



Chu Voon Fui



Agenda

- 1 Smart Homes
- 2 Industrial Automation
- 3 Smart Agricultural
- 4 Smart Cities

Smart Homes

Smart Home is becoming reality – requiring security solutions:

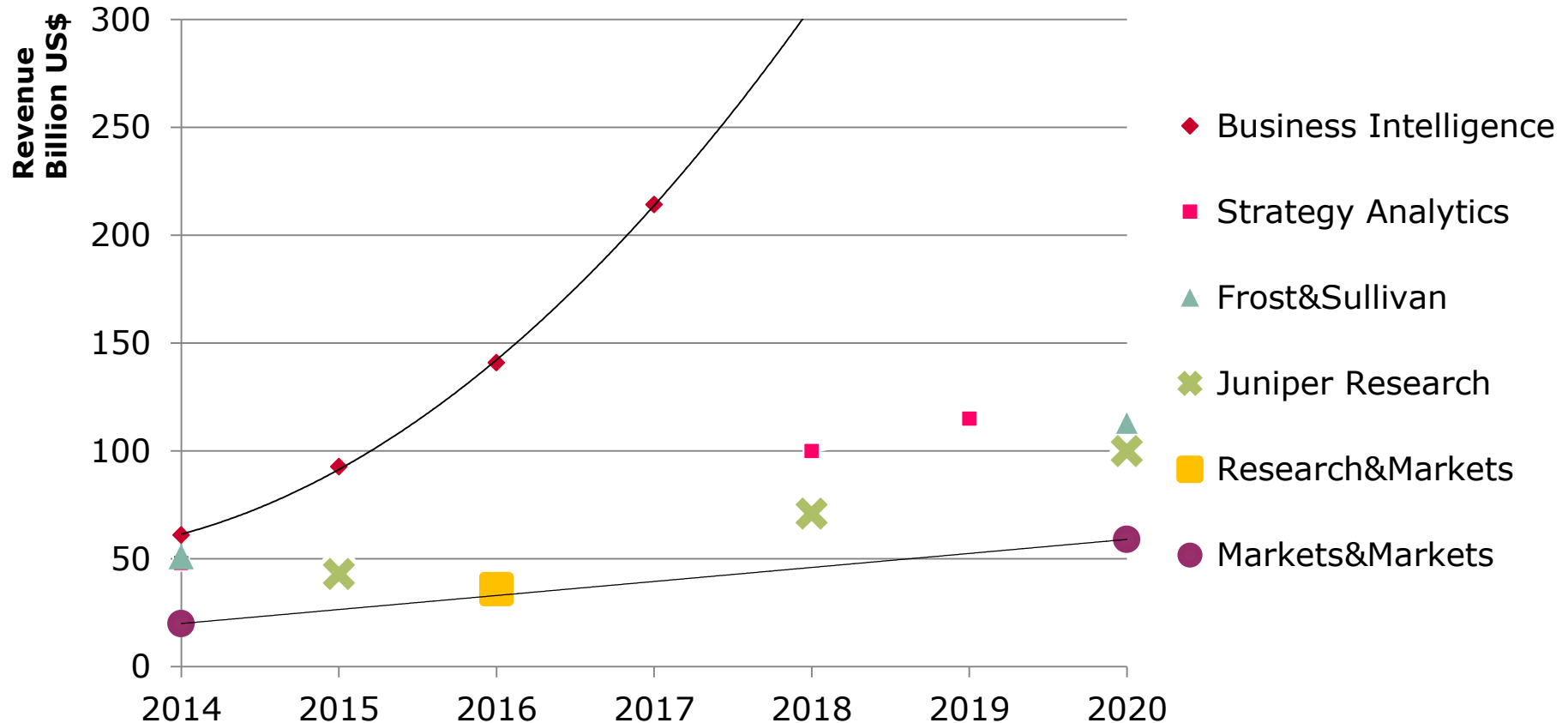


A Typical Family Home Could Contain More Than **500** Smart
Devices by 2022"

Source: Gartner

How will the market expand over the next years?

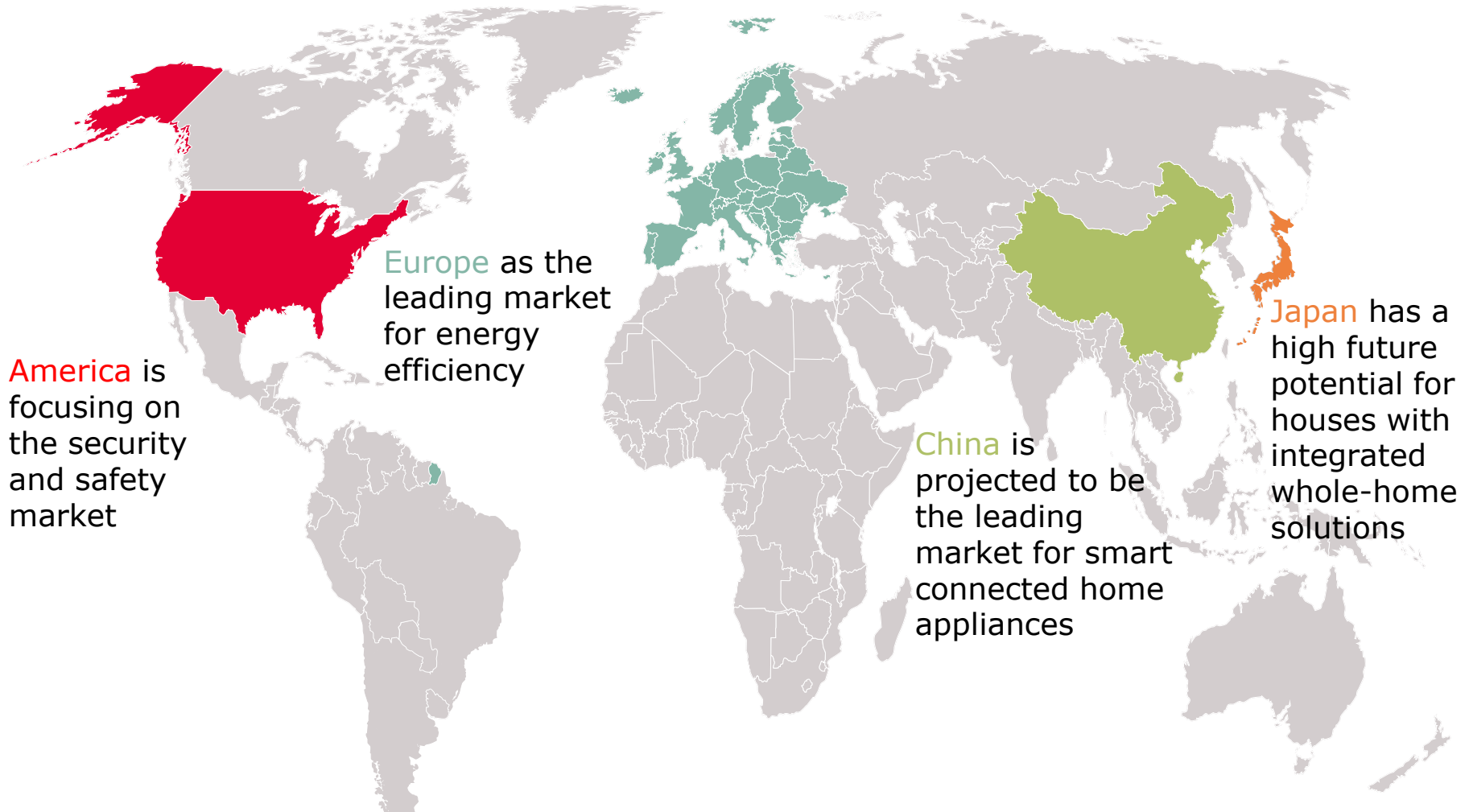
Researchers are forecasting highly inconsistent revenues through Smart Home related hardware, services and installation fees.



Forecasts are inconsistent since researchers use varying definitions. However, all research companies predict strong growth over the next years

Source: BI (2015), Frost and Sullivan (2015), VDE (2013)

How does the demand for certain Smart Home applications vary globally?



The market demand of specific smart devices is dependent on several external factors and differs geographically

Source: IHS (2015), Technavio (2015) and Deutsche Telekom (2015)

Why do consumers not buy smart devices?

Research institutes conducted interviews with potential customers to find out why they don't buy Smart Home devices.

Germany (n=1000)

1	Too expensive	44%
2	Lacking data security	29%
3	No additional value perceived	23%
4	Complex installation	22%
5	Haven't heard of products	19%
?	Don't know	13%

United States (n=2007)

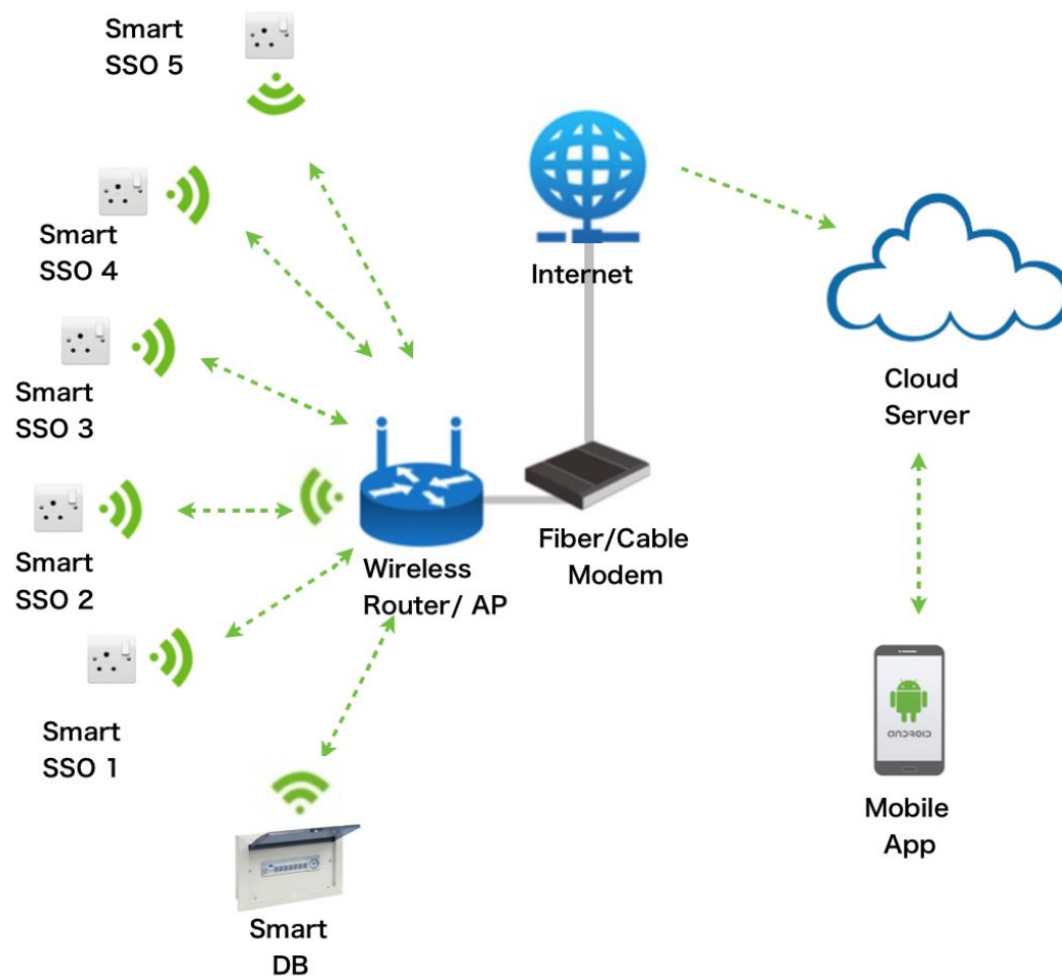
1	High initial costs	57%
2	High maintenance costs	37%
3	Fears over data security	30%
4	Risk of loss of privacy	30%
5	More likely to fail	24%



High initial costs and missing data security are the main obstacles that prevent potential customers from buying smart devices

Source: Deloitte (2015), Frost and Sullivan (2015), Brighttalk (2015)

Smart Home : Real Use Case



Industrial Automation (Industrie 4.0)

Authentication

Industrial manufacturing will go through disruptive changes: 4th industrial (r)evolution



85% of responding companies will have implemented 4.0
in their key areas by 2020

Source: Strategy& and PWC

IoT, a network of cyber-physical objects that contain embedded electronics to sense, compute, actuate and communicate

ADVANCED SENSING CAPABILITIES

Ubiquitous **Sensors** mark the "Point of Beginning" of the IoT, picking up meaningful data from the environment surrounding an IoT edge device.



TRUSTED SECURITY EXPERTISE

Security solutions shield connected systems and devices and protect personal privacy, intellectual property and public safety



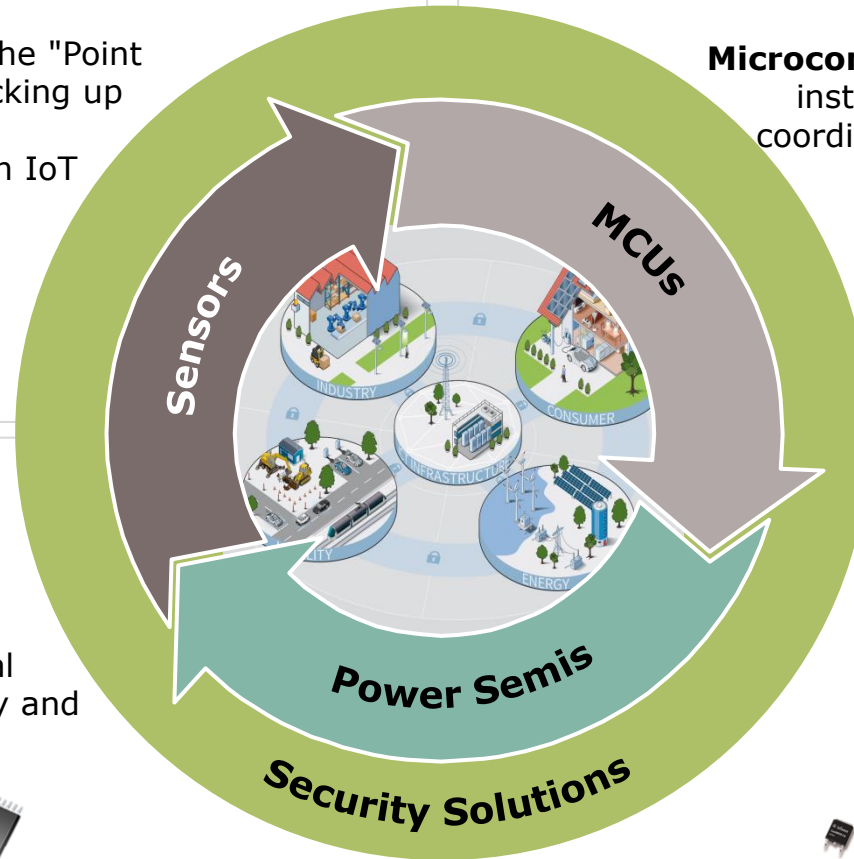
CROSS APPLICATION CONTROL

Microcontrollers (MCUs) control and instruct IoT devices by collecting, coordinating, processing, analyzing, and communicating data – thus making them "**smart**"



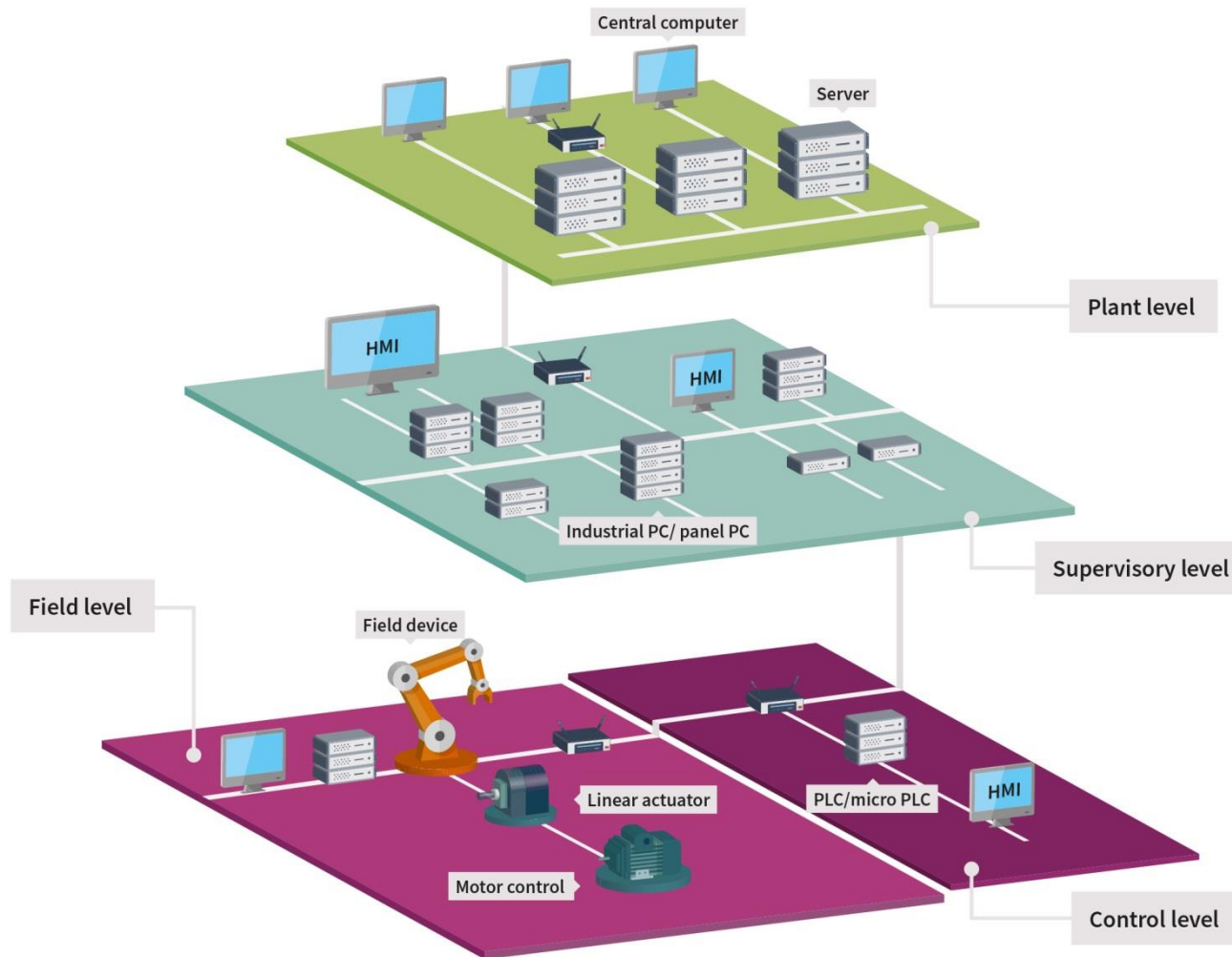
EFFICIENT POWER MANAGEMENT

Power Semiconductors actuate devices depending on "smart" decision: "Muscles" for the device



Making the Industrial Internet of Things smart, safe, secure and power efficient.

The generic architecture of industrial automation system



Computing
Devices
(Servers, PCs,
PLCs,...)

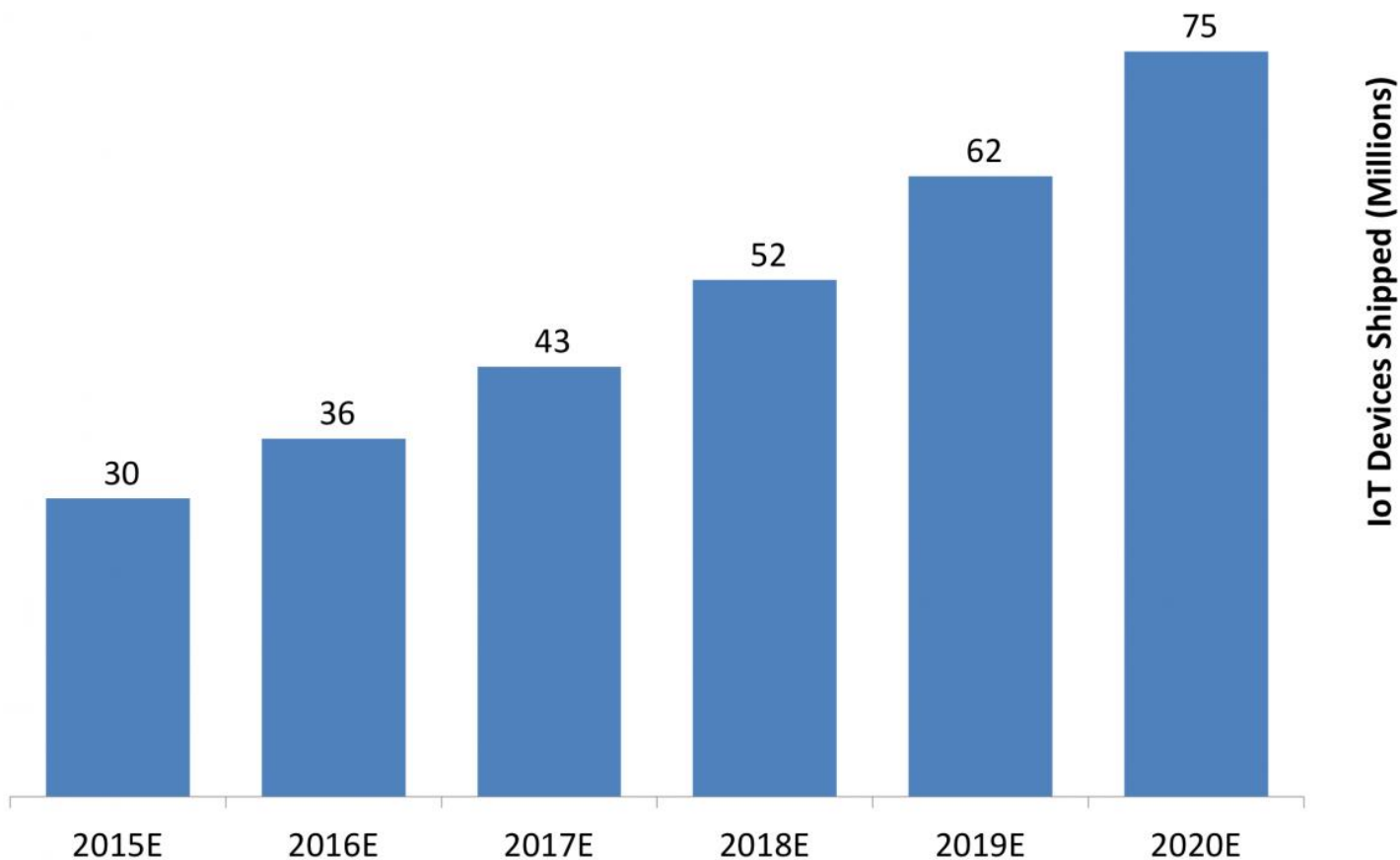
Network
Devices
(gateways,
routers,...)

Sensors and
actuators
(motors, position
sensors,...)

Smart Agricultural



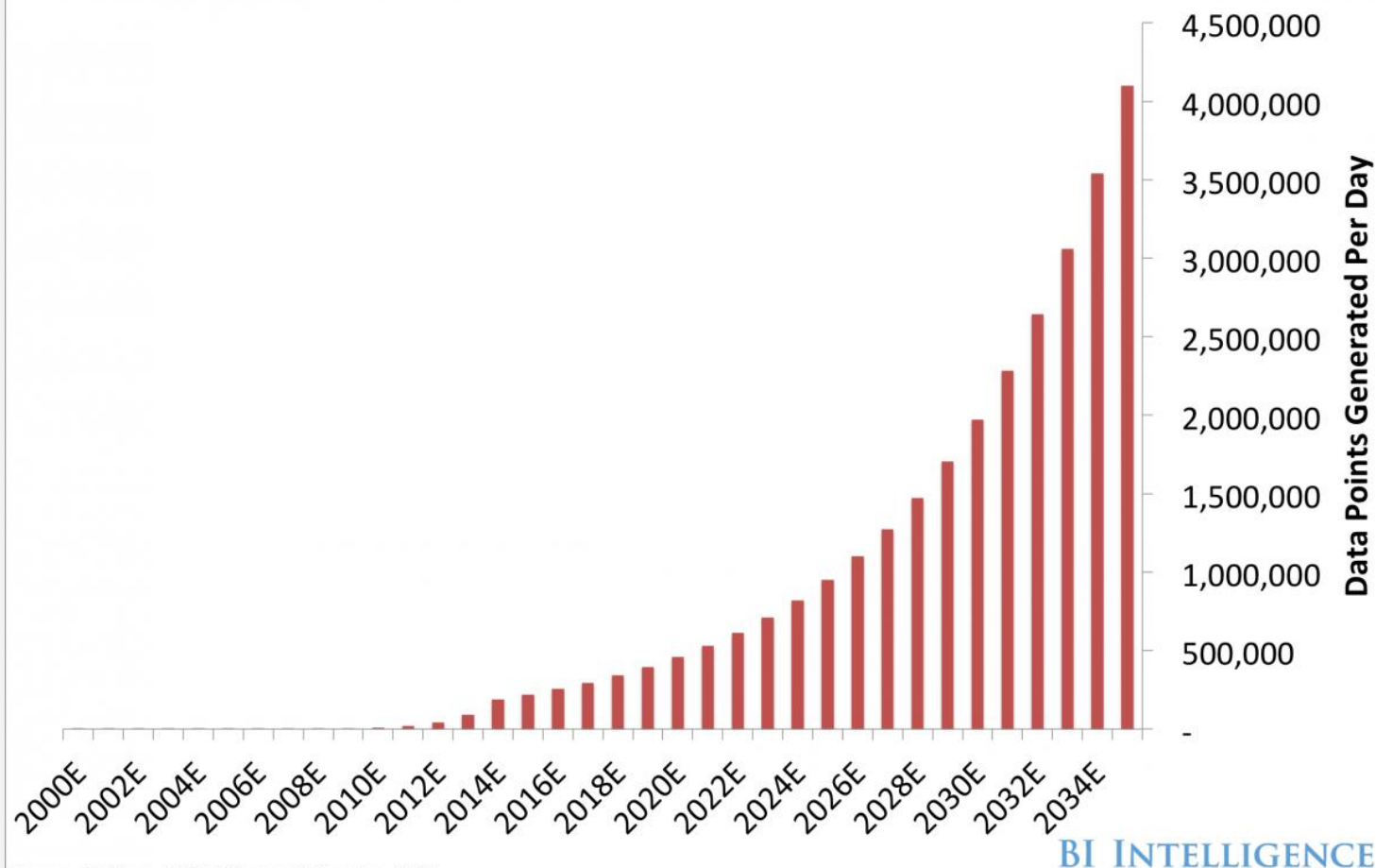
Estimated Agricultural IoT Device Shipments *Global*



Source: BI Intelligence Estimates, 2015

BI INTELLIGENCE

Estimated Amount Of Data Generated By The Average Farm Per Day

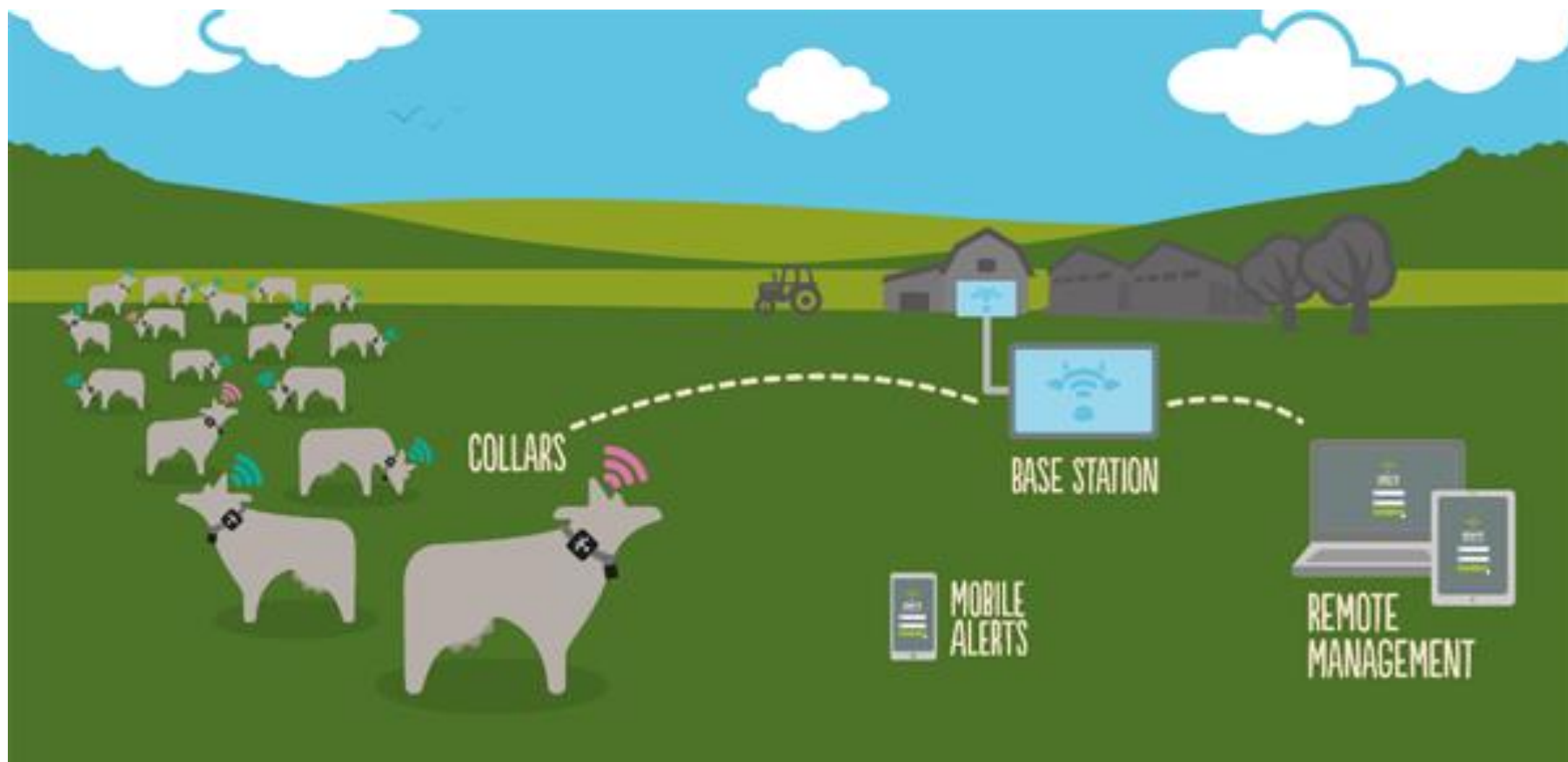


Source: OnFarm, BI Intelligence Estimates, 2015

High Tech Farming



Internet of Cows

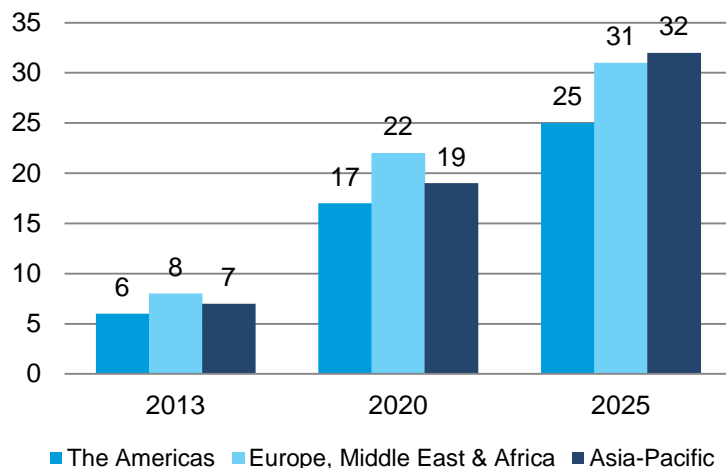


Smart Cities

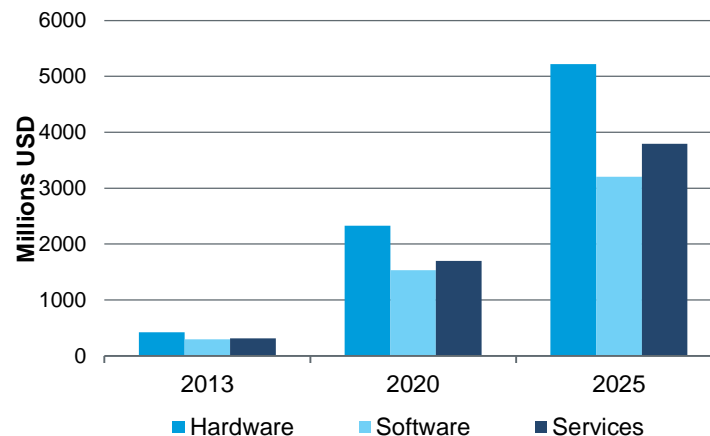


Smart city investment

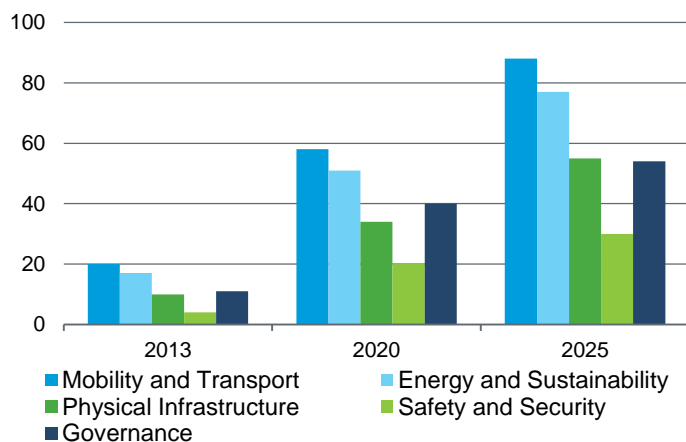
Number of smart cities



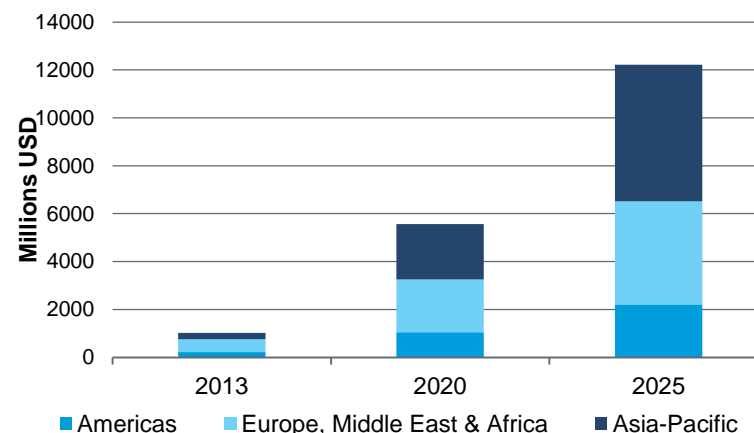
Investment type



Segmented by function area



Regional investment



TOWN PLANNING

What: A modelling system to simulate a city's built environment and its impact on the natural environment, people, resources and costs

Who: HDB, Electricite de France, Veolia

Uses: Among other things, show how different land uses affect amenities and transport networks; how to design new housing blocks to get ideal wind flow; where best to build cycling paths

Status: Research collaboration / prototype stage

WATER QUALITY AND LEAKS

What: A network of wireless sensors that monitors water quality and detects leaks in real time

Who: PUB, Singapore-MIT Alliance for Research and Technology, Visenti

Uses: Allows PUB to repair leaks faster and reduce water loss

Status: About 300 sensors installed by end-2015

NOTE: Artist's impression

GRAPHICS:
MIKE M DIZON and DAVID EE

ERP II

What: A satellite-based electronic road pricing (ERP) system that can use an on-board monitor to charge motorists according to distance travelled

Who: Land Transport Authority, IBM

Uses: This may replace the current system, which charges motorists each time they pass through an ERP gantry during certain times

Status: Feasibility being studied

SECURITY

What: A public-private Safe City Test Bed that produced, for example, a mobile app for commanders to track security forces in real time

Who: Economic Development Board, Ministry of Home Affairs, AGT International, Airbus Defence and Space, NCS, NEC Asia Pacific

Uses: Could help commanders respond to incidents more quickly and precisely

Status: Test bed completed

Building a SMART CITY

A slew of initiatives are taking place islandwide, the goal of which is to sharpen the Government's response to city issues and hence improve people's day-to-day lives.

3D MAPPING

What: Mapping the country in 3D from the air by using light planes equipped with lasers and cameras

Who: Singapore Land Authority

Uses: PUB could use the map to model flood patterns, while the Civil Aviation Authority of Singapore could plan more efficient landing paths for planes

Status: Expected to be completed by 2016

DISEASE AND HYGIENE

What: Computer models that use sensors and mobile apps to help detect and forestall dengue and food poisoning outbreaks

Who: National Environment Agency (NEA), IBM

Uses: For example, if people complain on Facebook or Twitter of being sick after eating at a particular restaurant, the system would alert NEA officers

Status: Research collaboration

IMPROVING PUBLIC TRANSPORT

What: Analysing CCTV video feeds and anonymised location-based data from mobile subscribers to learn commuters' travel patterns

Who: Land Transport Authority, SMRT, StarHub, IBM

Uses: Help agencies respond better to unplanned incidents on the train and bus network, such as breakdowns or emergencies

Status: Research collaboration

PROTECTING THE SEA

What: Eight buoys along coastline with sensors that test waters for pollutants and send real-time updates wirelessly to the NEA

Who: National Environment Agency (NEA)

Uses: Early detection of oil or chemical spills

Status: In place

JURONG LAKE DISTRICT - 'SMART CITY'

What: A government vision for the area to use smart technologies such as driverless cars to improve liveability for residents

Who: Singapore Government, Intel

Uses: For now, driverless cars will ply the Chinese and Japanese Gardens later this year. Expected to be used at Jurong East MRT next year

Status: Ongoing



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