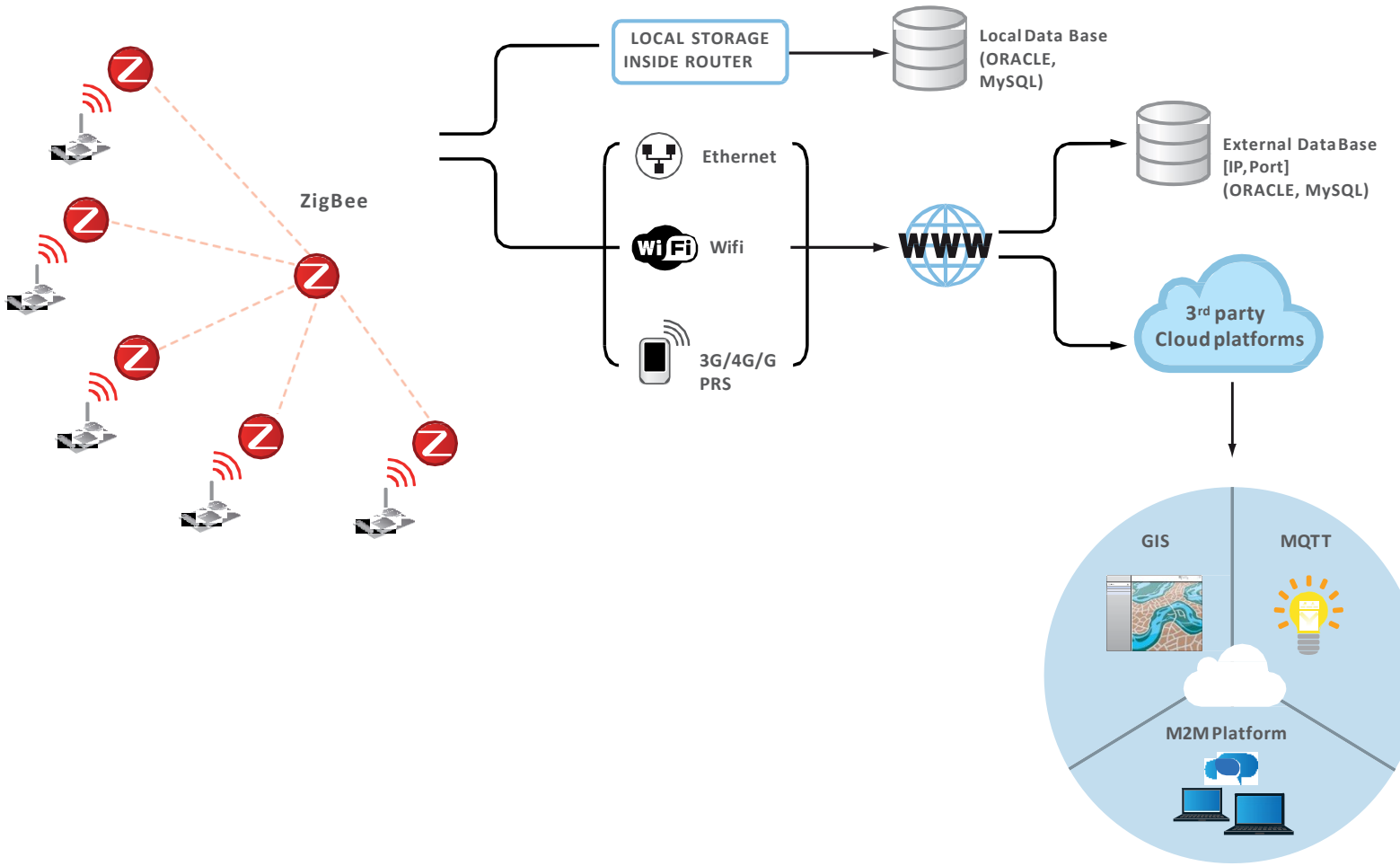
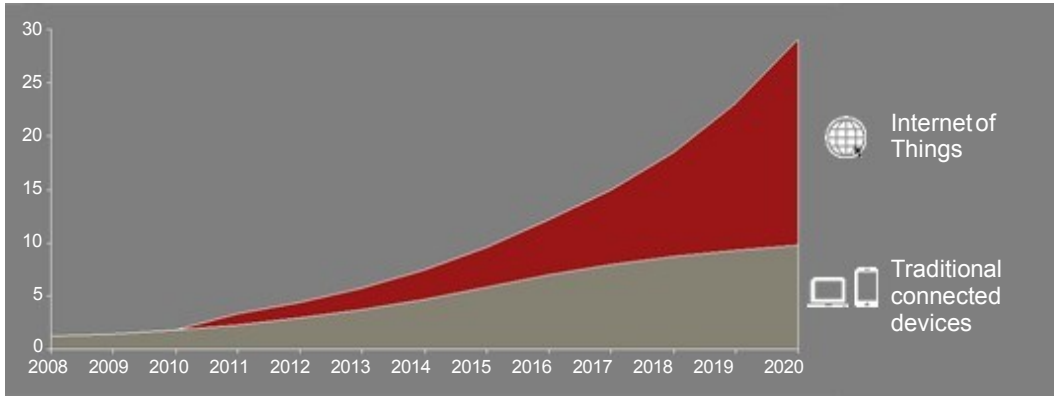
IoT: An Ocean of Apps, and a Huge Opportunity for Business and Employment

Dr Mondher Ben Ayed, CEO TMI


ZigBee
LOCAL STORAGE
INSIDE ROUTER
Local Data Base
(ORACLE,
MySQL)
Ethernet
Wifi
3G/4G/G
PRS
WWW
External Data Base
[IP, Port]
(ORACLE, MySQL)
3rd party
Cloud platforms
GIS
MQTT
M2M Platform

IoT will be pervasive



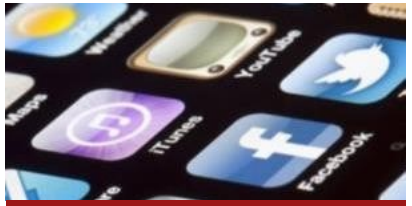
2013 to 2020: From half as many to twice as many – growth of IoT devices relative to traditional connected devices

By 2020 in the World…

Nearly 30 billion devices

Over 7.7 billion people

By 2020 in Silicon Valley…



20X+ as many connected devices per person

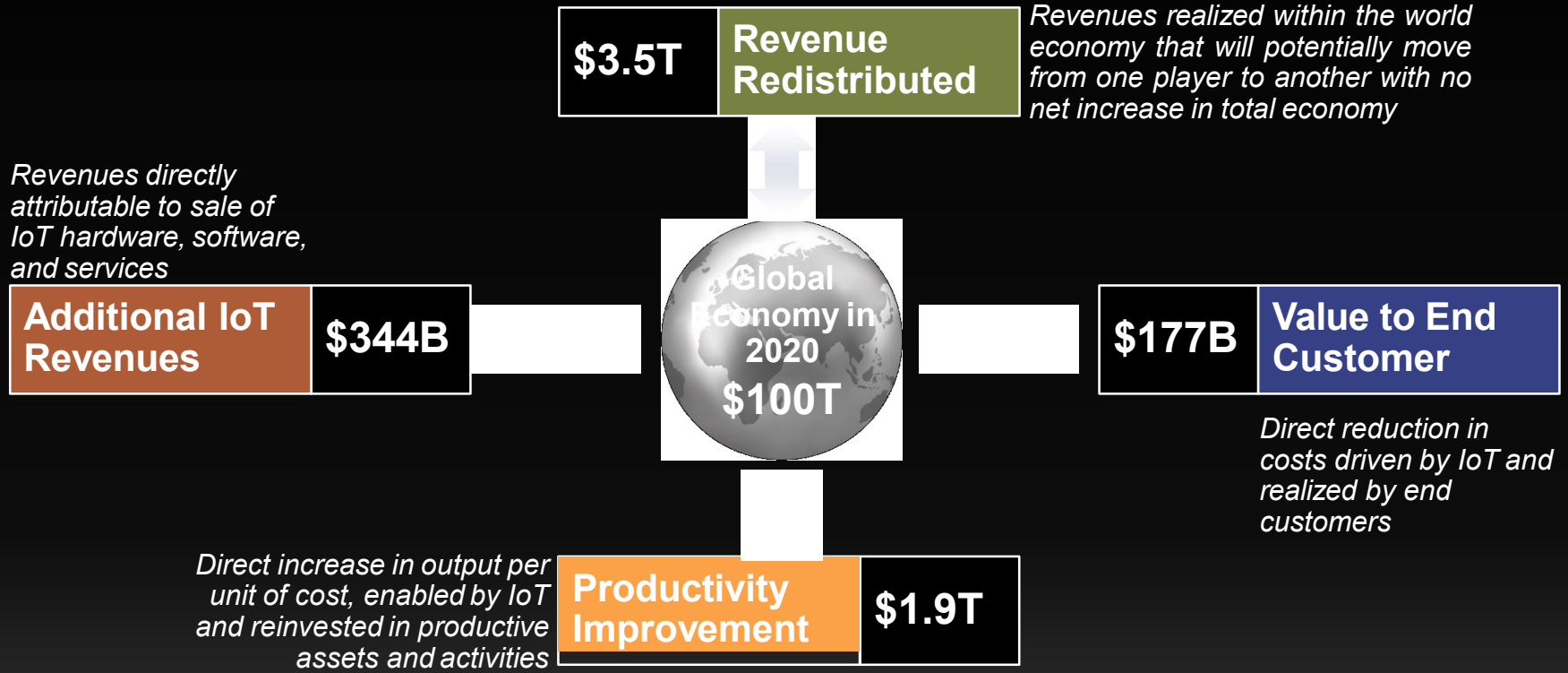
Over 3.2M people

Connected devices

Over 3.5 per every human on the planet

For a family of four: 250+
For us in this room: 7,000+
For all in Silicon Valley: 200M+

By 2020 IoT will impact close to 6% of the global economy



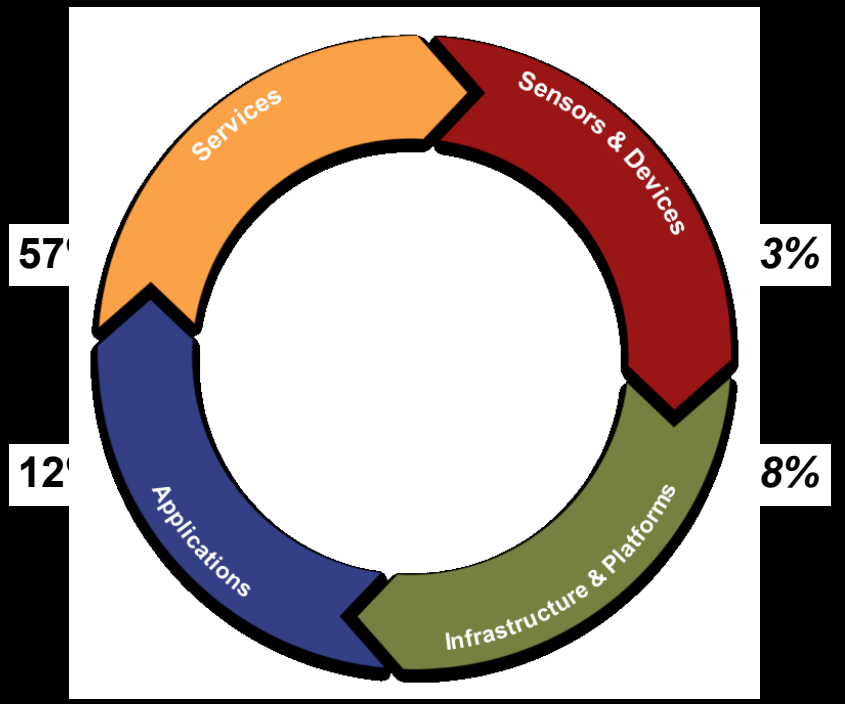
IoT will be **materially disruptive** – there will be **winners** and **losers**

Source: A.T. Kearney

Additional IoT revenues will be split in a multitude of ways

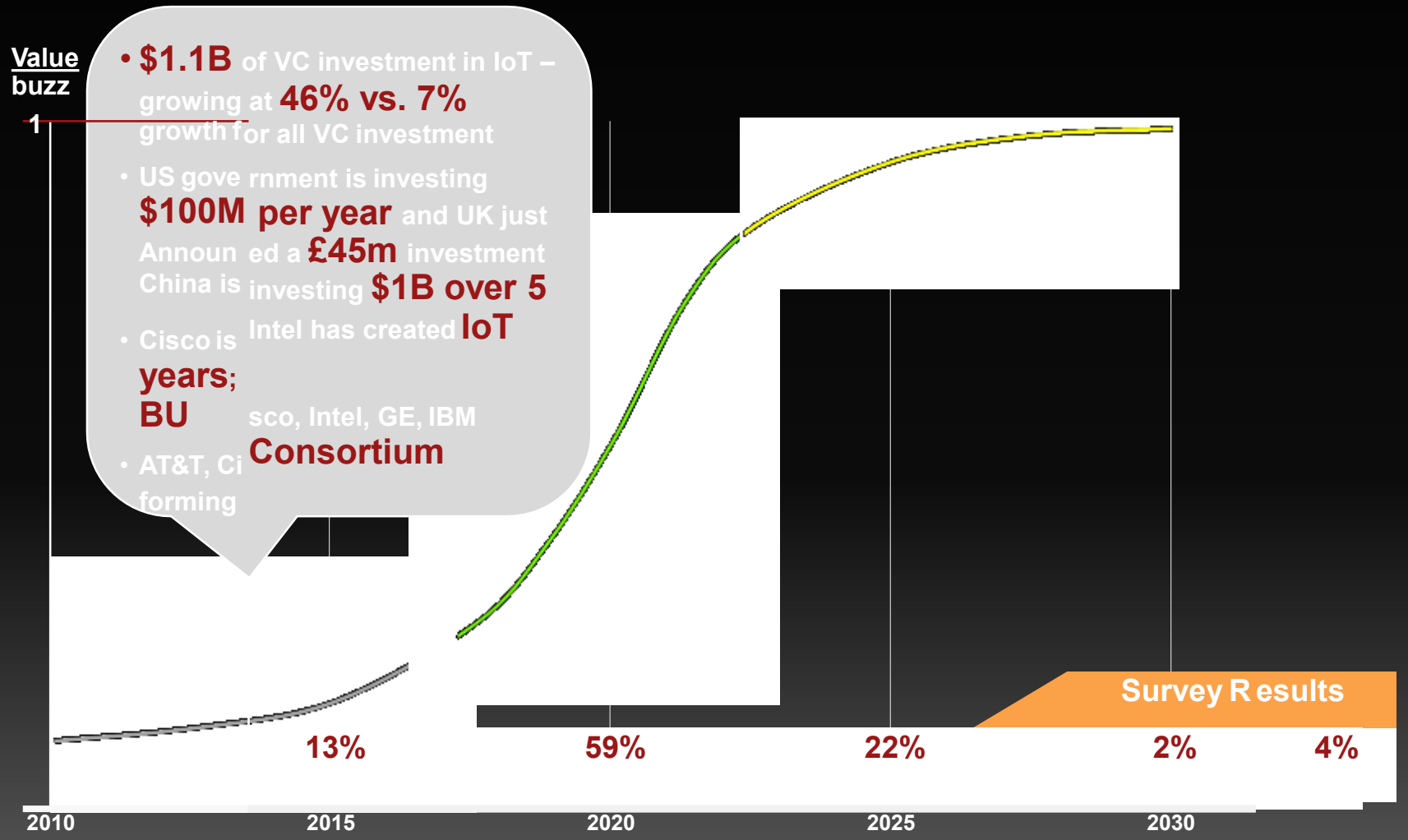
Additional IoT Revenues	$344B

			Survey Results: Time to Value Rank
Enterprise	63%	*$217B*	1
Consumer	28%	*$97B*	2
Public Sector	9%	*$30B*	3



Source: A.T. Kearney

It will take years for IoT potential to be realized



Source: A.T. Kearney

IoT VALUE CHAIN

Ecosystem	WE	Consumer
Industrial Manufacturers & Operators	System Integrators	The Client
Sensors, Systems & Communications	*Data Analysis & Web Services*	*End User*


Smart Cities
Smart City technology investment will total $108 billion by 2020.
Pike Research

Smart Parking
Monitoring of parking spaces availability in the city.

Structural health
Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.

Noise Urban Maps
Sound monitoring in bar areas and centric zones in real time.

Smartphone Detection
Detect iPhone and Android devices and in general any device which works with WiFi or Bluetooth interfaces.

Eletromagnetic Field Levels
Measurement of the energy radiated by cell stations and and WiFi routers.

Traffic Congestion
Monitoring of vehicles and pedestrian levels to optimize driving and walking routes.

Smart Lighting
Intelligent and weather adaptive lighting in street lights.

Waste Management
Detection of rubbish levels in containers to optimize the trash collection routes.

Smart Roads
Intelligent Highways with warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.


Smart Environment
More than 100,000 wildfires
clear 4 million to 5 million acres
(1.6 - 2 million ha) of land
only in the USA.

- **Forest Fire Detection**
  Monitoring of combustion gases and preemptive fire conditions to define alert zones.

- **Air Pollution**
  Control of CO2 emissions of factories, pollution emitted by cars and toxic gases generated in farms.

- **Snow Level Monitoring**
  Snow level measurement to know in real time the quality of ski tracks and allow security corps avalanche prevention.

- **Landslide and Avalanche Prevention**
  Monitoring of soil moisture, vibrations and earth density to detect dangerous patterns in land conditions.

- **Earthquake Early Detection**
  Distributed control in specific places of tremors.


Smart Water
Today, the worldwide water consumption is 300% compared to 1950.

- **Potable water monitoring**
  Monitor the quality of tap water in cities.

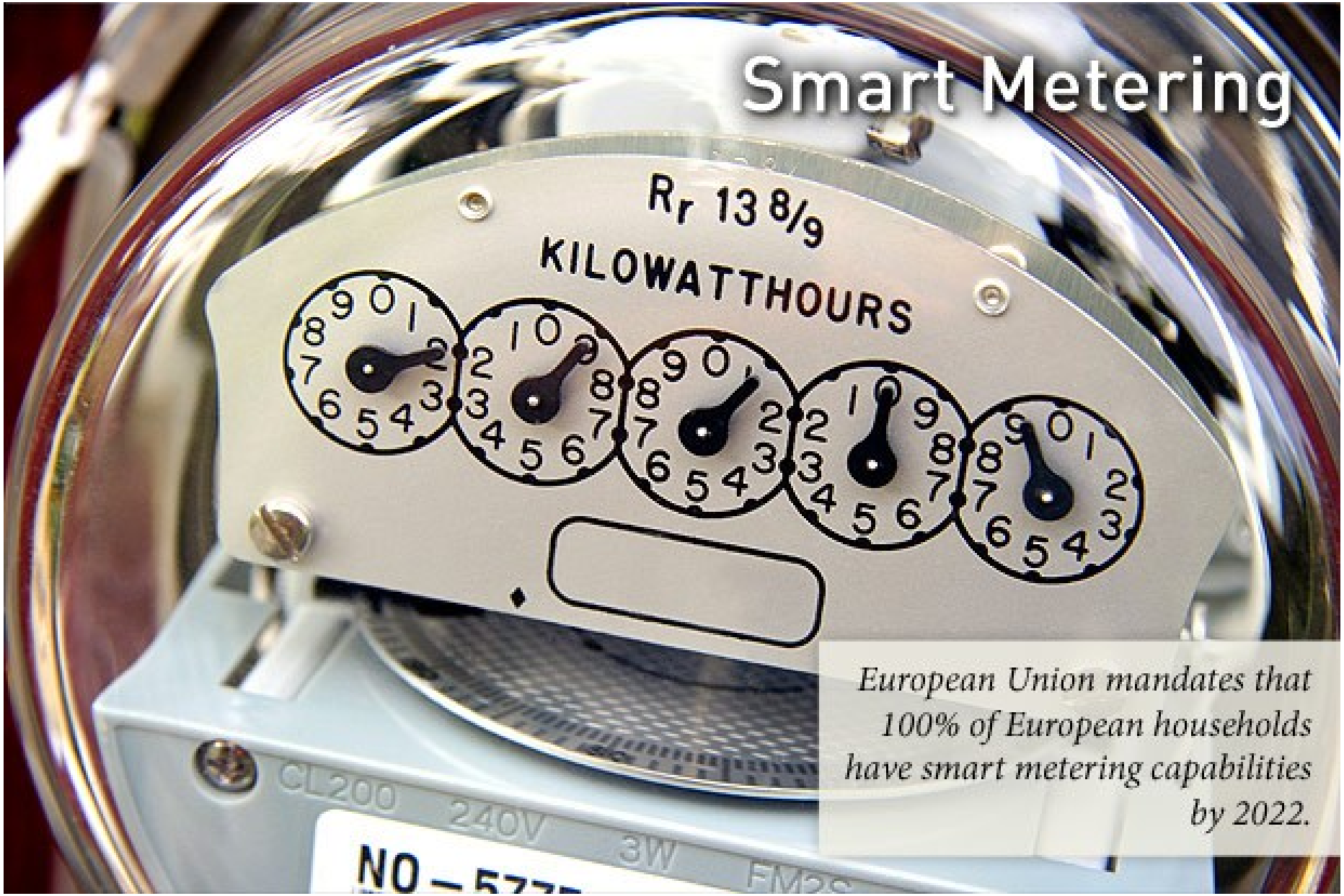
- **Chemical leakage detection in rivers**
  Detect leakages and wastes of factories in rivers.

- **Swimming pool remote measurement**
  Control remotely the swimming pool conditions.

- **Pollution levels in the sea**
  Control realtime leakages and wastes in the sea.

- **Water Leakages**
  Detection of liquid presence outside tanks and pressure variations along pipes.

- **River Floods**
  Monitoring of water level variations in rivers, dams and reservoirs.



European Union mandates that 100% of European households have smart metering capabilities by 2022.

- **Smart Grid**
  Energy consumption monitoring and management.

- **Tank level**
  Monitoring of water, oil and gas levels in storage tanks and cisterns.

- **Photovoltaic Installations**
  Monitoring and optimization of performance in solar energy plants.

- **Water Flow**
  Measurement of water pressure in water transportation systems.

- **Silos Stock Calculation**
  Measurement of emptiness level and weight of the goods.


Security & Emergencies
Nuclear energy covers 16% of the planet energy needs.

- **Perimeter Access Control**
  Access control to restricted areas and detection of people in non-authorized areas.

- **Liquid Presence**
  Liquid detection in data centers, warehouses and sensitive building grounds to prevent break downs and corrosion.

- **Radiation Levels**
  Distributed measurement of radiation levels in nuclear power stations surroundings to generate leakage alerts.

- **Explosive and Hazardous Gases**
  Detection of gas levels and leakages in industrial environments, surroundings of chemical factories and inside mines.


Retail
Failure to restock supermarket shelves costs the FMCG industry 4 billion € each year.
ECR Europe

- **Supply Chain Control**
  Monitoring of storage conditions along the supply chain and product tracking for traceability purposes.

- **NFC Payment**
  Payment processing based in location or activity duration for public transport, gyms, theme parks, etc.

- **Intelligent Shopping Applications**
  Getting advices in the point of sale according to customer habits, preferences, presence of allergic components for them or expiring dates.

- **Smart Product Management**
  Control of rotation of products in shelves and warehouses to automate restocking processes.


Logistics
Each year, more than 100 million shipping containers travel around the globe.

- **Quality of Shipment Conditions**
  Monitoring of vibrations, strokes, container openings or cold chain maintenance for insurance purposes.

- **Item Location**
  Search of individual items in big surfaces like warehouses or harbours.

- **Storage Incompatibility Detection**
  Warning emission on containers storing inflammable goods closed to others containing explosive material.

- **Fleet Tracking**
  Control of routes followed for delicate goods like medical drugs, jewels or dangerous merchandises.


Industrial Control
The volume of cellular M2M subscriptions is expected to increase fourfold between 2010 and 2016.
Pyramid Research

- **M2M Applications**
  Machine auto-diagnosis and assets control.

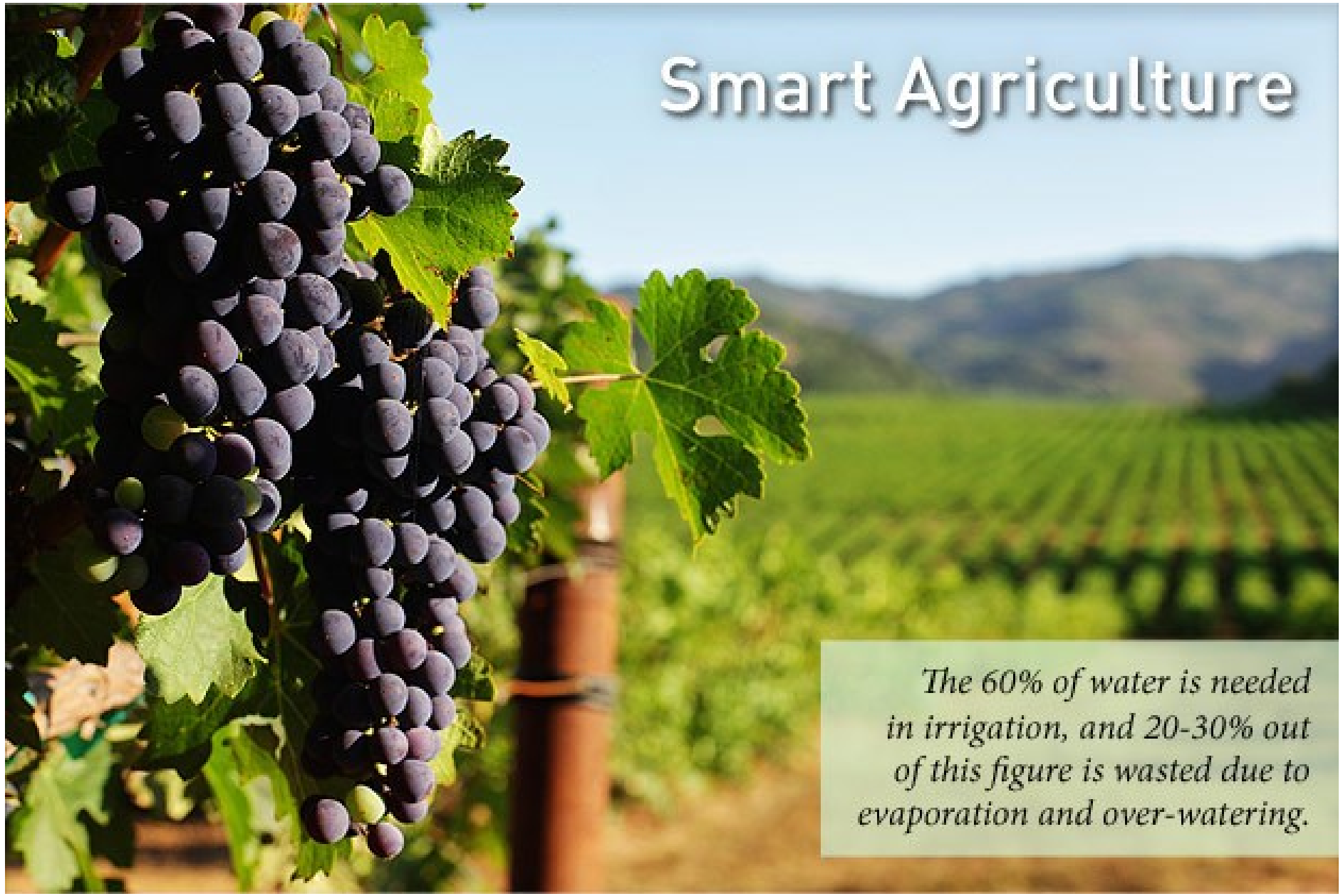
- **Indoor Air Quality**
  Monitoring of toxic gas and oxygen levels inside chemical plants to ensure workers and goods safety.

- **Temperature Monitoring**
  Control of temperature inside industrial and medical fridges with sensitive merchandise.

- **Ozone Presence**
  Monitoring of ozone levels during the drying meat process in food factories.

- **Indoor Location**
  Asset indoor location by using active (ZigBee) and passive tags (RFID/NFC).

- **Vehicle Auto-diagnosis**
  Information collection from CanBus to send real time alarms to emergencies or provide advice to drivers.


Smart Agriculture
The 60% of water is needed in irrigation, and 20-30% out of this figure is wasted due to evaporation and over-watering.

- **Wine Quality Enhancing**
  Monitoring soil moisture and trunk diameter in vineyards to control the amount of sugar in grapes and grapevine health.

- **Green Houses**
  Control micro-climate conditions to maximize the production of fruits and vegetables and its quality.

- **Golf Courses**
  Selective irrigation in dry zones to reduce the water resources required in the green.

- **Meteorological Station Network**
  Study of weather conditions in fields to forecast ice formation, rain, drought, snow or wind changes.

- **Compost**
  Control of humidity and temperature levels in alfalfa, hay, straw, etc. to prevent fungus and other microbial contaminants.


Smart Animal Farming
The CH_4 emissions from animal farming in the U.S. have increased a 17% during the past decade.
U. S. Environmental Protection Agency

- **Hydroponics**
  Control the exact conditions of plants grown in water to get the highest efficiency crops.

- **Offspring Care**
  Control of growing conditions of the offspring in animal farms to ensure its survival and health.

- **Animal Tracking**
  Location and identification of animals grazing in open pastures or location in big stables.

- **Toxic Gas Levels**
  Study of ventilation and air quality in farms and detection of harmful gases from excrements.


Domotic &
Home Automation
European Union homes should cut energy consuption by 20% by 2020 according to Kyoto Protocol.

- **Energy and Water Use**
  Energy and water supply consumption monitoring to obtain advice on how to save cost and resources.

- **Remote Control Appliances**
  Switching on and off remotely appliances to avoid accidents and save energy.

- **Intrusion Detection Systems**
  Detection of windows and doors openings and violations to prevent intruders.

- **Art and Goods Preservation**
  Monitoring of conditions inside museums and art warehouses.


eHealth
65+ people will go from 7% to
12% by 2030.

- **Fall Detection**
  Assistance for elderly or disabled people living independent.

- **Medical Fridges**
  Control of conditions inside freezers storing vaccines, medicines and organic elements.

- **Sportsmen Care**
  Vital signs monitoring in high performance centers and fields.

- **Patients Surveillance**
  Monitoring of conditions of patients inside hospitals and in old people's home.

- **Ultraviolet Radiation**
  Measurement of UV sun rays to warn people not to be exposed in certain hours.