# Internet of Things (IoT)

INDUSTRY REPORT

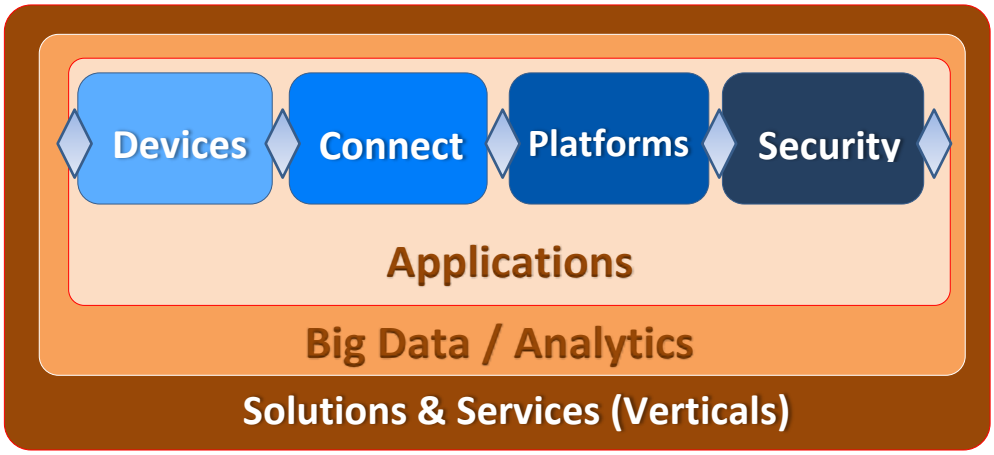
IMEX RESEARCH.COM

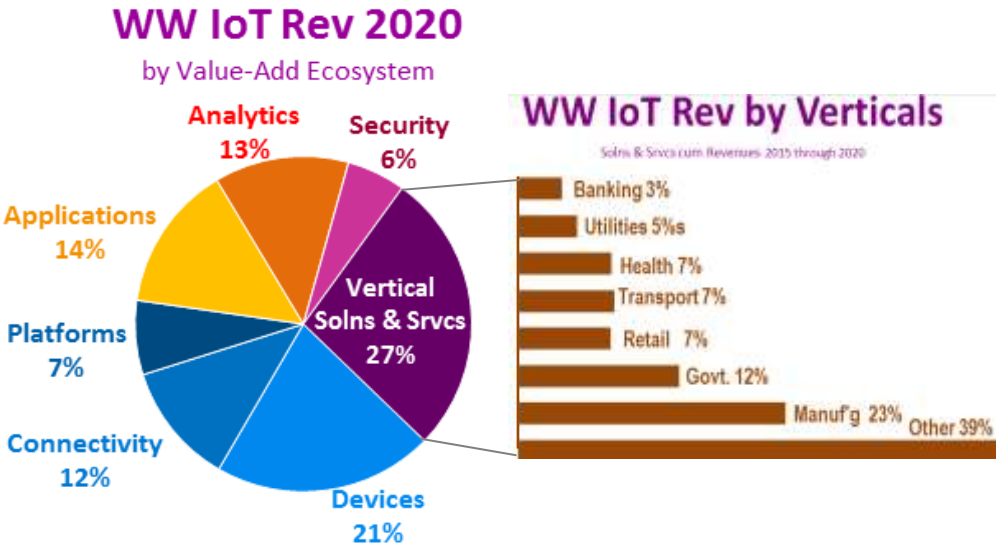
## Internet of Things IoT / Automation of Things (AoT)©

Click following links for additional information

Executive Summary | Table Of Contents | IMEX Research | Industry Reports | Order Form

With IT evolving into the key strategic asset for any business's success, CIOs constantly find themselves at crossroads in deciding if and when to venture into and embrace newer internet driven technologies which carry the potential to completely change the course of their business. IoT brings such a paradigm shift wherein it integrates classical IT with Operational Technologies (OT) to bring Automation of



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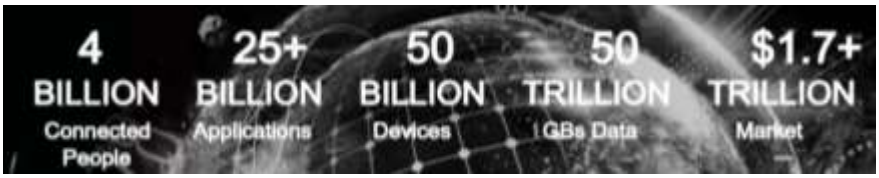
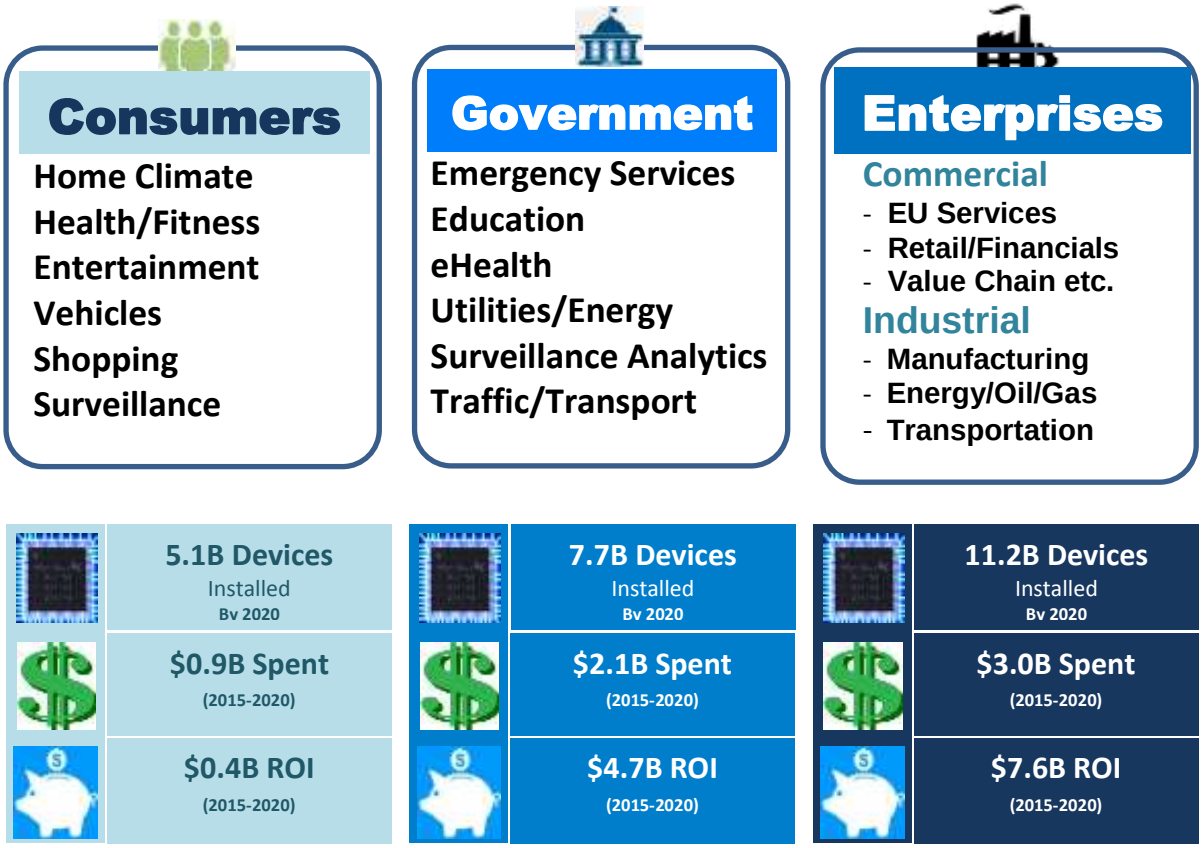
Things or AoT© to all processes encountered by Consumers, Enterprises and Governments alike using big data analytics deliver ultimate business value unheard of before. IoT technology has the power to transform industries, manage costs and deliver valuable business outcomes up and down the supply chain. Beyond the IoT's initial impact on consumers, like fitness wearables, IoT based solutions are being adopted rapidly for business and industrial uses - in the process reinventing such industry verticals as Manufacturing, Government/smart cities, Retail, Healthcare, transportation and others

# IoT Market Potential

**IoT market potential by 2020**




**IoT WW Spending & ROI (2015-2020) by End User Segments**




### Deriving Best Value from AoE/IoT by merging OT with IT

- AoE the Automation of Everything provides great flexibility by securely merging the huge operational data coming from connected machines with IT systems of intelligence to harness ultimate intelligence and business value.
- Maximizing value of AoE/IoT through connecting industrial data with business processes and analytics is best exemplified in the collaboration between GE and Microsoft to integrate GE's Predix Industrial OS natural language technologies, artificial intelligence, futuristic data visualization and enterprise application integration with Microsoft's Azure IoT Suite, Cortana AI, Office 365, Dynamics 365 and Power BI.

> ***Automation of Everything would allow IT users to focus on deriving business value and not on infrastructure – IMEX Research***

# The Promise of IoT

### Cost Reduction

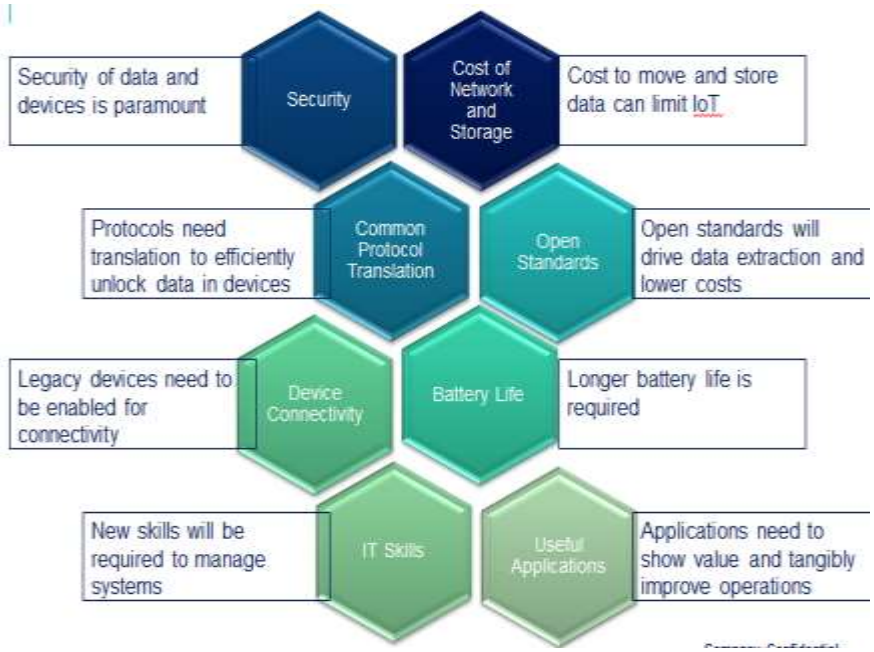
- Productivity and cost savings - Businesses are embracing IoT to improve productivity and save costs, such as capex, labor, and energy. For example, Verizon is saving more than 55 million kWh annually across 24 data centers by deploying hundreds of sensors and control points throughout the data center, connected wirelessly. The result is a reduction of 66 million pounds of greenhouse gases per year.

- Reduced Servicing Costs with predictive Maintenance
- Reduced Maintenance cost by Remotely Managing Devices and Actuators

### Increased Revenues

- Revenue generation - using IoT for incremental revenues like in Connected Car (partnership with Audi, GM, Tesla and Volvo for high-speed 4G/LTE connections as WiFi hotspots for business.
- New or Improved Service Offerings like remote vehicle access, auto-diagnostics and emergency services).
- Deeper Insights for Product Investments
- Deeper Customer Engagements increase retention

## IoT Market Challenges




An example of IoT Data Analytics pose specialized product requirements compared to Big Data products including those available from leading manufacturers in the marketplace today

| Product ⇨ / Metric ⇩ | IoT Analytics | Columnar DBs | Row-Based DBs | Value Stores | Hadoop Batch | Hadoop Streaming |
|---|---|---|---|---|---|---|
| | | HP Vertica, AWS RedShift | Oracle, Informix | Cassandra, MongoDB | Cloudera, Hortonworks | Spark/Shark, Storm |
| **BIG DATA** Capacity | o | o | | o | o | o |
| **FAST DATA** Import | o | | | o | o | o |
| **EDGE** Analytics | o | | | | | |
| **REAL-TIME** Insights | o | | | | | |
| **INTEGRTD** Platform | o | o | o | | | |
| **STG DATA** Structure | o | | o | o | | |

### Top Issues making IoT more vulnerable:

- ❖ Technological Issues
  - End2End Physical and Cyber Security & Privacy, Privacy (Loss of IP Address/Identity),
  - Connectivity – Transition to IPv6 from Mesh, Bluetooth, WiFi, LTE Networks
  - Device Management/Remote Update of SW & FW
  - High Scale Telemetry and Command/Control
  - Multiregional Interoperable On-Premise and Hyperscale Cloud

- Support for Heterogeneous Devices & Operating Systems

❖ Governance
- Endless variety and pace to market IoT devices and applications
- Magnitude of Risk vs Device/System capabilities not properly matching
- Lack of Network Security expertise in Professional Services companies
- Over dependence on machine based decision making and absence of human oversight

❖ Standards
- Naming, Online Fragmentation of Identity, Interfaces
- Interoperability on System Interfaces, Protocols, Cabling, APIs
- Establishing common set of standards between IoT Systems, Companies, Nations

# Present Market Leaders 2015

**Major Companies** (for complete list including profile and contacts see www.imexresearch.com)


## Start-Ups – 540 Companies by Market/Product Segments

See **IMEX Research - IoT Industry Report 2016** – Co. Profiles by Targeted Market Segments/Competitive Products Positioning/End User Customer Wins/Key Management and VC/Corporate Funding

## Major IoT-VCs/Investor Cos. (for complete list incl. profile, funding, contacts see www.imexresearch.com)

| | | | | |
|---|---|---|---|---|
| Accel Partners | Foundation Capital | Kleiner Perkins | Qualcomm Ventures | SoftBank Capital |
| Andreessen Horowitz | GE Ventures | Caufield & Byers | Sutter Hill Ventures | SV Angel |
| Bessemer VPs | Google Ventures | Marc Benioff | Redpoint Ventures | Trident Capital |
| Cisco | Greylock Partners | Menlo Ventures | Robert Bosch Venture | Trident Capital |
| Citi | Index Ventures | Mitsui & Co. Ltd | Capital GmbH | True Ventures |
| Crosslink Capital | Institutional VPs (IVP) | NEA | SAP Ventures | Venrock |
| DCM Ventures | Intel Capital | New Venture Partners | Sequoia Capital | Crosslink Capital |
| DFJ Esprit | Khosla Ventures | Norwest VPs | Shasta Ventures | Xiaomi |

# Goals for Next Gen AoE/IoT

In the Automation of Everything Era, the new goals of Infrastructure include:

**Driving Down Operational and Management Costs – Achieving Cost Effectiveness**

- Automation and Self-Service capabilities to reduce scale-out and management complexities arising from manually driven operations
- Auto recovery, self-healing architecture for 24x7 uptime operations
- Public Cloud Storage Cost and scale economics to be available inter-clouds using standard API

**Adoption of Industry Standards based Infrastructure and Open API Platforms**

- Unification of Infrastructure Management (Devices/Actuator Controls, IPv6 Connectivity, Platforms) using single pane of dashboard, - Reduction of costs using Open API Initiatives

**Roadmap for Migration from Legacy to Modern IoT Infrastructure**

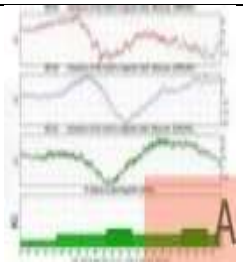
- Capabilities and Tools for migration from Legacy IoT to Next Gen AoE encompassing
  - **Traditional Architecture:** First Generation Home Automation Devices-IoT Sensors and Actuators
  - **Modern Architecture:** Hybrid encompassing IT and OT (Operational Technologies)
  - **Next Gen Architecture:** AoE providing Business Value IoT by leveraging Real-time Analytics
  - **Future Proofing** including future generations of Machine Learning Derived Cognitive Analytics (EIR Things addresses,100Gbps, Real-time Edge Analytics, WW cloud-based integration, Open APIs etc.)

# IoT Driven Use cases (Typical)

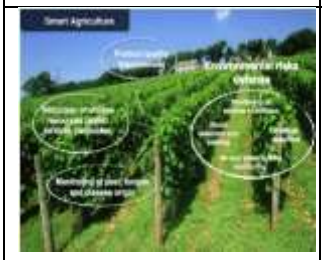
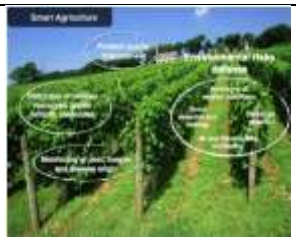
Beyond the IoT's early adoption by consumers such as fitness wearables or Nest climate controls or home surveillance and automation, IoT based solutions and services are being deployed in numerous business and industrial use cases in almost all vertical industries ranging from Manufacturing, eHealthcare, Retail but most importantly in Government to create smart cities.

## Future of IoT Driven Healthcare

| Body Sensors | IoT Connect Monitors | Medical Data Bases |
|---|---|---|
|  |  |  |

| Machine Learning | Big Data Usage | Prediction | Recommendations |
|---|---|---|---|
|  |  |  |  |

## FDA IoT Driven Food Contamination Tracking System

| Smart Agri-Sensors | Universal ID | Global Access | Processed Food |
|---|---|---|---|
|  |  |  |  |
| **Track Tracing** | **Govt. Smart Srvcs** | **Recall** | **Fix Contamination** |
|  |  |  |  |

# IMEX Industry Report – IoT 2016

IMEX Research's Industry Report on IoT addresses the need to fully understand the directions IT industry vendors will take in formulating products to meet the demands of next generation Datacenter operations converging IT (Information Technology) with OT (Operations Technology). It enumerates a number of metrics for data center to achieve and provides detailed guidance for IT infrastructure vendors and IT decision makers (CIOs and operations managers) on how to optimally deploy sensors as part of intelligent edge computing to connect with intelligent platforms (compute, storage, local and WAN networks) into big data analytics to derive actionable business insights .

***"Over time, Business Value derived from Real-time IoT Analytics will become the key differentiating factor among leading AoE/IoT Suppliers"*** *- Anil Vasudeva, President & Chief Analyst, IMEX Research*

## Subjects analyzed

***IoT State of the Industry:***
what is the industry and market dynamics, market segments and size, technologies, players in IoT

- ***IoT/AoE Strategic vision:***
  what Trends, Opportunities, and Threats will IoT/AoE© bring as it evolves over next 5 years?
- ***Enterprise architecture:***
  What are the datacenter infrastructure requirements?
  Prescriptive guidance based on experiences of early adopters in implementing managing SDDC
- ***Case Studies:***
  Experiences of early adopters of implementing and managing data center using profiles of some leading US data centers
- ***Best Practices***
  Implementing and Managing SDS - best practices for configuring and managing in test, development and production
- ***IoT Vendors:***
  Products, profiles and strategies.

## Major chapter include:

1. **Executive Summary**
2. **Market Drivers and Industry Dynamics**
3. **Market Segments and Product Requirements**
4. **Market Forecast and Market Shares**
5. **Enabling Technologies, Migrations, Standards**
6. **Supply Ecosystem, Competitive Products Positioning by Segments**
7. **Major Suppliers Portfolio and Competitive Strategies**
8. **Go-to-Market Distribution Channels**
9. **Recommendations for Vendors, Channel Players, End Users & Investors**
10. **Appendices – Methodology, References, Industry Links.**

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