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IoT: Landscape and Nasscom Initiatives

May 2017

Definition of IoT and its framework

1.

The concept of Internet of Things has gained traction over the years and is here to stay

2.

In order to maximize the benefits from IoT, many consortiums of companies and industry bodies have drafted technology and regulatory protocols to promote standardization and uniformity

3.

IoT is helping to create value for stakeholders through availability of information, with the help of technologies such as sensors, networks, standards, augmented intelligence and augmented reality

4.

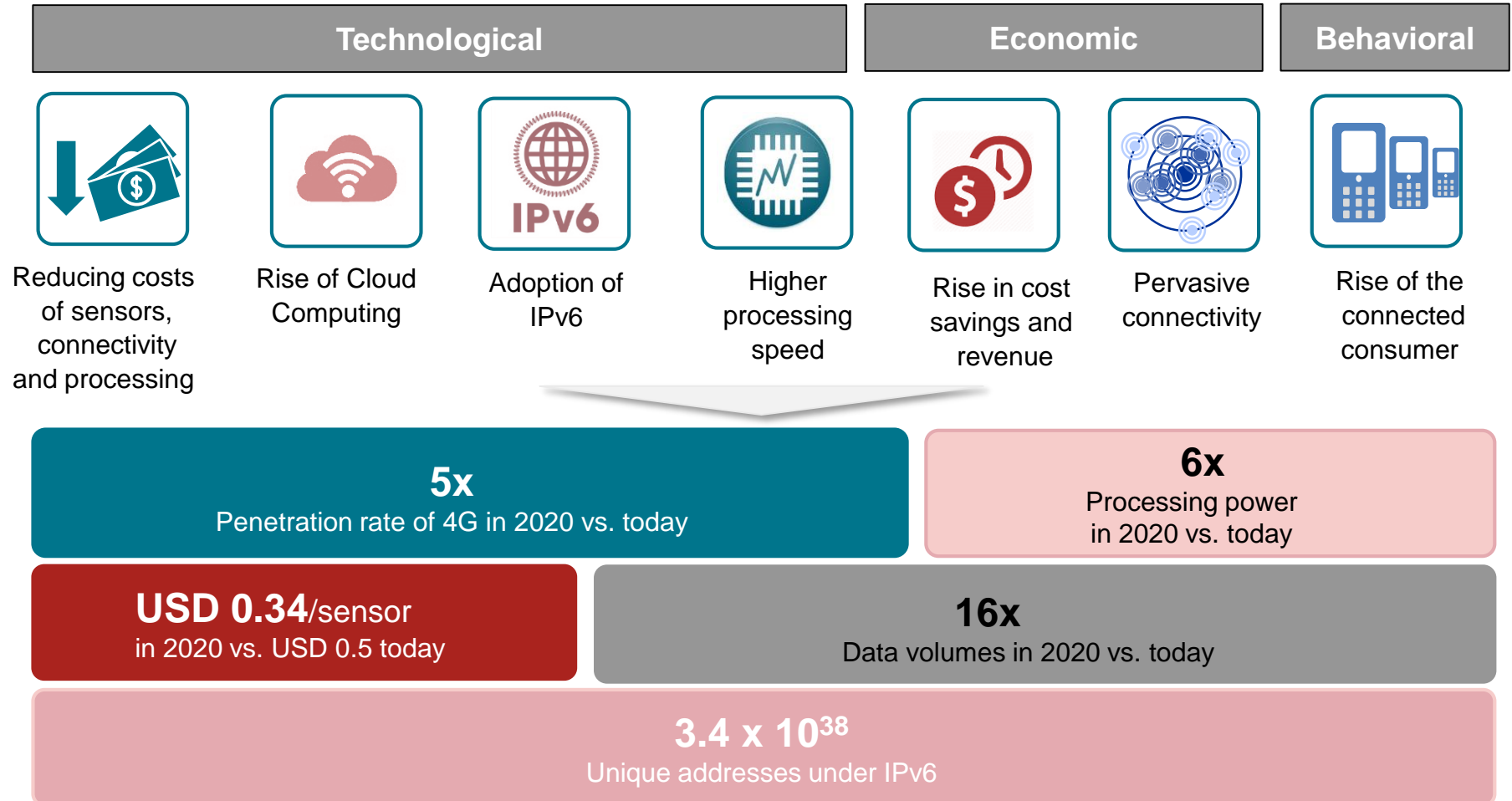
IoT is benefitting both consumers and industries in distinct and innovative ways through varied applications

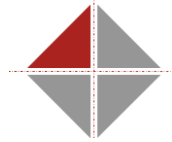
5.

IoT is helping to enhance process efficiencies significantly across industries, particularly Manufacturing, thus taking industrial applications to the next level

Numerous technological, economic and behavioral changes are enabling the rise and adoption of IoT globally

Figure 2.2: Key drivers of the worldwide IoT market





Several technology challenges are interrupting smooth functioning of the IoT ecosystem

Figure 2.3: Major technology challenges existing in the IoT ecosystem

Security of sensors



- Untrusted devices with access and brute force attacks on infrastructure

Battery consumption



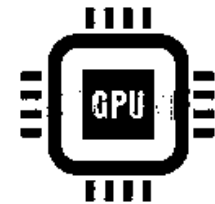
- Sensors and devices with high power consumption for end-to-end IoT communication

Interoperability



- Devices with limited volume capabilities and existing compatibility

Networks/ Communications



- Limited bandwidth and low speeds in connectivity

Measures being taken to overcome these challenges

- Low-power, wide area wireless networks are being deployed to reduce battery consumption and improve connectivity for IoT communication
- Strong authentication across each layer of the IoT stack is being deployed



There is lack of uniformity in the specifications, standards being formed by several regional and international organizations

Figure 2.4: Major standardization challenges existing in the IoT ecosystem

Security



- Technical standards pertinent to security norms are very nascent

Global reach/ coordination



- Disparate regional programs on standards and protocols are leading to fragmentation

Architecture/ Reference models



- There is a lack of reference models that can incorporate existing standards

Application standards



- Interoperability among applications is also lacking currently

Measures being taken to overcome these challenges

- Leading consortiums of companies and industry bodies are drafting standards to ensure uniformity



Additionally, there are business related challenges being faced by organizations in the IoT space

Figure 2.5: Major challenges faced by businesses in the IoT ecosystem

Compelling use-cases, business models



- Lack of viable business models and use-cases across all industries

Well-defined RoI



- Lack of confidence among companies to invest heavily in IoT, given the unpredictability of RoI

Scalability



- Lack of seamless scalability and augmentation of systems without frequent downtimes

Data control & access



- Unavailability of data as well as lack of platforms for data analysis

Measures being taken to overcome these challenges

- Companies are conducting PoCs for many applications to develop and deploy successful use-cases
- Collaboration among market players in the ecosystem is helping to maximize value from IoT data collected



Challenges from a consumer's point of view also need to be addressed for enabling adoption of personalized IoT products and services

Figure 2.6: Major consumer related challenges in the IoT ecosystem

Privacy



- High incidence of consumer concern for data privacy and fears of hacking

Price



- High price perception still remains a major barrier

Technology intimidation



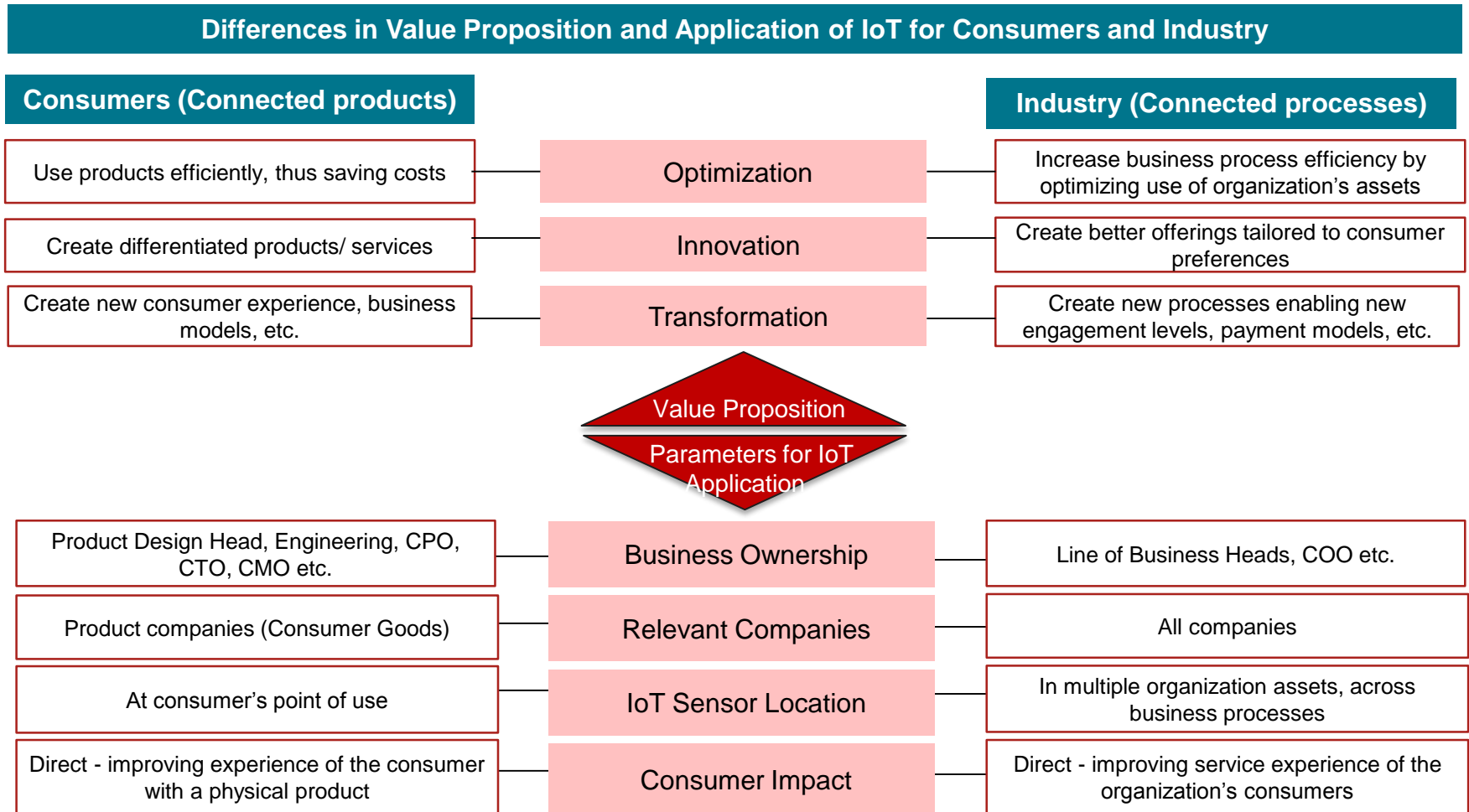
- Consumers find it hard to adapt to new technologies

Measures being taken to overcome these challenges

- Industry associations along with government bodies are creating awareness among consumers regarding possible benefits of deployment of IoT technology
- Seminars, hackathons, community events, etc. are being conducted as well

IoT creates value for the Consumer and Industry in very distinct and innovative ways

Figure 1.3: Value creation by IoT



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Global IoT Market Trends

Both Consumer and Industrial applications are expected to drive growth of IoT going forward

Figure 3.3: IoT installed base by category (million units), 2014 – 2020

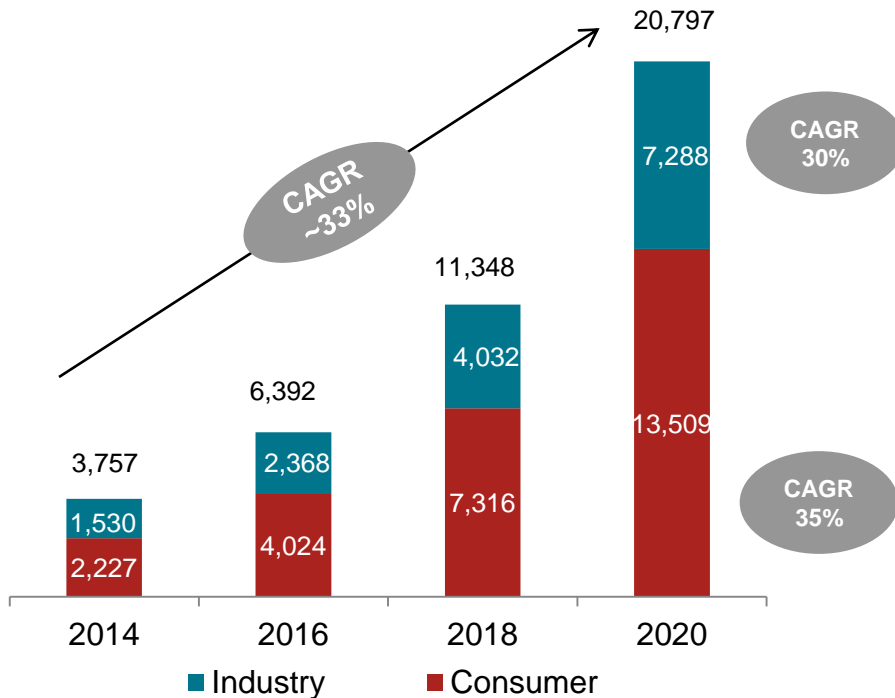
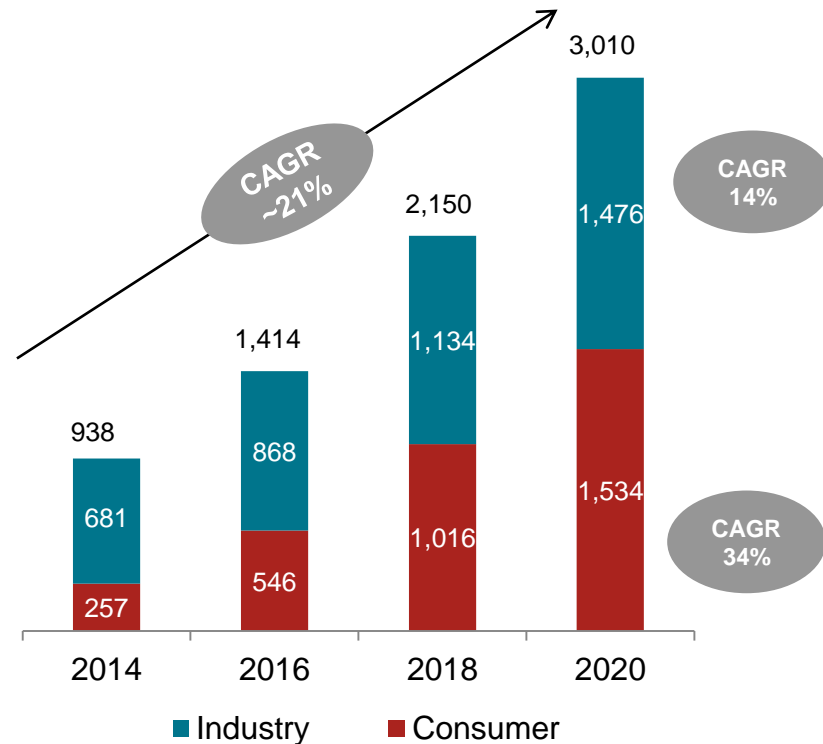


Figure 3.4: IoT revenue* by category (USD billion), 2014 – 2020



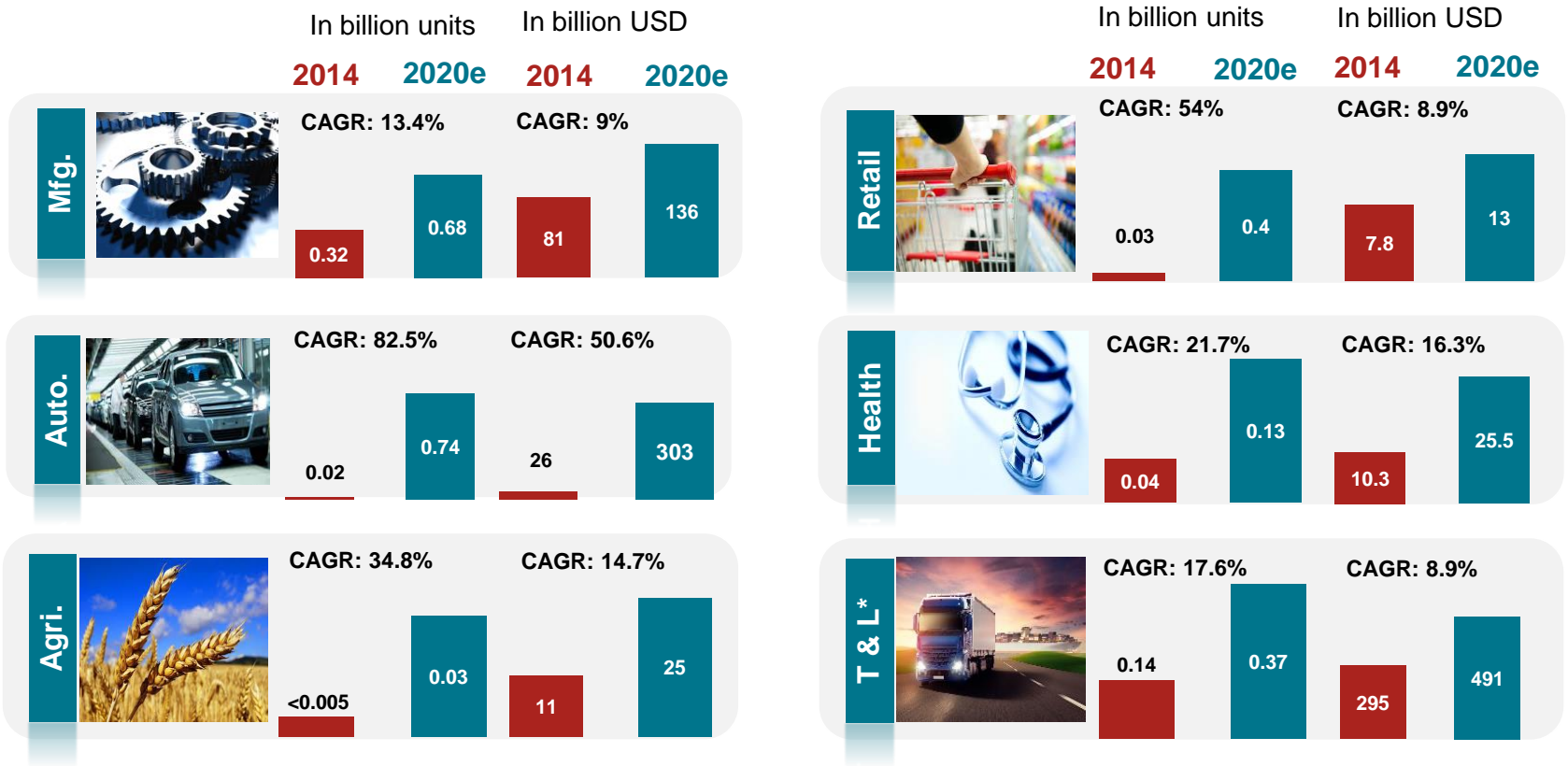
Illustrative examples for each category under IoT

- **Industrial IoT** : Manufacturing, Healthcare, Transport, Energy, Automotive, etc.
- **Consumer IoT**: Health & Fitness, Infotainment, Security & Safety, etc.

Source: Deloitte Analysis, [Gartner and other Industry reports](#)

*The revenue figures include only top 20 applications for both Consumer and industrial IoT

Among verticals, Manufacturing and Automotive will drive the highest volumes, with Transportation and Logistics providing maximum IoT revenue by 2020

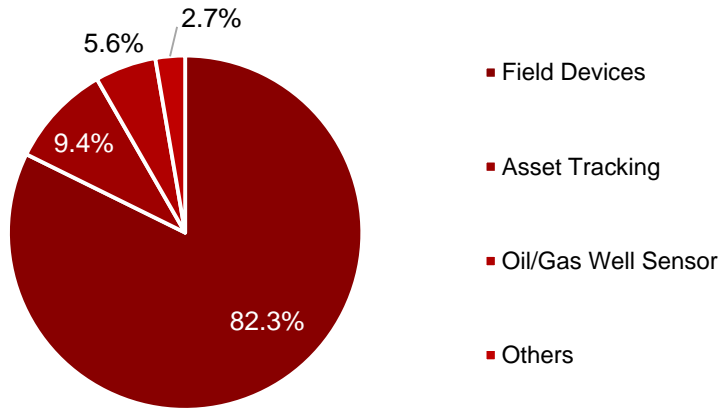


Note: Manufacturing units include those from Natural Resources too, Retail units include those from Wholesale Trade, *T & L = Transportation & Logistics
 All numbers above include only industry specific units and not consumer units. However, units and revenue for Automotive are across industries
 Source: Deloitte Analysis, Industry reports

IoT in Manufacturing will enable players to increase efficiency of their supply chains

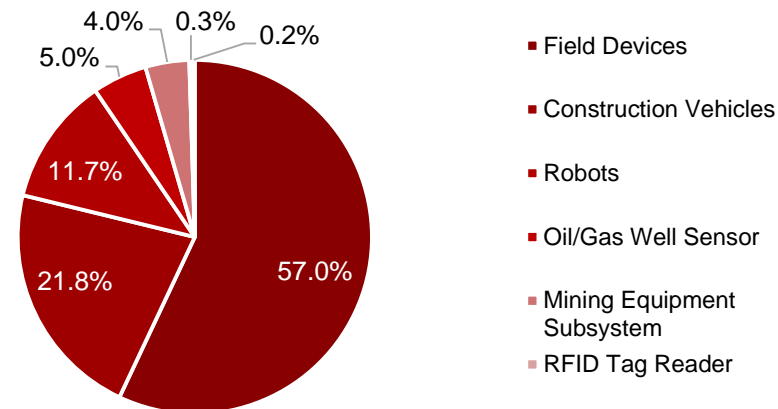
Mfg.
Auto.
Agri.
Retail
Health
Logistics

Manufacturing units - Split by applications (2020e)



Total units: 0.68 billion

Manufacturing spending - Split by applications (2020e)

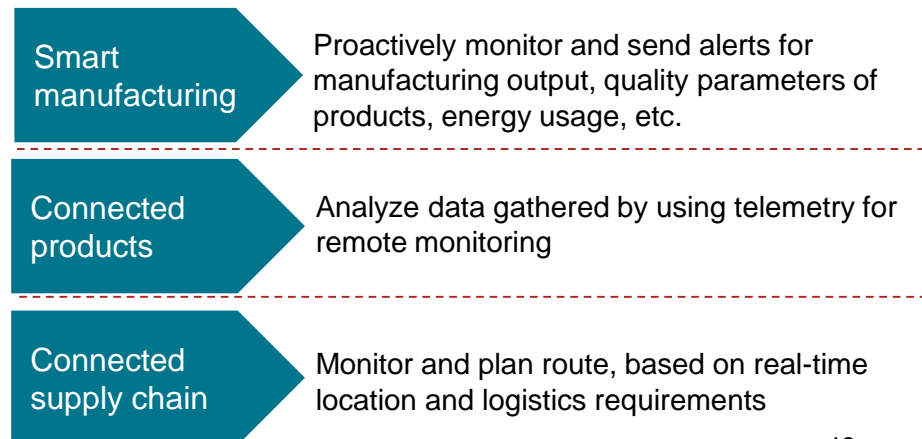


Total spending: USD 136 billion

Impact on Business Model

- **Adoption of different business models:** Manufacturing companies are expected to sell product based service offerings emphasizing on pay-per-use, outcome-based models instead of a transactional one-time sale
- **Partnerships & Alliances:** Manufacturing companies will look to partner with specialists in this area such as analytics or other technology companies

Use Cases



Source: Deloitte Analysis, Company websites, Industry reports

Others in Manufacturing units split by applications includes - RFID tag readers, Robots, Construction vehicles, Mining equipment subsystems and Vehicle subsystems

IoT in Automotive industry is transforming automakers into technology companies

Mfg.

Auto.

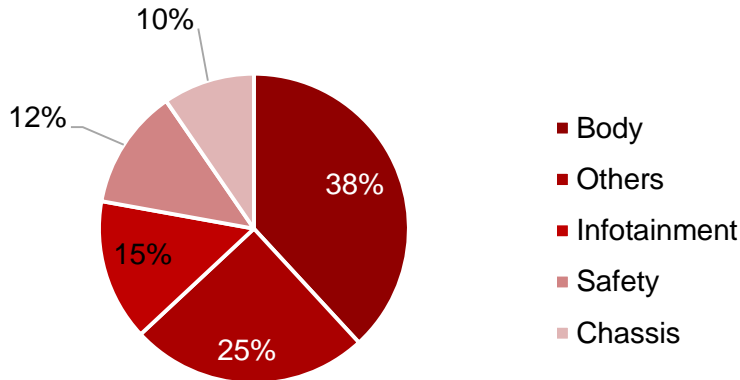
Agri.

Retail

Health

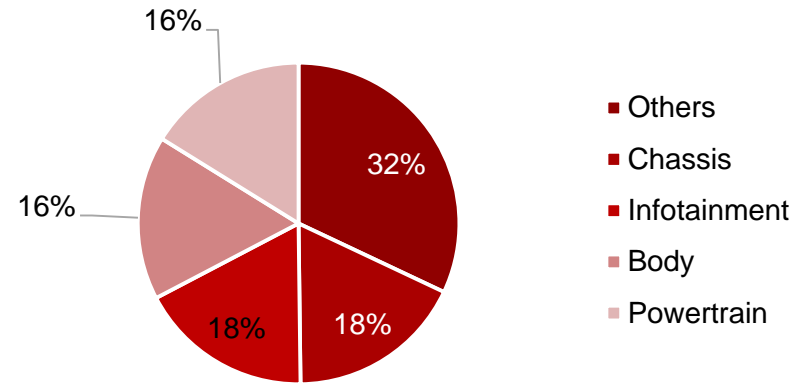
Logistics

Automotive units - Split by applications (2020e)



Total units: 0.74 billion

Automotive spending - Split by applications (2020e)



Total spending: USD 303 billion

Impact on Business Model

- **Adoption of different business models:** Carmakers are changing from just OEMs to technology companies that solve mobility problems
- **Partnerships & Alliances:** In order to utilize the information generated by vehicles properly, automotive players will look to partner with Finance and Media companies, System Integrators etc.
- **Customized product offering:** OEMs will offer tailored services for infotainment, driving experience etc., on the basis of consumer behavior patterns

Use Cases

Consumer infotainment

Build applications on a driver's "brought-in" phone rather than embedded hardware

Usage based insurance

Track acceleration, braking etc. helping insurers to work out the cost of premiums

Emergency response

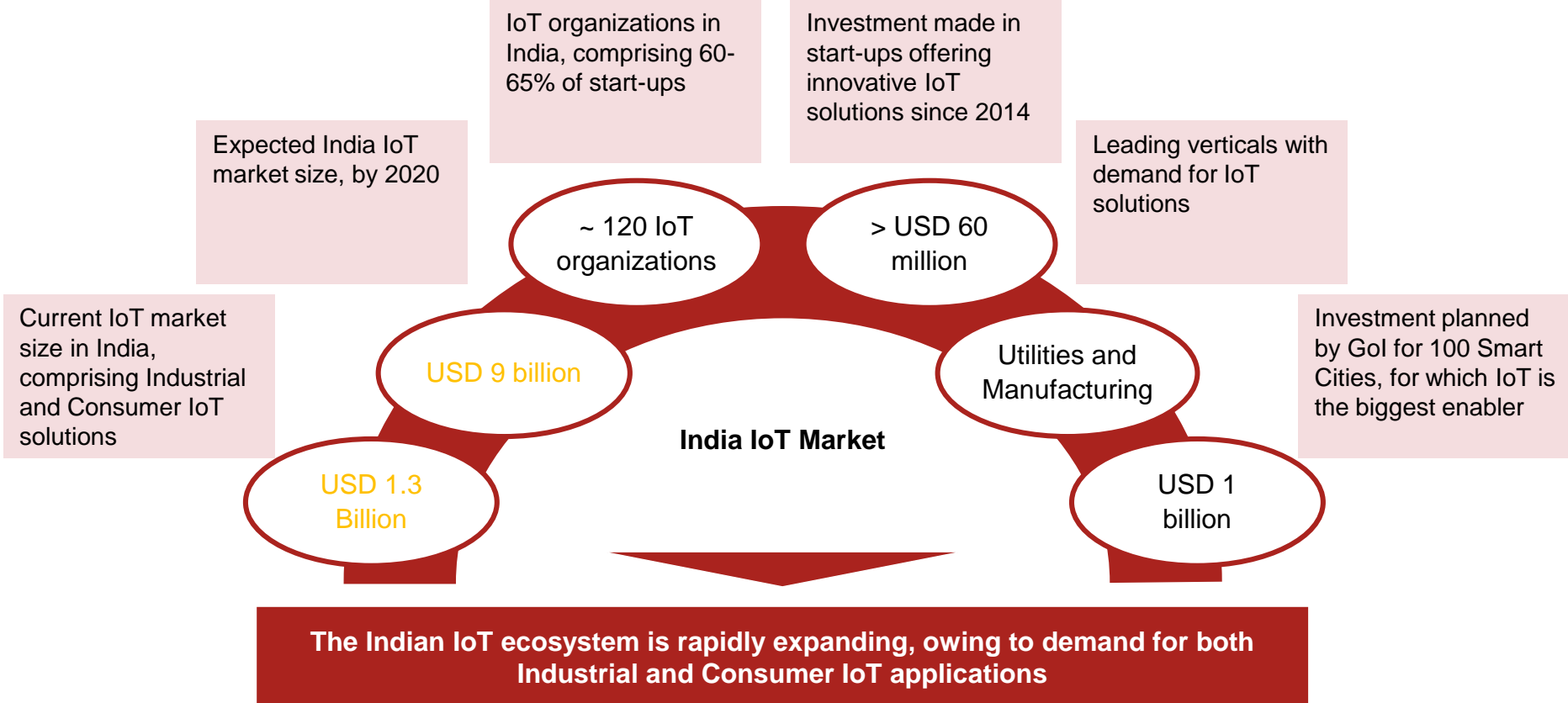
Manage emergency response vehicles by maintaining constant contact with dispatch

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India IoT Market Trends

India is a rapidly growing hub for IoT solutions

Figure 4.1: Current state of Indian IoT market



Indian IoT market is expected to grow significantly

2016

IoT market: USD 1.3 billion
IoT Installed Units: 60 million

2020

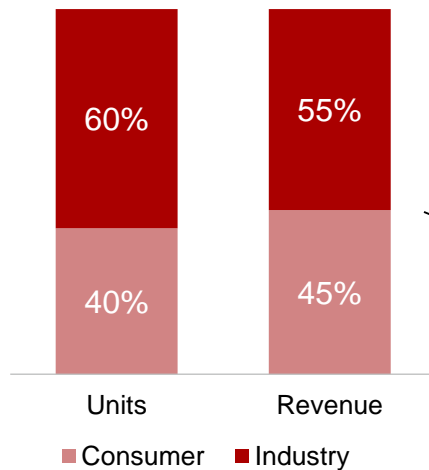
IoT market: USD 9 billion
IoT Installed Units: 1.9 billion



- Although India began its IoT journey much later than developed economies, the installed base of connected units in India is expected to grow at a rate much faster than them
- IoT market in India is expected to grow significantly, with the number of connected devices expected to grow ~32X to 1.9 billion and revenue expected to grow ~7X to USD 9 billion by 2020

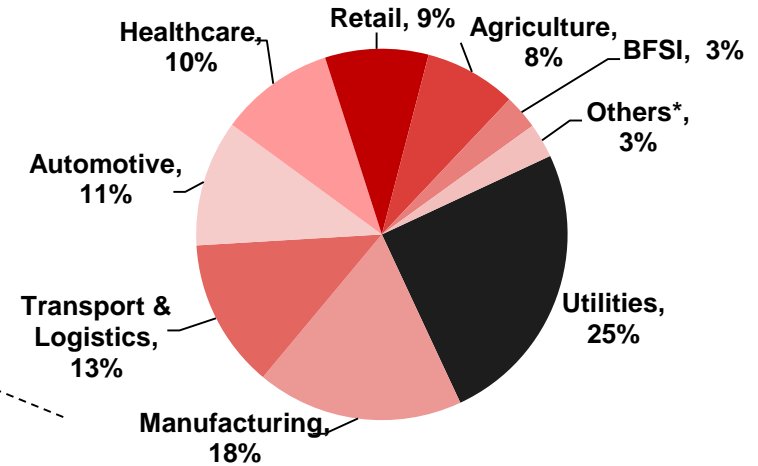
IoT market in India is expected to be valued at USD 9 bn, with an installed base of 1.9 bn units by 2020

Figure 4.2: IoT market in India (2020e)



India IoT installed base (e): 1.9 Bn units
India IoT market size (e): USD 9 Bn

Figure 4.3: Market size by industry (2020e)



India Industrial IoT market size: USD 4.95 Bn
 *Others include food technology, education, construction etc.

Key Insights

- IoT solution deployment for Digital Utilities/ Smart Cities and in the Manufacturing, T&L and Automotive industries will drive the demand for Industrial IoT applications going forward
 - With Govt's focus on building Smart Cities and IoT being a key enabler for this, Utilities' share in the IoT market is expected to be the highest
 - With growth and consolidation, owing to the e-commerce boom and regulatory changes such as GST, Transport & Logistics industry will increasingly leverage IoT technology for more efficient operations
- Rise of the tech-savvy consumer along with increasing smartphone and mobile internet penetration is driving consumer IoT applications in the India market
 - However, consumer IoT adoption is expected to be slower than its industrial counterpart due to cost of IoT devices and security as well as privacy concerns of consumers

Numerous organizations have entered this space over the last decade



Note: The above representation is not an exhaustive list of organizations in the IoT ecosystem in India

Source: Deloitte Analysis, NASSCOM


CoE for IoT



Information on tap | The new wave | Industrial revolution
Behind the jargon, the competency and future mapping

Welcome to the
NASSCOM[®]
Center of Excellence

CONNECTION
ANALYSIS
DATA
SEARCHING
VERIFICATION
CODING
SENDING

A man with a beard, wearing a dark blue long-sleeved shirt, is seen from the side, looking at a row of server racks in a data center. The racks are filled with various electronic components and cables. The background is slightly blurred, showing more server racks and a desk with a computer monitor.

A part of the Digital India initiative by the Government of India to kick-start the IoT ecosystem

The Centre of Excellence is where ideas get designed, get built, get tested and go to market

Not just any idea but the future of the **'Internet of Things'**

This is where technology innovators, academics and consumers get together to create a potpourri of elegant solutions



Partners

Strategic Partners



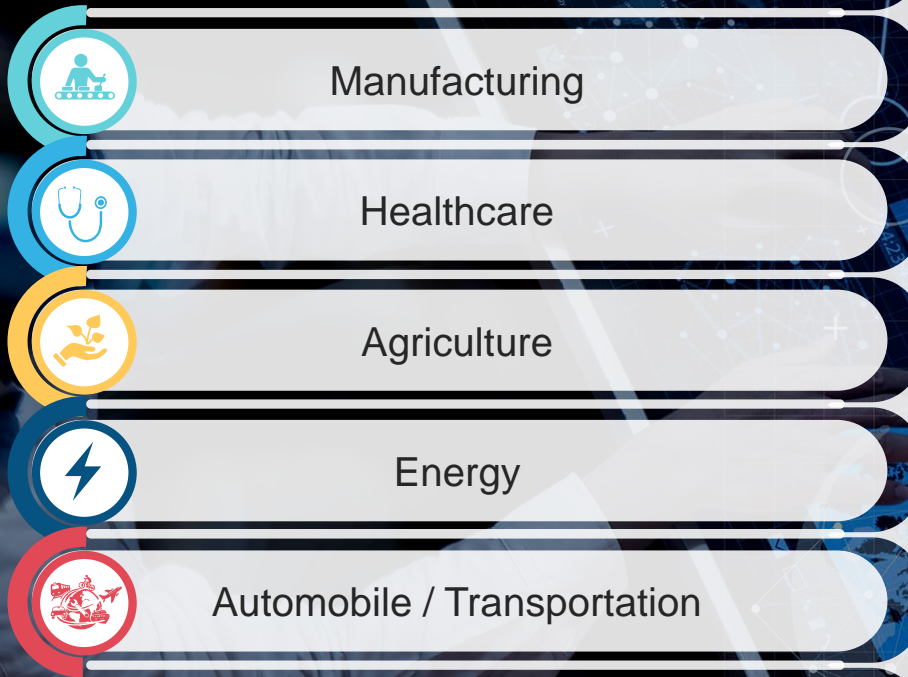
Infrastructure Partners



Technology Partners



Making a difference to the consumer in select verticals that are a priority for the adoption of IoT



Supported by the 3 pillars of excellence:

Corporate Programs
Co-creation
Product Acceleration

Advantages for Startups



Funding- *Connect with investors*

- Connected with prominent venture capitalists and angel investors in the country who are part of our various programs



Accelerate- *Grow through rapid prototyping*

- With our lab access, tie-ups with industry accelerator programs, and engagements with technical experts take your product from prototype to build



Mentor Support- *Top-notch industry experts*

- Engage with experts on technical side as well as business side and Learn the dynamics of the market and understand the current trend in the industry



Enterprise Connect- *build strong connections*

- Meet senior executives of major industry players and leverage their knowledge and experience to take your product to the market



Govt. recognized Incubator- *access to many schemes*

- Since our center is majorly funded by the government, our startups get the enormous benefits provided by the government through Startup India and other programs



Lab access- *build finished products*

- Possibilities are tremendous with access to our state-of-art lab. Build end-to-end finished products and get help to be certified from various institutions

CO-CREATION PROGRAM

Customer (Industry + Govt)

Pain points and gaps that need to be addressed

Support to CoE team to properly understand the problems

Support and mentorship to innovators

Translate the domain problems to the technical requirements

Bring and connect existing technology solutions

Identify and connect with suitable Innovators and System Integrators

Technology Partners / Innovators

Support development and adoption of the solution

Work with CoE and Customer to understand the technology requirements

Develop the end-to-end solution

Support customer during adoption of the solution

CONNECTION
ANALYSIS
DATA
SEARCHING
VERIFICATION
CODING
SENDING

SMART MANUFACTURING – EXAMPLE USE CASES

- Failure analysis for predictive maintenance
- Automation of shop floor material transportation along with logging for analytics
- Remote monitoring and diagnostics
- Worker tracking for improved safety
- Worker training via AR/VR
- Augmenting quality inspection via AR/VR
- Asset tracking and management
- Interactive worker assistance at assembly line

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Startups Incubated

CardioTrack


- It is a network connected Electrocardiogram and can be easily installed in public health centers.
- The key functions of the app include receiving digital ECG data from CardioTrack via Bluetooth interface and displaying the signals and helps to calculate instantaneous and average heart rate.
- Also offers Micro EMR App to assist the primary care physician with predictive diagnosis and assist the patient to become more knowledgeable about the illness, symptoms, and medications and a Cloud-based data analytics solution to create health demographic map to assist healthcare planners. It provides CardioTrack at no cost to physician or clinic and takes a share of the user fee collected by the physician.



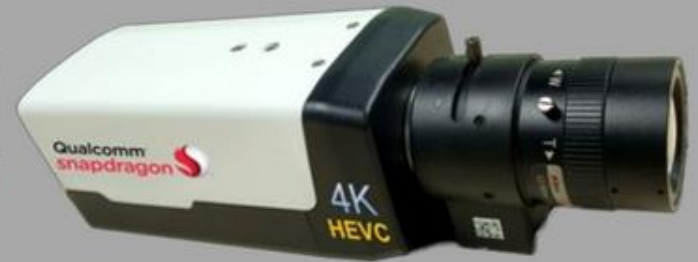
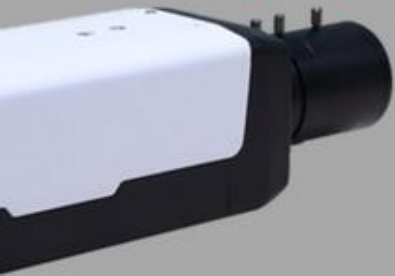


IOTPOT



- IOTPOT is engaged in developing solutions for the kitchen cooking domain addressing three critical hot spots: risk, complex processes and archaic methods.
 - Their products include Klove Knob, a smart burner knob that replaces existing stove plastic knob and makes the stove smarter
 - Powered by artificial intelligence (AI) and machine learning (ML), Klove always thinks about food. Your food.
- 

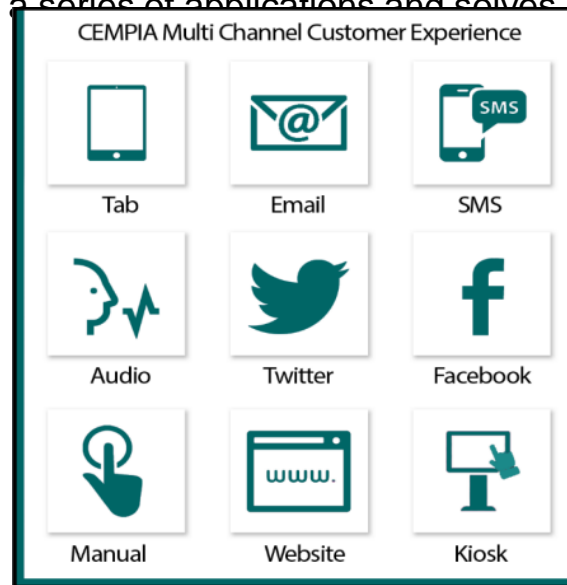
Uncanny Vision



- Uncanny Vision is pioneering the task of bringing advanced Deep Learning/AI-based Vision technologies to IoT devices. Their Software Toolkit increases the performance of computer vision algorithms multifold and increased speed improvement to the order of 2 to 20 times.
- Uses a mixture of algorithm know-how and optimization skills and claims to achieve optimizations from 2x up to 20x, with average 5x optimization compared with reference software implementations

CEMPIA - Customer Experience Management Platform for Insights & Actions

CEMPIA is a Multi-channel, Multi-lingual, Digital Customer Experience Management Platform to understand Patient Experience at every touch point in your Hospital . CEMPIA captures patient's /attendant's/visitor's feedback, suggestions and complaints through a series of applications and solves any Dissatisfaction Real Time



SeeHow



- SeeHow is developing smart cricket ball and mobile app to help bowlers in coaching. Their intelligent cricket ball will help bowlers improve their game
- Their ball contains a sensing system that detects information about the ball's motion, spin on the ball, impact on the pitch, position of the seam and drift in the air
- It also provide analytics of all the accumulated data on an accompanying mobile phone app. This allows bowlers to diagnose their performance and benchmark their stats

Doxper

Instant digitization of healthcare records using just pen & paper

- DOXPER offers comprehensive recording of medical prescriptions as well as interactions
- Between a clinician and a patient Doxper fits seamlessly into existing clinical workflow without altering any step of the doctor-patient interaction
- Once the doctors write the prescription, the smart pen transfers the captured data to the mobile, which can be accessed anytime using the Doxper Blu android app.

ThingsCloud

The things cloud is an IoT big data technology company coupled with hardware design & AI focusing on clean tech. It has 4 products - ThingsHiFi, ThingsWiFi, ThingsCloud, ThingsApp

- ThingsHiFi is a solar grid tie inverter that connects to the traditional roof-top Solar PV and doubles as a Net-metering device that supplies power back to the grid. The ThingsWifi is a plug and play device that can monitor energy consumption from any device at home or work place
- The technology enables user to generate, consume, sell, and store energy





Thank you

Contact us: coe-iot@nasscom.in