

# Business Analytics



UNIVERSITAT DE  
BARCELONA

Facultat d'Economia  
i Empresa

# What are we going to do?

- Presentation.
- What is Business Analytics?
- Impact of Business Analytics in a Company. General approach.
  - Objectives: We will dedicate this sessions to analyze what is the impact of gathering, managing and analyzing data in the different areas of a Company
    - Strategy.
    - Technology.
    - Business Processes.
      - Internet of Thinks.

# Business Processes



# Value Chain. Internet of Thinks.



## Primary Activities.

- **Inbound Logistics. This is not a necessary activity in the business model of this company.**
- **Operations. activities to make the service work: management of the premises, management of the facilities, etc.**
- **Outbound Logistics. This is not a necessary activity in the business model of this company.**
- Marketing & Sales. from the definition of new services and the price of each one, to the promotion and creation of sales channels that are not only direct but also through distributors and other channels. Follow-up and execution of the sale including underwriting functions.
- Service. customer service once they are on the premises and handling of complaints, etc.

# What is IoT

How did we get here?

What is the future?

The Internet of Things connects devices such as everyday consumer objects and industrial equipment onto the network, enabling information gathering and management of these devices via software to increase efficiency, enable new services, or achieve other health, safety, or environmental benefits.

### CONNECTED HOMES

- Smart Thermostats
- Smart Appliances
- HVAC Systems
- Security
- Smart Lighting
- Entertainment Systems

### WEARABLES

- Fitness Bands
- Smart Watches
- Smart Glasses
- Action Cameras

### INDUSTRIAL INTERNET

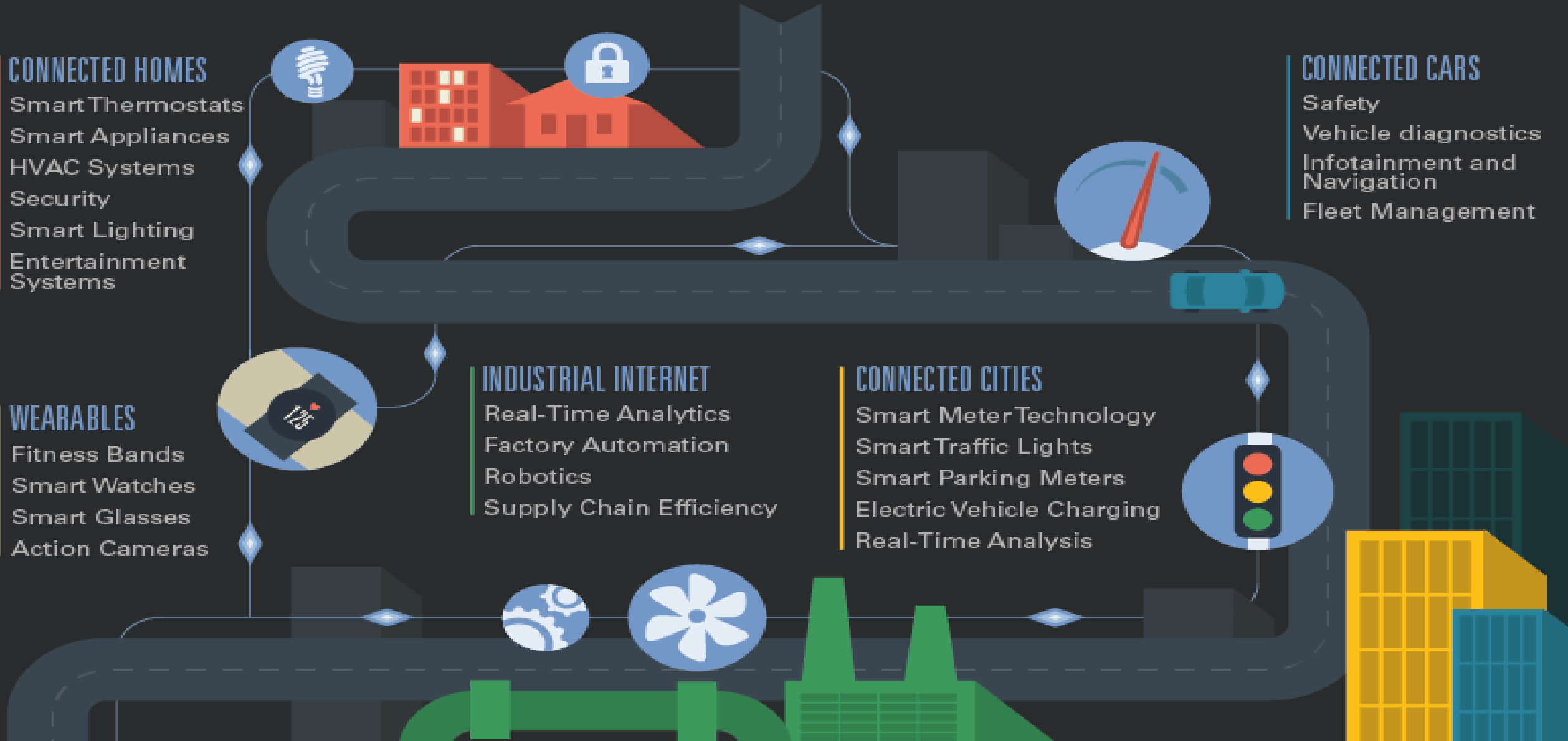
- Real-Time Analytics
- Factory Automation
- Robotics
- Supply Chain Efficiency

### CONNECTED CITIES

- Smart Meter Technology
- Smart Traffic Lights
- Smart Parking Meters
- Electric Vehicle Charging
- Real-Time Analysis

### CONNECTED CARS

- Safety
- Vehicle diagnostics
- Infotainment and Navigation
- Fleet Management



## HOW DID WE GET HERE?

With key obstacles gone, the cost of connectivity has declined at the same time that new ways to analyze mountains of data have developed.

### COST OF SENSORS

\$1.30 → .60  
AVG. COST  
over the past 10 years.

### COST OF BANDWIDTH

↓ 40x  
over the past 10 years.

### COST OF PROCESSING

↓ 60x  
over the past 10 years.



### SMARTPHONES

Smartphones are now becoming the personal gateway to the IoT.



### WI-FI

With Wi-Fi coverage now ubiquitous, wireless connectivity is available for free or at a very low cost.

### BIG DATA

As the IoT will by definition generate voluminous amounts of unstructured data, the availability of big data analytics is a key enabler.



### SCALABILITY OF IPv6

**IPv6** =  $3.4 \times 10^{38}$   
IP addresses

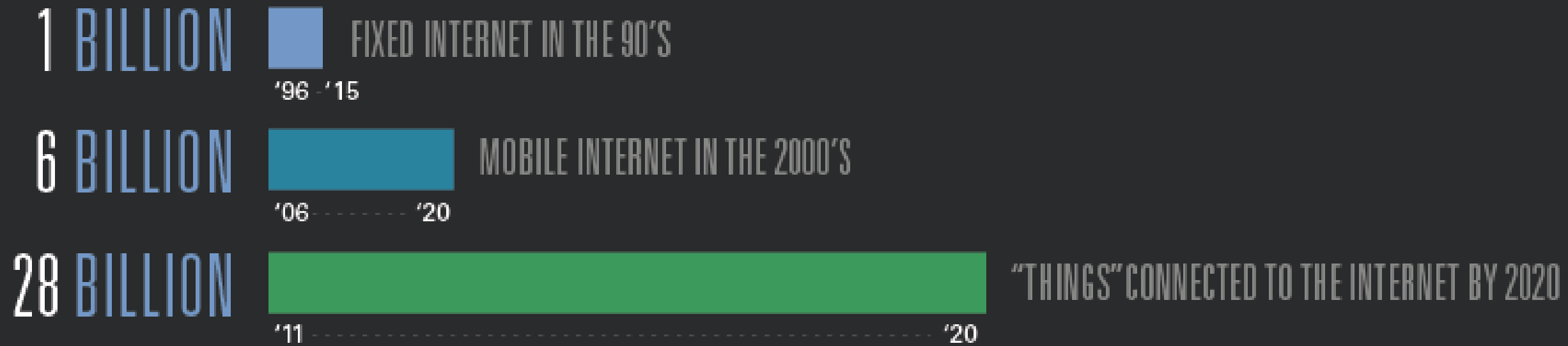
Internet Protocol (IP) addresses are the identification and location system for every computer on a network. IPv4, the fourth version of this protocol, allows for 4.3 billion addresses. **IPv6, the newest version, allows for an almost limitless amount.**

# WHAT IS THE FUTURE?

The Internet of Things (IoT) is emerging as the third wave in the development of the Internet. Personal lives, workplace productivity and consumption will all change. Plus there will be a string of new businesses, from those that will expand the Internet “pipes”, to those that will analyze the reams of data, to those that will make new things we haven’t even thought of yet.

## DEVICES CONNECTED TO THE INTERNET

Source: IDC

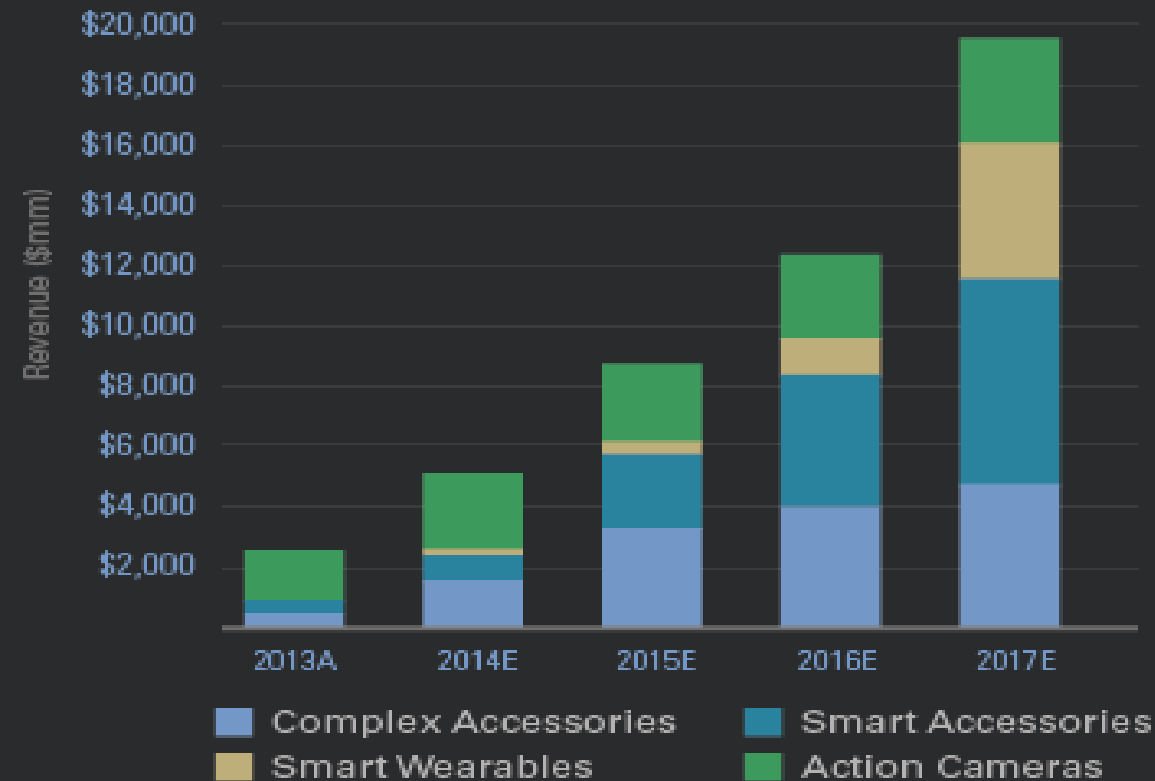




# WEARABLES

Source: IDC, Goldman Sachs  
Investment Research

Connected wearable devices include categories such as fitness bands, smart watches, smart glasses and action cameras.

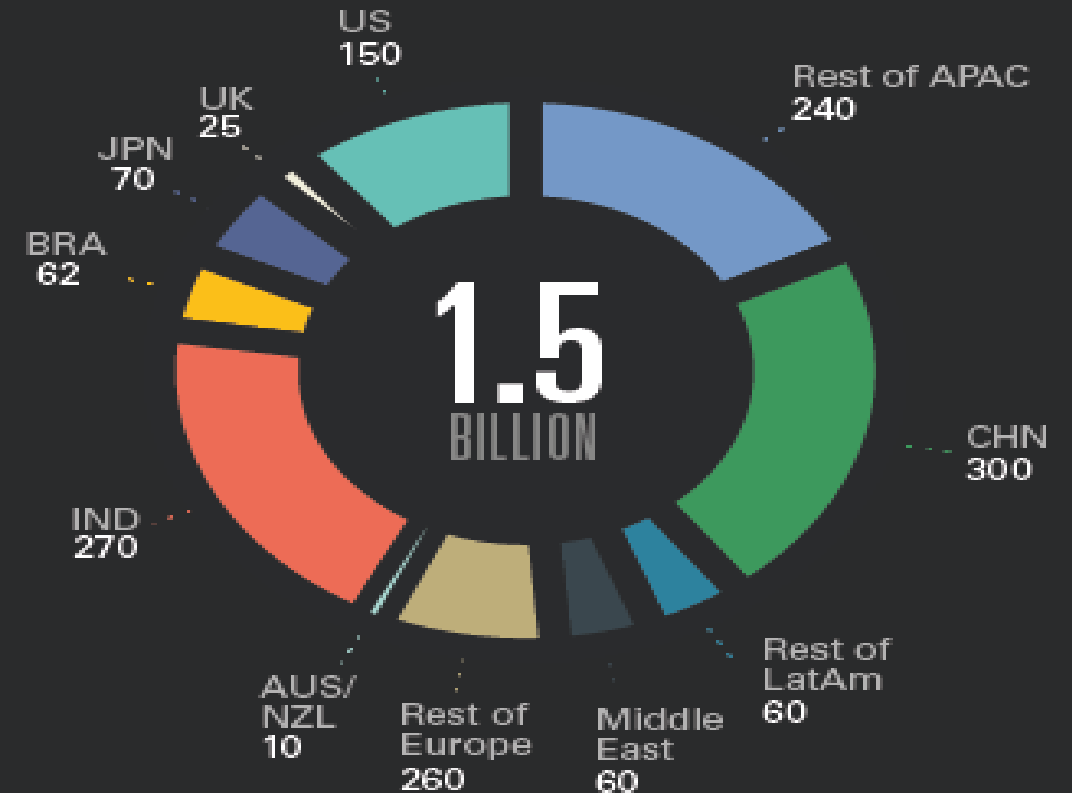


Wearable devices to reach about \$20bn by 2017,  
growing at over **60% CAGR**

# CITIES

Source: Company data,  
Goldman Sachs Investment Research

Smart meters, which monitor water, gas and electric usage, play a key role in helping cities analyze data, create efficiency and connect to the IoT.

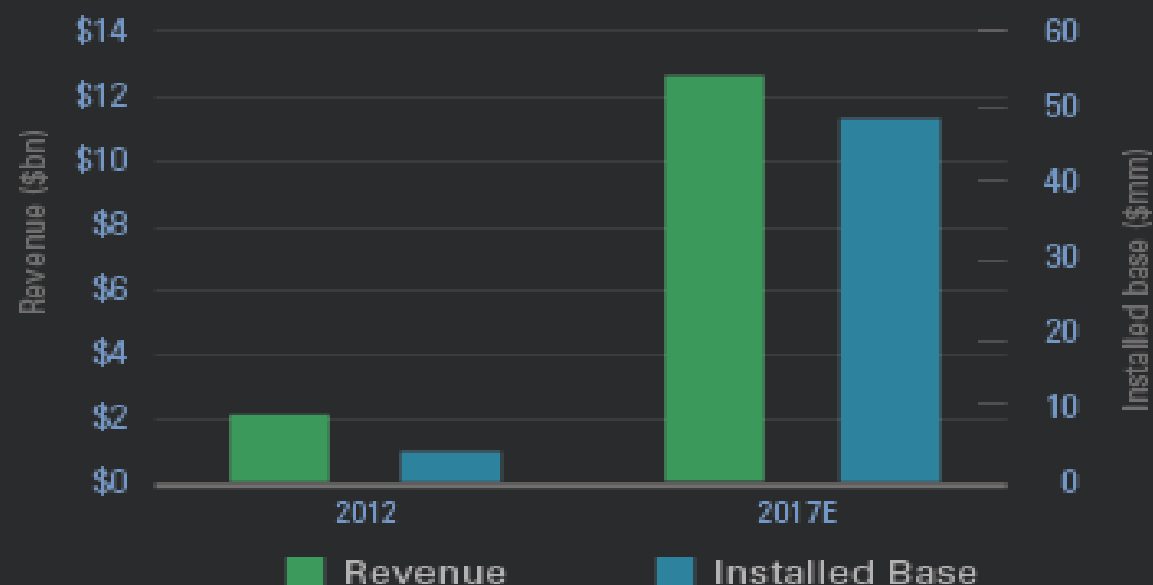


Approximate estimate of smart meter opportunity  
by geography, in millions

# HOMES

Source: Berg Insight

Connected homes include connecting household appliances to the network, with resulting advantages including improved security, remote management of devices, and energy management.

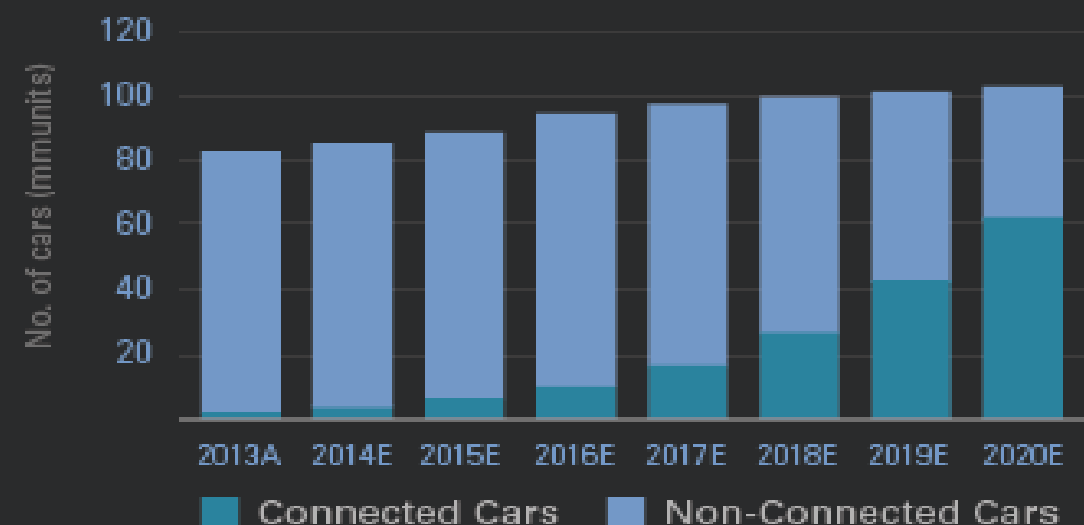


North America and Europe home automation systems

# CARS

Source: Gartner (March 2014), Company data, Goldman Sachs Investment Research

Connected cars are vehicles that connect to the internet and may also feature the ability to communicate with other vehicles and infrastructure, such as traffic lights.



Connected cars penetration is being driven by applications in the following: safety, vehicle diagnostics, infotainment and navigation, and fleet management.

New types of applications  
and services using IoT.

# The interactions between these entities are creating new types of smart applications and services.

SENSORS + CONNECTIVITY + PEOPLE + PROCESSES

Starting with popular connected devices already on the market



## SMART THERMOSTATS

nest



Save resources and money on your heating bills by adapting to your usage patterns and turning the temperature down when you're away from home.

## CONNECTED CARS

CAR2GO



Tracked and rented using a smartphone. Car2Go also handles billing, parking and insurance automatically.

## ACTIVITY TRACKERS

BASIS



Continuously capture heart rate patterns, activity levels, calorie expenditure and skin temperature on your wrist 24/7.

## SMART OUTLETS

belkin



Remotely turn any device or appliance on or off. Track a device's energy usage and receive personalized notifications from your smartphone.

## PARKING SENSORS

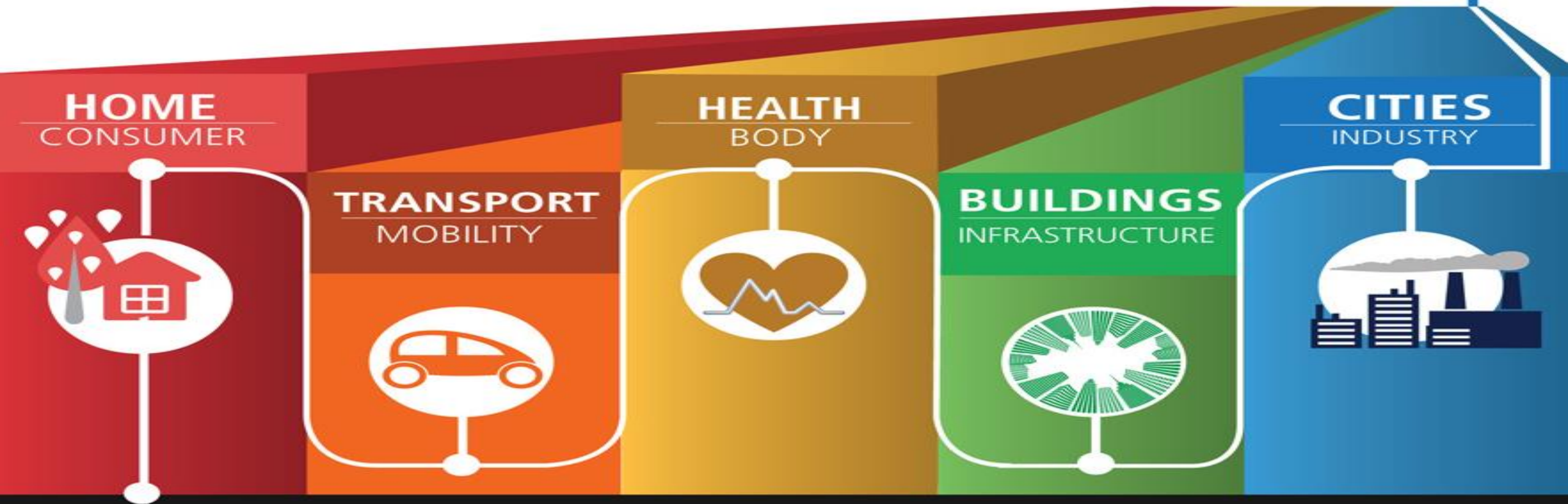
STREETLINE  
CONNECTING THE REAL WORLD



Using embedded street sensors, users can identify real-time availability of parking spaces on their phone. City officials can manage and price their resources based on actual use.

And quickly advancing

**TO ➡ DIVERSE APPLICATIONS**



*Light bulbs  
Security  
Pet Feeding  
Irrigation Controller  
Smoke Alarm  
Refrigerator  
Infotainment  
Washer / Dryer  
Stove  
Energy Monitoring*

*Traffic routing  
Telematics  
Package Monitoring  
Smart Parking  
Insurance Adjustments  
Supply Chain  
Shipping  
Public Transport  
Airlines  
Trains*

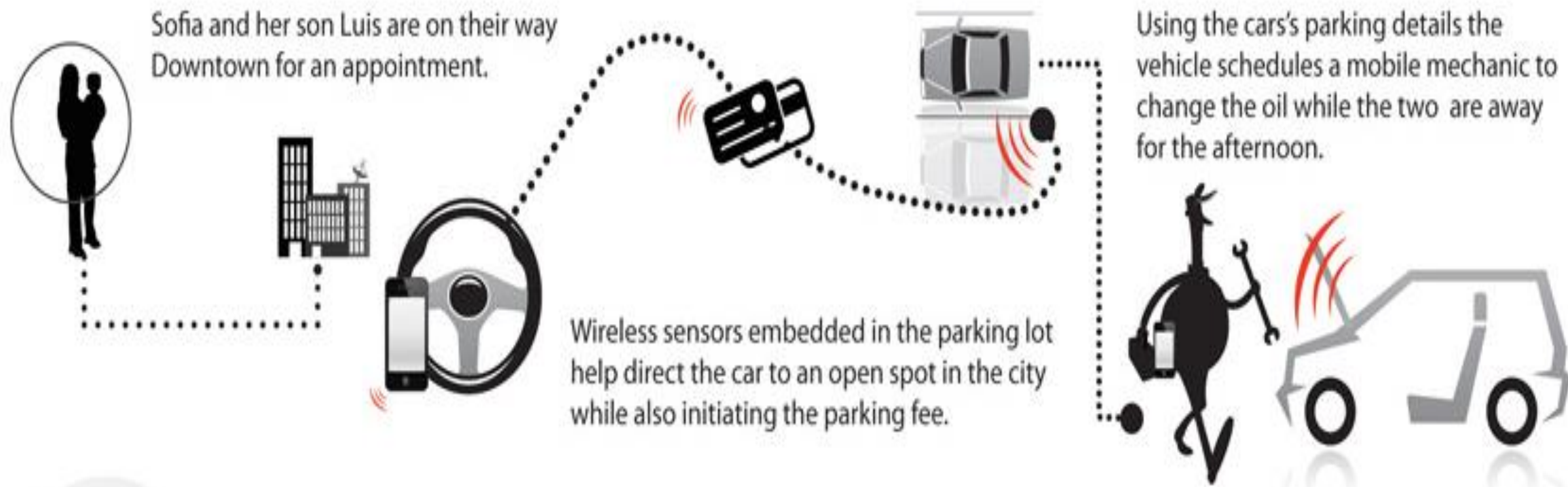
*Patient Care  
Elderly Monitoring  
Remote Diagnostic  
Equipment Monitoring  
Hospital Hygiene  
Bio Wearables  
Food sensors*

*HVAC  
Security  
Lighting  
Electrical  
Transit  
Emergency Alerts  
Structural Integrity  
Occupancy  
Energy Credits*

*Electrical Distribution  
Maintenance  
Surveillance  
Signage  
Utilities / Smart Grid  
Emergency Services  
Waste Management*



## TRANSPORTATION + SMART CITIES



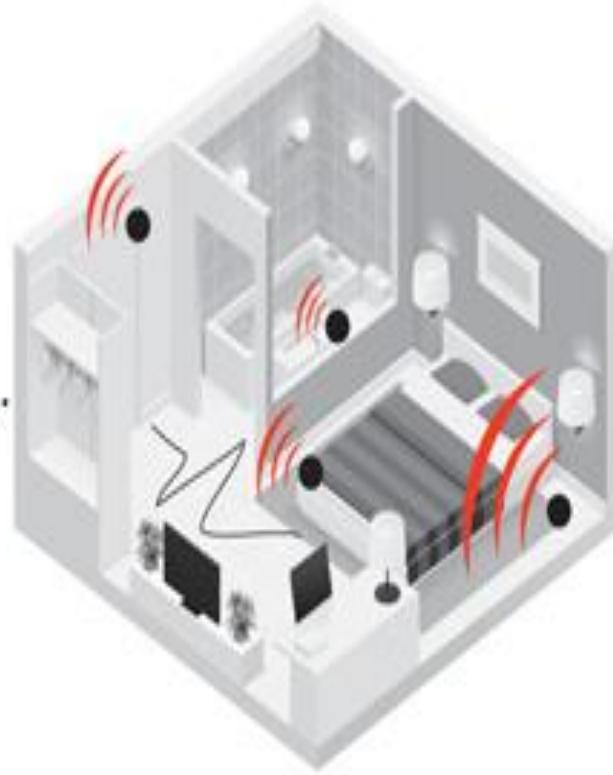
***In Downtown San Francisco 20-30% of all traffic congestion is caused by people hunting for a parking spot.***

- San Francisco Municipal Transportation Agency (SFMTA)

## HEALTHCARE + SMART HOME



Aging uncle Earl is still living isolated at his home and you are concerned about his safety.



Wireless sensors throughout his house help measure healthy activity levels, sleeping patterns and medication schedules. ....



Alerts are automatically sent to health care services and authorized family members if any abnormal activity is detected.

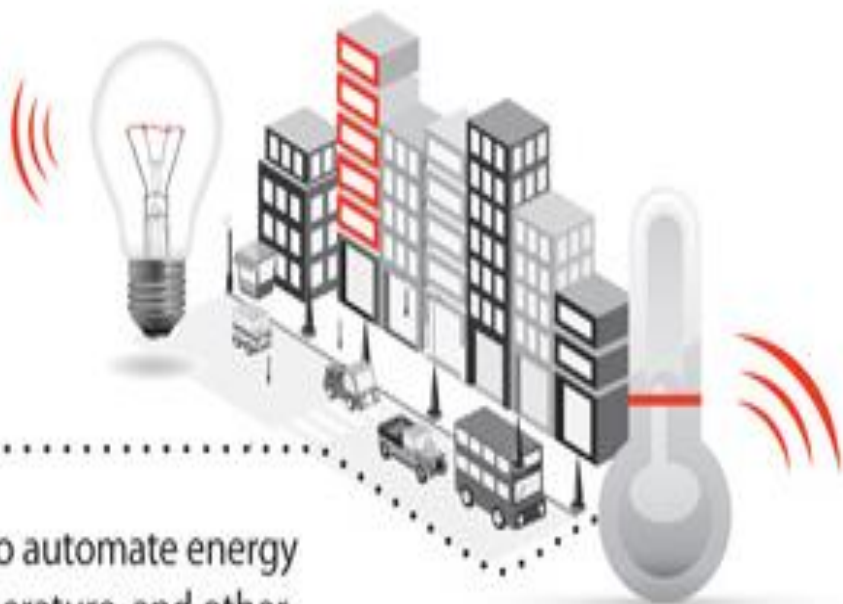
***40 million adults age 65 and over will be living alone in the U.S, Canada and Europe.***

- U.S. Department of Health and Human Services: Administration for Community Living (ACL)

# SMART BUILDINGS + MOBILITY



Anna is being pressured to reduce her company's expenses for their new corporate office.



After speaking with experts she decides to install sensors to automate energy usage according to building occupancy, people flow, temperature, and other ambient conditions – improving the building's overall efficiency.

***Energy used by commercial and industrial buildings in the US creates nearly 50% of our national emissions of greenhouse gases.***

- United States Environmental Protection Agency



# REAL-TIME SERVICE NETWORKS

- Appliance Monitoring
- Predictive Maintenance
- Service Technician / CRM
- Waste Management / Recycling



## R Hotel Denver, *Industrial Washer #GHS40-2608*

Location: ID: FC-RM #00243

Manufacturer: Appliance Park

Louisville, KY ID: #45205343

Materials: FC / SUS

Sensor: Vibration

Connectivity: Wireless LAN

Connor, the Lead Maintenance Manager at the R Hotel in Denver, receives a sensor notification that the pump body O-ring #6 on washing machine #230243 is starting to fail in the housekeeping laundry room.

On his mobile, Connor prompts the machine to order a new part. This action triggers a bidding opportunity for local service technicians within the product's authorized maintenance network.

The request lays out:

- Pricing parameters
- Timing requirements
- Machine history
- Part specs
- Predictive sensor measurements & alerts

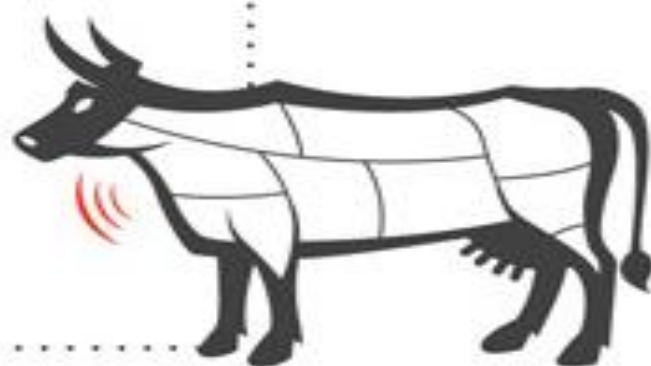
Tom from IA Appliances bids on the service request and receives a notification a few moments later that his bid was accepted.

Within 1.5 hours, a service technician from IA Appliances is on site (Using a temporary facility access code for the wireless door lock) to replace the water pump. Connor sends a brief note on the service quality and IA Appliances releases a bid request for the part's raw materials to local recycling centers.



# DIGITAL FARM TO TABLE

- Farm & Livestock ID & Sensors
- Food packaging sensors
- Retail Supply Chain Monitoring
- Health Services



**Cattle**  
**AIN: 840 003 123 456 789**

**Location:** ID: Braymeadow Farm FR  
#00285453543  
**Slaughterhouse ID:** #45205343  
**Sensor:** Temperature, Accelerometer  
**Connectivity:** RFID, NFC, WAN



Maria and her daughter are picking up groceries for the week. Using packaging with printed sensors, the two can make sure the ground beef they are purchasing has never reached unsafe temperature levels while on the shelf or being transported.

The packaging also contains a QR code which they can use to query the cow's RFID tag and bring up its history:

- Where it was raised
- Where it was slaughtered
- Where it was packaged
- What it was fed
- How it was transported
- The last time it was inspected.

A week later the U.S. Department of Agriculture's Food Safety Service determines ground beef from originating from a regional packing company and sold at a neighboring store is contaminated with E. coli O157:H7. All packages from this distributor change their alert color and notification messages are sent to those shoppers that may have been impacted.



# Barriers and Opportunities



Here are some industries that stand to benefit from the IIoT:



Transportation



Natural  
Resources



Manufacturing



Renewable  
Energy



Smart Cities



By 2020, there will be  
**50 billion devices**  
connected to the internet.

In the coming years,  
**40% of total data created**  
will be from sensors.

This includes sensors in iPhones, cars, and other household objects, but it also includes large-scale and multi-million dollar industrial machines like power grids, airplanes, and oil extraction.

Source: Gartner





# Within this mountain of data, some of it is useful, the rest is noise.

Software that creates useful insight from this overwhelming amount of information is extremely valuable.



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The market to make sense of the IIoT is a booming space, and it's expected to be worth over \$300 billion by 2020.

Source: [Gartner](#)

Large industrial companies can use the IIoT to gain insights, leading to improved operations and increased revenues.

# The possibilities include:



## Having immediate control

Make changes to complex systems at the touch of a button



## Isolating issues

Detecting problem areas earlier allows for better use of personnel



## Boosting productivity

Sensors can help detect arising problems and avoid unplanned downtime



## Saving costs

Increase efficiency by using accurate and up to date data







Many organizations struggle to effectively manage the complexity of data generated by the IIoT, often with no strategy in place.

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IDG Research conducted a 2016 survey\* to better understand how industrial organizations are being impacted by the IIoT. It found that:

70%



...of organizations are still in the 'consideration', 'early discussions' or 'planning' phase, which means they are preparing for IIoT.

30%



...are early adopters, either in the 'piloting' or 'implementation' phase with projects well underway.

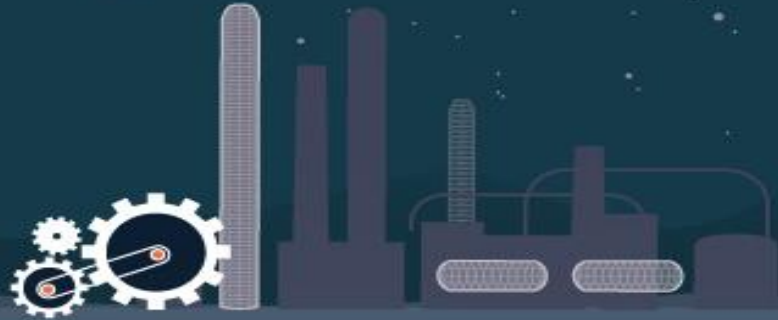


# Opportunities

The IIoT will bring efficiency and uptime to industrial business operations.

80%

...of senior IT executives view improving operating efficiency and uptime as the top benefits that IIoT will bring.



Other benefits identified include:



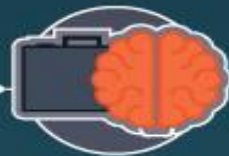
Improved operating costs



Improved uptime



Improved asset performance management



Knowledge transfer in the workplace

# Barriers

For senior IT executives, data integration is the number one barrier.

64%

...say integrating data from disparate sources and formats, and extracting business value from that data, is the biggest challenge the Industrial IoT presents.



36%

...say limited access to the right skills and expertise is the problem.





Organizations with 1,000 or more employees **find improving uptime as a more compelling benefit** than those organizations with fewer employees.

When evaluating IIoT platforms, senior IT executives look for the ability to correlate data from any source into a common data model.



70%

...say that having proven capabilities for data modeling and mapping ranked **higher than everything else**.



Organizations with 1,000 or more employees are more likely than smaller companies to **struggle with traditional database management and analytics tools** (34% vs 12%).

Companies are overwhelmed by data. The risks of not having a data management strategy were made clear by senior IT executives.



87%

...say the overwhelming volume and **veracity of data will result in losing valuable business insights**.

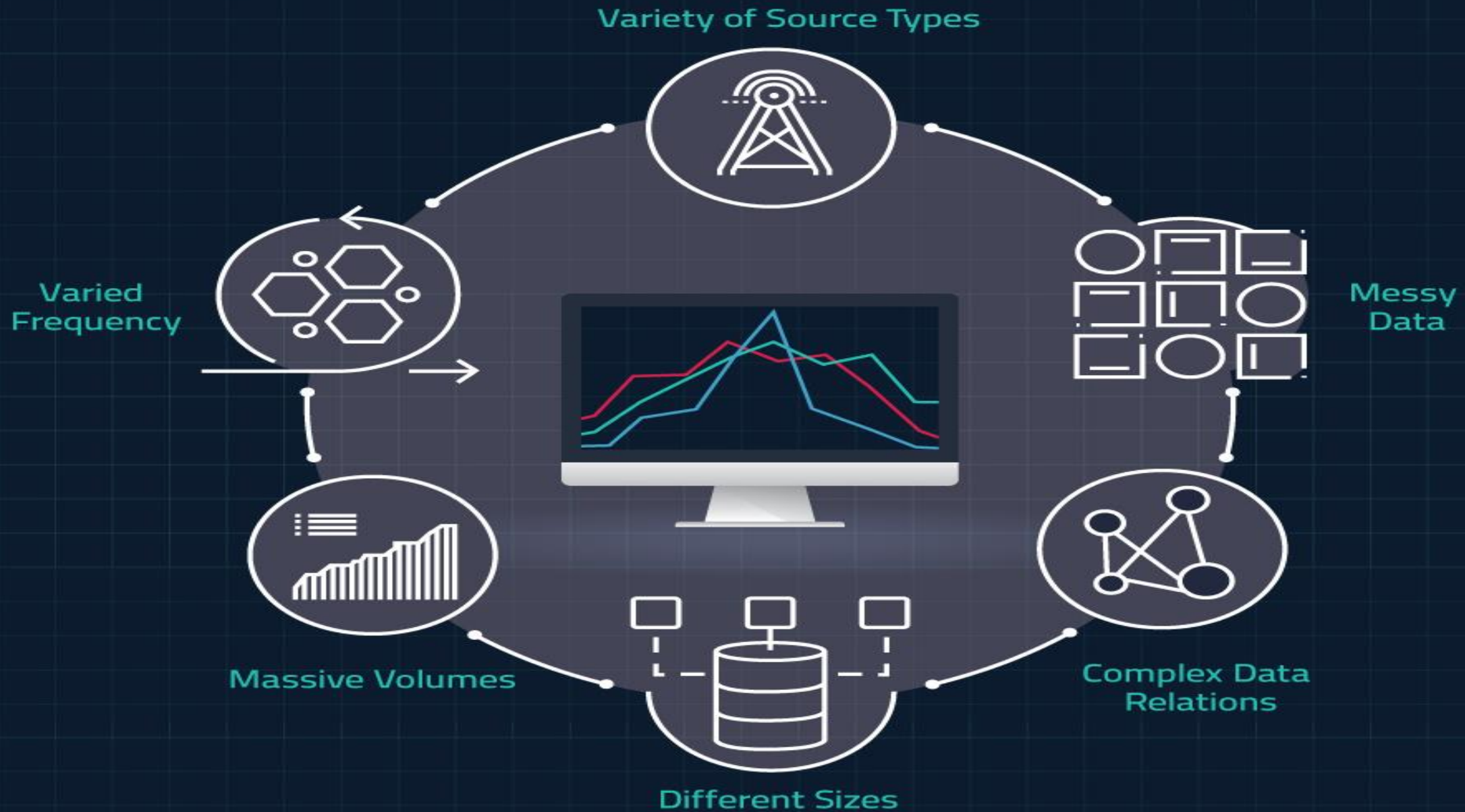


33%

...say that businesses without a data management strategy will **become marginalized, obsolete, or disappear**.



# Why is industrial data so complicated?





"After careful consideration of all 437 charts, graphs, and metrics, I've decided to throw up my hands, hit the liquor store, and get snockered. Who's with me?!"

## Key questions.

- What is the IoT, and what value does it create for consumers?
- What are some of the key challenges that the IoT represents?
- What opportunities does the IoT offer to each company?
- What resources and capabilities will each company need to succeed with IoT? What does success look like?
- As the CEO of each company, what course of action would you take concerning the IoT?

# Thank You



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