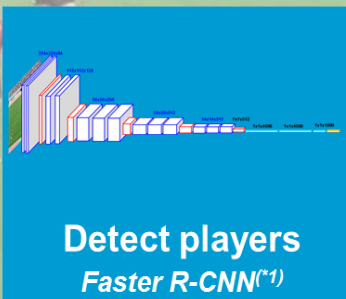
Detect ball
Size, shape and
color features



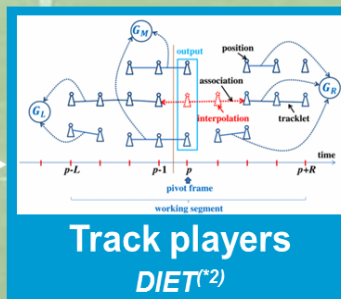
Transform
into 2-D field

■ Players detection / tracking

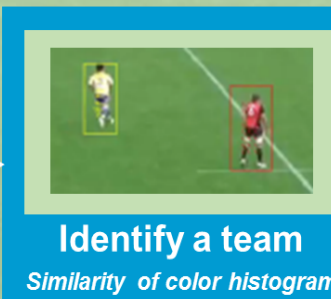
Apply deep learning approach to control learning costs



Detect players
Faster R-CNN(*1)



Track players
DIET(*2)

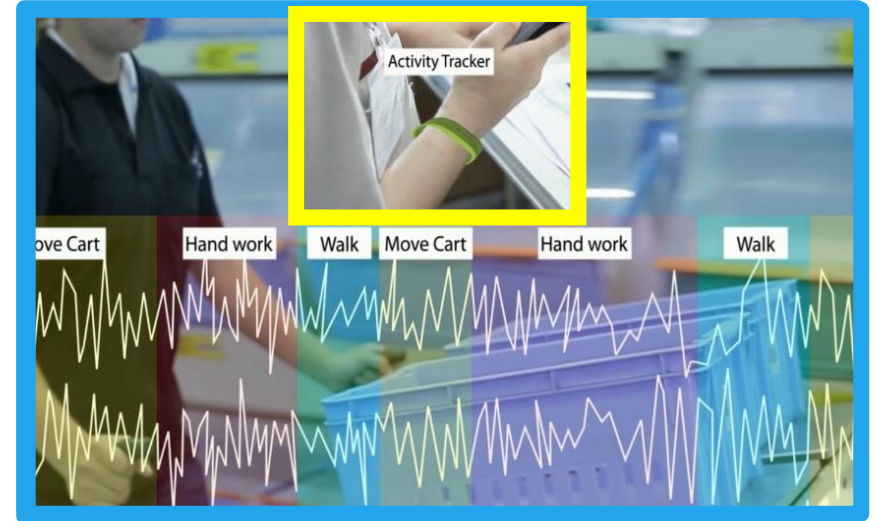


Identify a team
Similarity of color histogram

*1: Region-based Convolutional Neural Networks

*2: V. Pham, et al., "DIET: Dynamic Integration of Extended Tracklets for Tracking Multiple Persons," Proc. CVPR2014, pp. 1206-1211, 2014.

IoT Case: Behavior Analysis

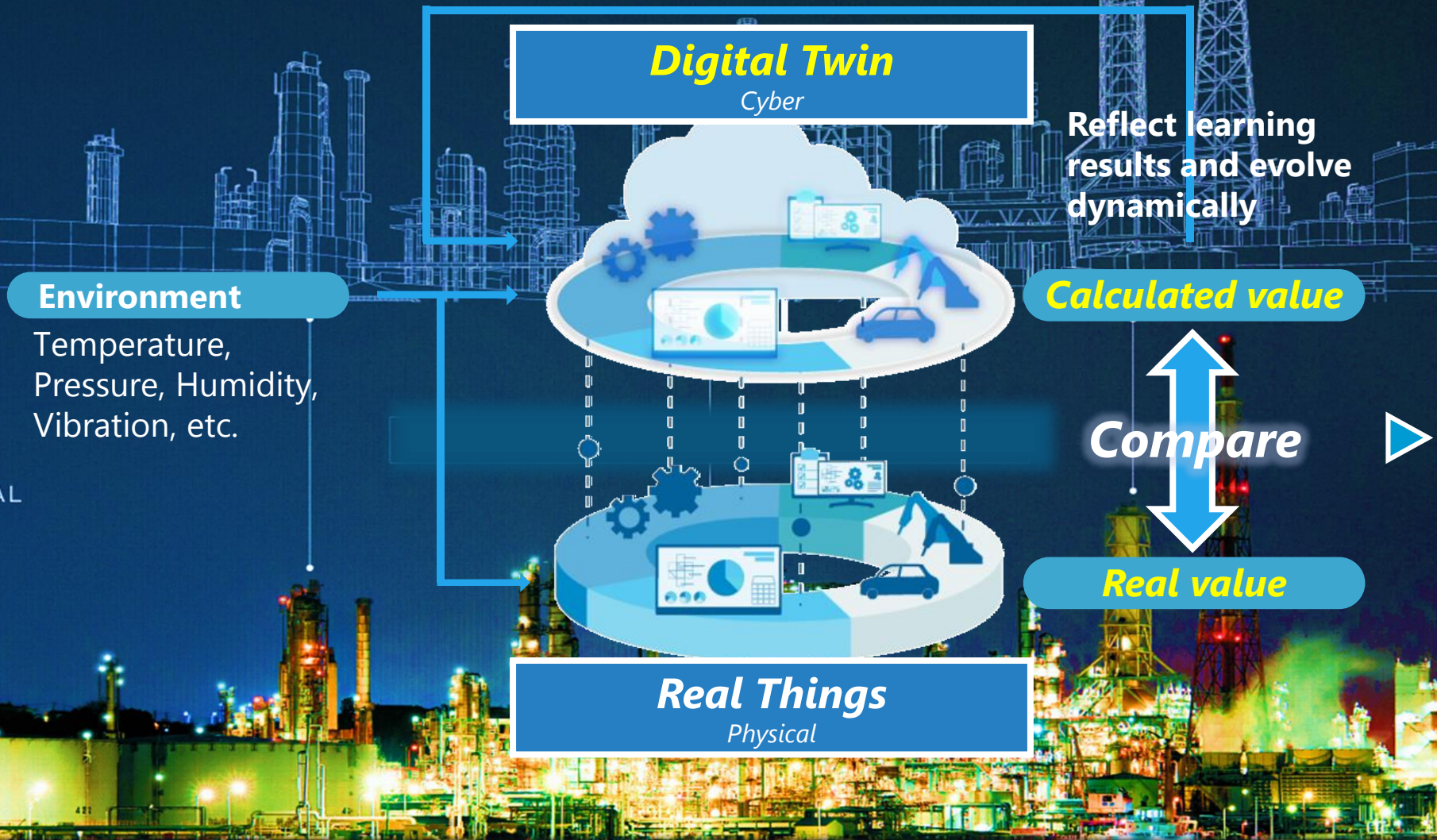


Digital Twin

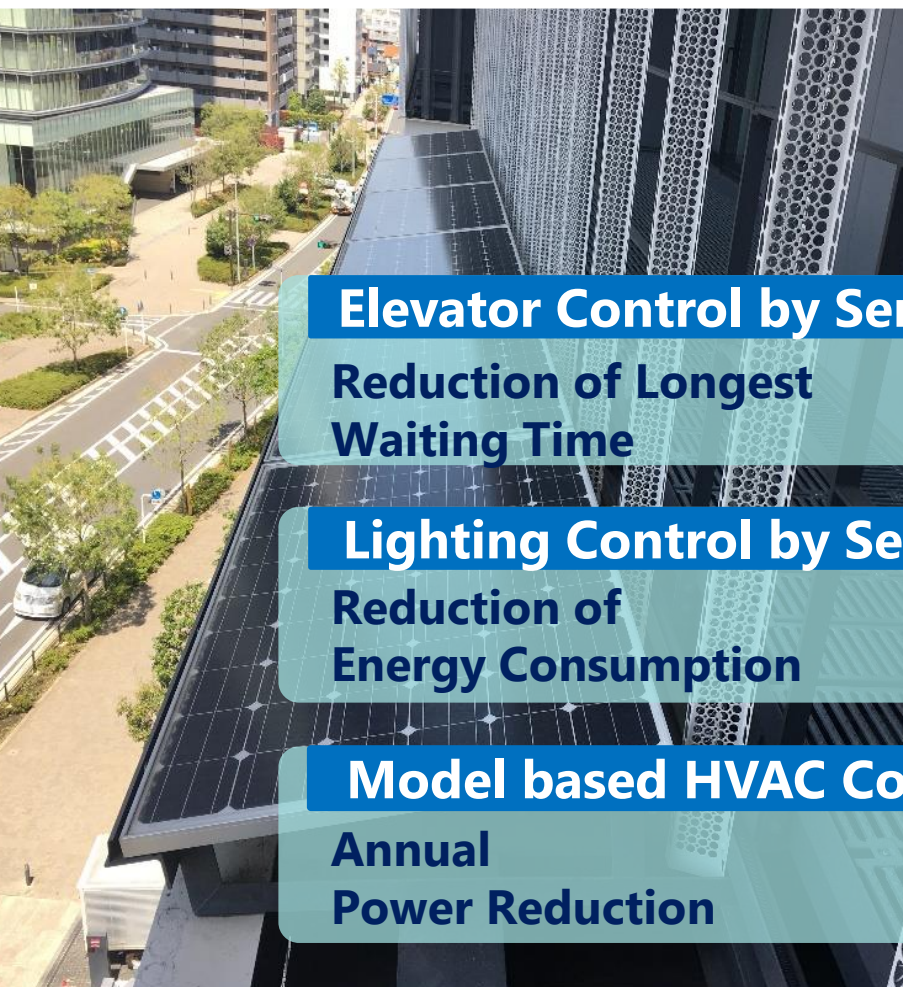
to provide accurate emulation and simulation of things

DIGITAL

REAL



Smart Building



Elevator Control by Sensors

Reduction of Longest Waiting Time

20%

Lighting Control by Sensors

Reduction of Energy Consumption

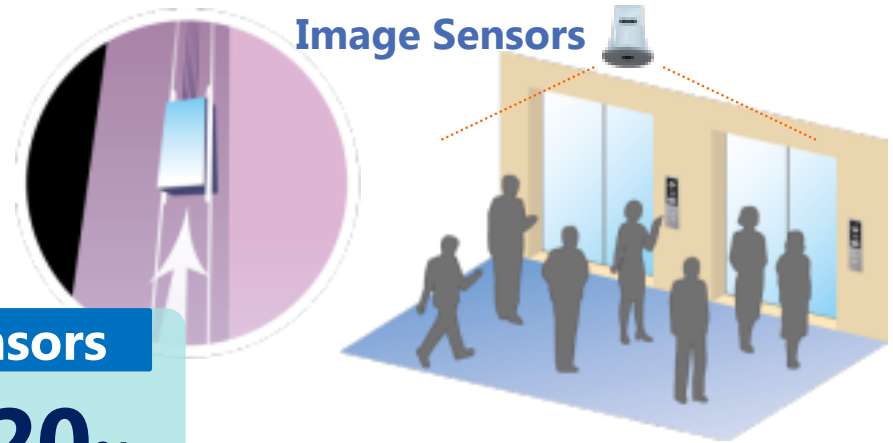
11%

Model based HVAC Control

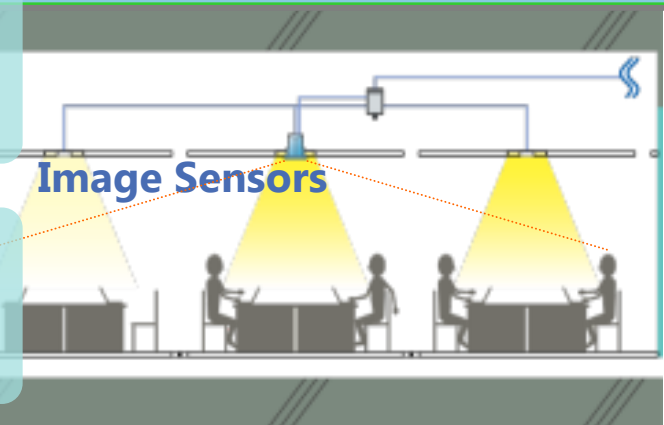
Annual Power Reduction

12%

Elevator Control based on Congestion Monitoring



Sensor-based Lighting Control



DigitalTwin for Smart Building

Not Local, But Entire

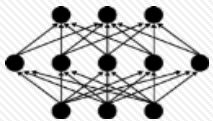
Building Model

Deep Learning

35,000 sensors

Sustainability

IIC Testbed

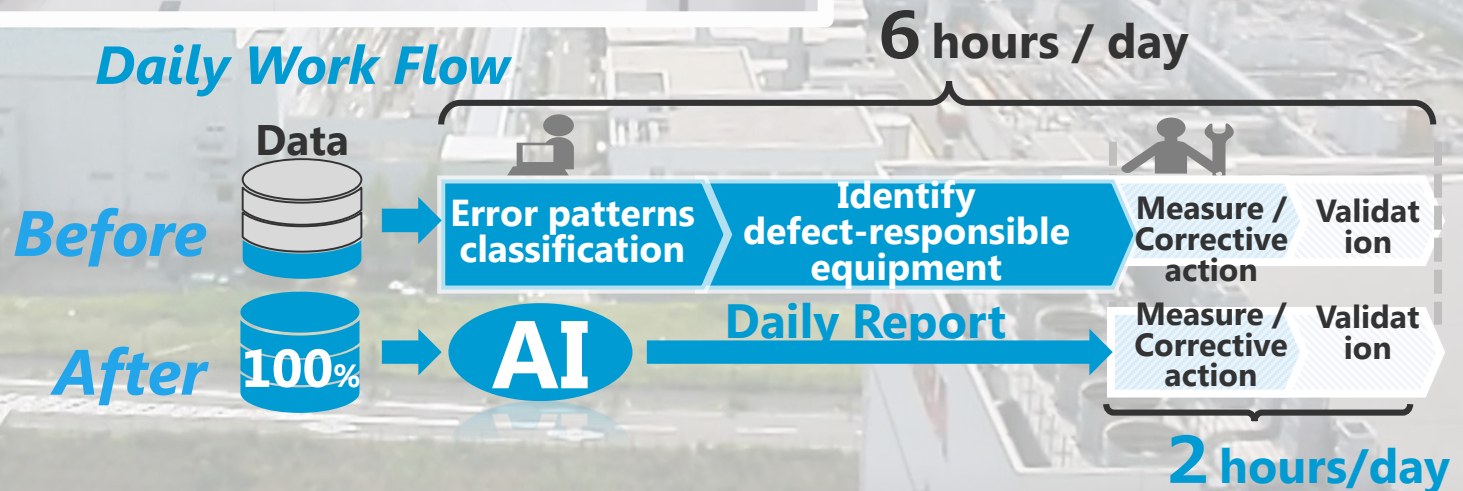


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DELL EMC

IoT Testbed w/ Deep Learning

Smart Factory



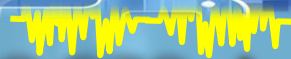
DigitalTwin for Smart Factory

Not Local, But Entire

Machine Model



Deep Learning



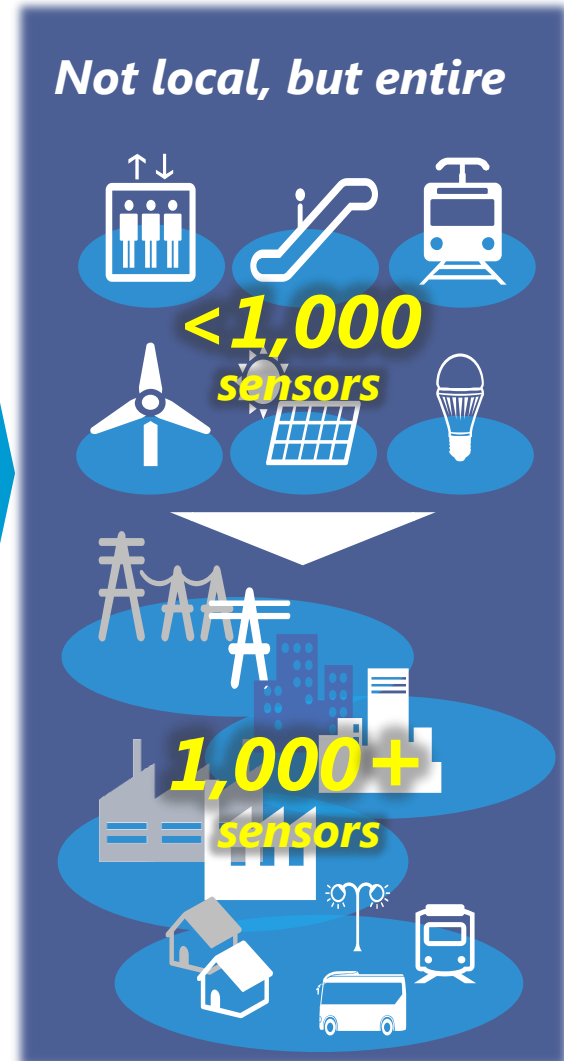
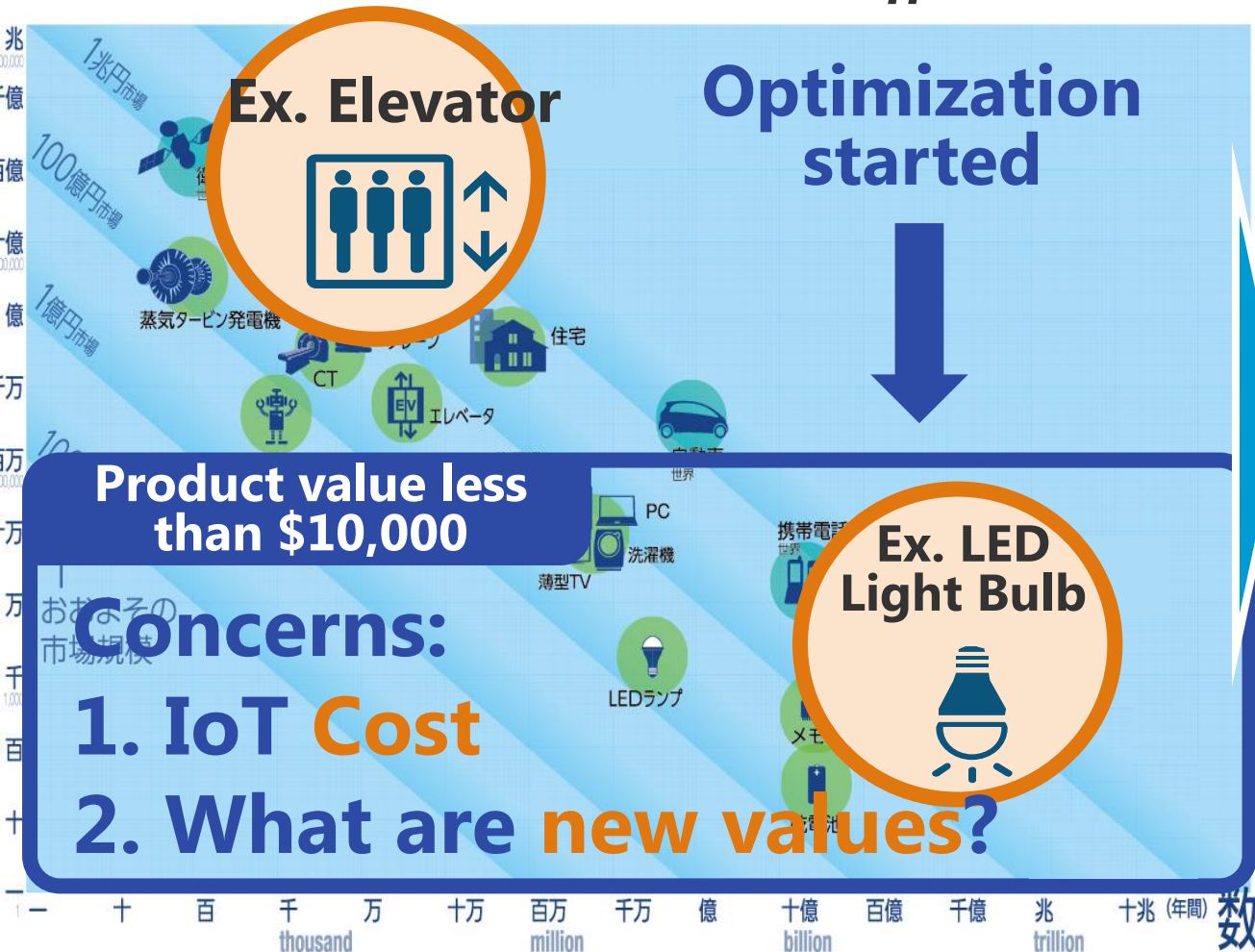
6,000,000 sensors



***Identification of
Optimal Parameters***

"DigitalTwin + AI" provides new value of IoT

Concerns when IoT started to take off



MIC of Japan; WHITE PAPER Information and Communications in Japan, IDC, Cisco

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