CompTIA

Emerging Technology COMMUNITY

BUSINESS OPPORTUNITIES IN EMERGING TECHNOLOGIES
WHITE PAPER SERIES FROM COMPTIA'S EMERGING TECHNOLOGY COMMUNITY

Internet of Things

60%

Introduction

Each year, the members of CompTIA's Emerging Technology Community produce a Top 10 Emerging Technologies list that reflects what key players in the industry see as the new technologies that are poised to be the most impactful to their businesses.

The foundation for the list is original research conducted by CompTIA. Using an online survey that crosses multiple industries and includes companies of all sizes, CompTIA's research team determines which emerging technologies have the highest adoption rates. This information is provided to members of the Emerging Technology Community who are experts in managed services and the delivery of technology. This group further analyzes each technology from a tech enablement perspective: Beyond adoption, which technologies have the most significant revenue opportunity or the best chance to revolutionize business practices? After this analysis, the top 10 list is finalized. Read more about the 2019 Top 10 Emerging Technologies List.

In 2019, the Internet of Things (IoT) ranked no. 1 for the second year in a row. IoT is already driving change and impacting efficiencies in businesses across the country. From tracking inventory to managing the movement of people through airports and retail malls, it will provide the data needed to improve marketing, increase sales and decrease costs. *Business Opportunities in Emerging Technologies: Internet of Things*, a white paper authored by CompTIA's Emerging Technology Community, will help providers take a deeper dive into this technology and the opportunities that exist with meaningful insight into the current market landscape, actionable advice for businesses, and a collection of case studies and resources.

Learn more about the Emerging Technology Community.

IoT Market Landscape

The Internet of Things (IoT) describes the practice of interconnecting the physical world with cloud services through the use of electronic devices, software and sensors. Every physical object can now become a digital device, able to capture data, perform computations, and connect to a network. As Microsoft's CEO Satya Nadella said in 2018, "The world is becoming a computer. Computing is becoming embedded in every person, place and thing."

IoT applications can be described as *things* (or devices), collecting data or events that are then used to generate *insights*, which translate into *actions* implemented to help improve a business or process. An example is an engine (a thing), sending pressure and temperature data used to determine if the engine is performing as expected (an insight), which is then used to proactively schedule maintenance on the engine (an action). The end goal of all IoT solutions is to take action on business insights found through gathering data from assets.

The implementation of IoT can help businesses realize many benefits, from improved productivity and increased profits to deeper insights into how their products are being used. In fact, many organizations are already benefiting from automated approaches to common workforce tasks that traditionally have been performed manually. From remotely monitoring sensors that anticipate maintenance needs to acting as a sales tool on a retail floor, IoT has the potential to directly impact the bottom line. At the root of these benefits is access to and analysis of more data. Data collection and analysis allows organizations to become substantially more responsive.

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>
> - Satya Nadella, CEO, Microsoft

IoT is a booming market that is growing at an incredible pace. According to research published by Zinnov, IoT expenditures are estimated to increase from $201 billion in 2018 to $500 billion in 2023. In a similar vein, the research firm Bain & Company predicts that global IoT spending will reach $520 billion in 2021. On the more ambitious end of the scale, IDC estimates global IoT spending to hit $1.2 trillion by 2022. For context, IDC reported that overall IT spending worldwide in 2018 was $4.5 trillion. IoT-specific spending is not likely to be a quarter of all IT spending, so IDC's number includes items needed for IoT that typically fall into other categories, such as networking equipment or database software.

One of the most popular approaches for describing the extent of IoT's impact has been connected devices. The numbers are eye-popping but not always consistent—early projections by Cisco showed 50 billion connected devices by 2020, while early projections by Gartner only showed 24 billion connected devices in the same timeframe. As with any projections, the numbers are in a constant state of flux, and they likely miss the point anyway. At some point, there are simply enough connected devices to force new behavior. Furthermore, each organization will build its own behavior as it drives a strategy around devices and data.
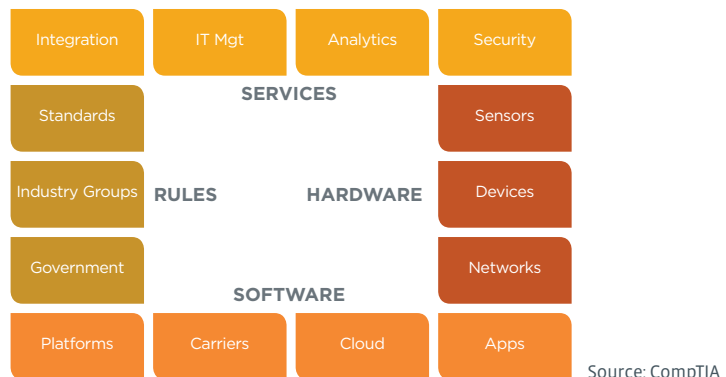
According to CompTIA's <u>2019 Trends in Internet of Things</u> research study, nearly two-thirds of companies say that IoT initiatives are aimed at incorporating technology into existing business processes. This viewpoint is consistent across company size and between business/IT functions. The one exception is the executive level, where 54% see IoT as an addition to business processes and 45% see it as a stand-alone IT project.

For all the hype and financial potential, there has not been dramatic progress in IoT adoption over the past few years. IoT is still the most widely adopted technology in CompTIA's emerging tech tracking, but there are formal initiatives taking place at just over a quarter of all companies. The pace of IoT adoption may seem somewhat surprising given the rapid adoption of cloud computing and mobile devices, but there are reasonable explanations for the inertia. Looking at the extended history of technology adoption, it is more likely that cloud computing was an outlier and that adoption patterns will somewhat regress toward typical levels. Furthermore, many emerging trends build on cloud computing along with other components, and the complexity can be a lot to handle, even for companies that are pushing the envelope with technology.

THE EVOLVING IoT ECOSYSTEM

Integration	IT Mgt	Analytics	Security
Standards	**SERVICES**		Sensors
Industry Groups	**RULES**	**HARDWARE**	Devices
Government			Networks
Platforms	Carriers	**SOFTWARE** Cloud	Apps

Source: CompTIA

With this large of an opportunity, CompTIA research has defined an ecosystem surrounding IoT. There are generally four components within the ecosystem. First is the hardware. These "things" include the specific devices and sensors that are being created. With the growing miniaturization of technology and the lower cost of high-performance silicon, manufacturers are creating new inexpensive solutions to leverage sensors and add computing to devices that had not previously been capable of data processing.

Hardware requires software, the second part of the ecosystem. These devices require either an operating system or firmware to be functional, and new devices such as cars, homes and wearables have different operating systems or firmware than one would find in typical IT equipment. Software also drives connectivity and data collection, which are the pieces that turn individual devices into valuable systems.

Standards are the third category and expected to be the largest hurdle. As with any new technology, competing standards often cause market confusion. Standards are needed in each area of the IoT stack—applications, services, network and access. Some companies are throwing their full support behind a single endeavor, while others are participating in multiple standard-defining groups in order to be well positioned as the landscape shifts. Development of IoT standards will be similar to the development of TCP/IP, enabling common communication methodologies.

Services are the final component of the ecosystem. In the case of IoT, services are a closer-knit part of the ecosystem due to the value provided. While interesting alone, hardware, software and standards are only truly valuable when combined with data to provide insights. Many small firms that do not have the resources to deal with the complexity of IoT systems will rely on services to deliver value in the IoT space. Technology firms that help unlock these insights will be in high demand and integral to the ecosystem. This will, ultimately, be where the best business opportunities will emerge for IT solution providers.

Understanding the complex IoT ecosystem is only the first hurdle that companies need to clear as they adopt this new technology. CompTIA research shows that upfront investment cost and ongoing maintenance/support costs are major challenges that companies expect to encounter. Fewer companies, though, are focused on fully quantifying the return on investment. IoT, like other emerging technologies that play a more strategic role, requires a different way of thinking about ROI. Businesses will likely need assistance in calculating the appropriate costs over the life of the technology and in describing the benefits that will be realized by different parts of the organization.

Another challenge that may not be getting enough focus is the need for good processes and practices around data. Only 13% of companies in CompTIA's research indicate that they are concerned about an inability to take advantage of new data streams, but the research also shows that many companies have poor data practices, such as a high incidence of data silos across various departments. At the end of the day, the value in IoT is in new sources of data that drive new actions. As with big data or artificial intelligence, companies need to have solid data management if they expect to get value from IoT.

Making Money with IoT

With a wide range of areas where businesses need IoT assistance, solution providers can build IoT business practices that allow them to enter this market that is full of opportunities. CompTIA's 7th State of the Channel research study shows that 48% of channel firms claim to be experimenting with IoT or putting it into practice. Most of this activity may be on the experimentation side, since a recent MDC Research study shows that only 16% of partners report having an IoT solution in production today.

To take advantage of these opportunities, it is helpful to understand the high-level process for delivering IoT solutions.

1. Envision IoT

The first step in delivering IoT is to help your clients envision the possibilities of IoT and what that could mean their organizations—helping them see a roadmap where IoT becomes more and more a part of their daily operations and the benefits this brings.

2. Pilot IoT

The second step is helping your customers implement pilot IoT solutions. Whether this means building and installing hardware prototypes or implementing a proof of concept, the goal is to allow your customer to see how IoT will work with their systems and how IoT can deliver value.

3. Deploy IoT

The next step is helping your customers deploy IoT solutions into production and providing ongoing support for those solutions. Here the project scope may extend beyond technical implementation into creation or modification of workflow and processes.
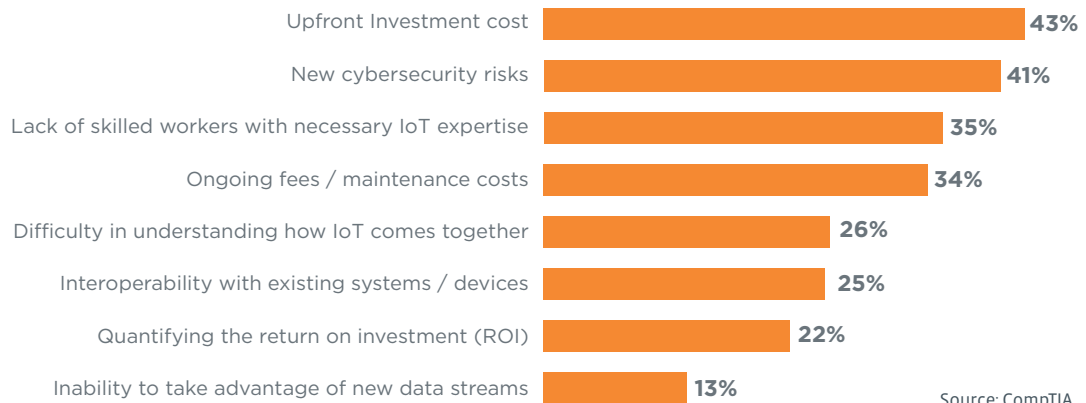
4. Secure IoT

Through all stages, security is one of the largest areas of concern. Businesses are learning that they cannot simply apply prior security techniques to innovative technology solutions. Offering security auditing and implementation services will go a long way in establishing a successful practice.

As you begin your IoT practice, one of the first things to research is the current IoT landscape. You should evaluate current application offerings and use cases for IoT. Several of these use case examples are highlighted later in this report. You can also look into the types of products and services organizations are currently building and selling. Each of these aspects can help influence your decision on the type of IoT practice you build and the types of products and services you will provide.

Another thing to consider is the industry verticals where IoT is getting the most traction. Industrial manufacturing, government, technology and automotive/transportation are areas where significant IoT spend and opportunity currently resides, with manufacturing outpacing other industries by a wide margin. These are also the areas expected to see the most spending growth over the next several years.

After identifying an area where IoT might be implemented, the next step is to fully understand the risks and hurdles. This step is critical because so many technology projects underestimate the risks, leading to unexpected costs or problems. This is especially true when a line of business, not the IT department, is driving the decision process. Companies are already concerned about IoT costs; CompTIA research shows that 43% say that upfront costs are a major hurdle, and 34% cite ongoing costs as an issue. But if there is not a thorough assessment of other risks—such as cybersecurity, interoperability or handling new data—those costs will skyrocket.

POTENTIAL HURDLES OF IoT

Upfront Investment cost	**43%**
New cybersecurity risks	**41%**
Lack of skilled workers with necessary IoT expertise	**35%**
Ongoing fees / maintenance costs	**34%**
Difficulty in understanding how IoT comes together	**26%**
Interoperability with existing systems / devices	**25%**
Quantifying the return on investment (ROI)	**22%**
Inability to take advantage of new data streams	**13%**

Source: CompTIA

On the other side of the ROI equation are the benefits companies hope to gain from IoT. CompTIA research shows that cost savings lead the list, with 43% of companies expecting that IoT will lead to a reduction in operational costs. As with other emerging technology trends, cost may ultimately prove to be a lower priority, as businesses realize that IoT's primary benefits may be improved data for decisions, better asset tracking or automated business processes.

POTENTIAL BENEFITS OF IoT

Benefit	Percentage
Cost savings from operational efficiencies	43%
New / better streams of data for decision-making	38%
Staff productivity gains	36%
New / better customer experiences	36%
Better visibility / monitoring of assets	34%
Revenue growth from new products or services	34%
Automating business processes	32%
Automating processes	21%

Source: CompTIA

For some partners, their IoT initiative is an extension of an existing practice, building upon years of knowledge, skills and expertise derived from working with customers. For others, an IoT practice is a new venture starting completely from scratch. Regardless of where the journey begins, there will likely be an iterative approach to developing an offering, working with vendors and other partners while targeting specific industry verticals.

There are multiple opportunities to drive revenue selling IoT-related solutions and services, and they can be found in all sectors, ranging from automated predictive maintenance, failure notifications and self-healing procedures to policy adherence, such as ensuring hardhats and safety vests are being worn by personnel. When thinking about revenue for an IoT practice, consider the benefits of delivering complete end-to-end solutions. If the services offered stop at helping the customer build the solution, what will their internal teams do when something goes wrong? IoT solutions can be complicated, and a customer may not have an internal team capable of supporting them. Providing management, monitoring and support for IoT solutions creates a great opportunity for recurring revenue. Additionally, with expertise in big data and analytics, a solution provider can help customers leverage their data to identify trends that can positively affect their business, thus increasing customer satisfaction.
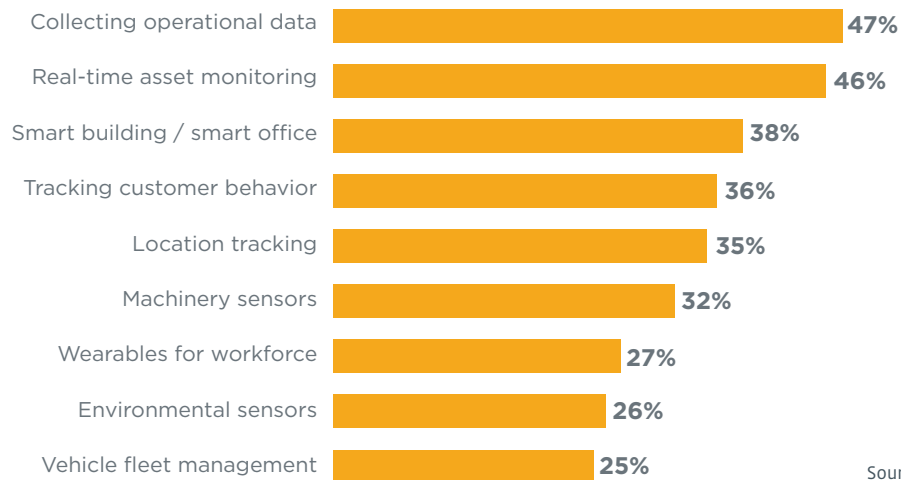
As IoT becomes more and more integrated into the daily operations of an increasing number of organizations, partners with IoT practices will be differentiated from those who do not. IoT will not only create significant opportunities for partners, but also give them competitive advantages.

Case Studies

The application of IoT technologies may be limited only by your imagination and ingenuity, but there are patterns emerging around typical uses for this emerging trend. Data from CompTIA's 2019 Trends in Internet of Things shows that the most popular use cases among end-user companies are collecting operational data and real-time asset monitoring. Of course, these steps are just part of larger processes that drive new behavior.

TYPES OF IoT PROJECTS

Collecting operational data	**47%**
Real-time asset monitoring	**46%**
Smart building / smart office	**38%**
Tracking customer behavior	**36%**
Location tracking	**35%**
Machinery sensors	**32%**
Wearables for workforce	**27%**
Environmental sensors	**26%**
Vehicle fleet management	**25%**

Source: CompTIA

From a solution provider perspective, MDC Research recently asked IT firms about their production applications and customer use cases. Their responses reveal that the most popular reasons for using IoT today include automation, monitoring and data analytics. These examples suggest that IT solution providers are being used to turn the raw data collected from IoT devices into business insights and actions.

Following are links to relevant case studies of actual IoT implementations and the IT provider solutions that have enabled them.

Colfax

Colfax, a manufacturing and engineering technology company, selected the ThingWorx Industrial Innovation Platform powered by Microsoft Azure to align its IoT efforts, increase efficiencies and accelerate progress across its development teams. Leveraging ThingWorx and Colfax's application expertise will bring new products to market more rapidly and enhance service levels.

Read the case study

thyssenkrupp

Thyssenkrupp AG focuses on industrial engineering and steel production. Using Willow's innovative WillowTwin platform, thyssenkrupp created an intelligent digital twin of its Innovation Test Tower. By collecting and integrating data from across the facility, thyssenkrupp has developed a rich ecosystem of data-driven insights, helping operators and asset managers understand how occupants are using the building.

Read the case study

Starbucks

Working with Microsoft and its partner, Avnet, Starbucks is creating an even more personal, seamless customer experience in its stores by implementing advanced technologies, ranging from cloud computing to blockchain.

Read the case study

Emerson

Emerson Electric Co., a Fortune 500 company that manufactures products and provides engineering services for a wide range of industrial, commercial and consumer markets, is partnering with Cisco to extend intent-based networking to the extreme IoT edge to better connect people and things.

Read the case study

Urban Digital Solutions

Managed service provider and security integrator Urban Digital Solutions (UDS) provides IT services to construction and architecture clients. UDS' focus from the beginning has been physical security and providing access control as a service (ACaaS) with vendor ISONAS seemed like a natural fit.

Read the case study

Tampa Bay Electronic Systems

Tampa Bay Electronic Systems capitalized on the trend in adding IoT-enabled products to homes by installing more than a dozen Somfy shading motors into a new home addition. Because the addition featured several huge windows, shading the home from the sun was crucial to the comfort of the homeowners.

Read the case study

Certified Refrigeration and Mechanical

A critical part of running any food-related business is keeping perishable products cold. Aside from effects on consumers, facilities can lose certifications, receive fines or even get shut down. To solve the problem of needing to constantly check the temperature of refrigerators, freezers and chillers, Certified Refrigeration and Mechanical installed IoT systems.

Read the case study

Cuseum

Engaging museum visitors and identifying what they like and where they spend their time isn't easy. Cuseum makes IoT products that connect items in the museum to visitors' smart devices, turning phones into digital tour guides while delivering insights about visitors to museum management.

Read the case study

Further Reading

DISTRIBUTOR RESOURCES

Most, if not all, commercial and industrial distributors have resources at your disposal, from design to configuration, warehousing to standard parts drop shipments, and much more. You can start with these or ask your preferred distributor how they can help you get started or advance your marketing and sales of IoT to your customers.

- **Ingram Micro**   iot.ingrammicro.com

- **SYNNEX**   synnexcorp.com/us/integratedsolutions

- **Tech Data**   iot.techdata.com

- **D&H**   dandh.com

- **Scansource**   scansource.com

- **Arrow**   arrow.com

- **Avnet**   avnet.com/wps/portal/us/solutions/iot/overview

INDUSTRY RESOURCES

- **IOT Playbook**   iotplaybook.com

  – The Path to IoT Success Requires Preparation

  – Downloads and Case Studies

  – IOT Vendor Company Directory

  – Making Sense out of Sensors

  – Security

- **IOT Advisory Group** iotadvisorygroup.com

- **IOT For All**   iotforall.com

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Join CompTIA's Emerging Technology Community

The Emerging Technology Community encourages the adoption of new and emerging technology that will improve business outcomes for members and their clients. Our community is comprised of industry thought-leaders investigating emerging technology to further the industry and identify and leverage numerous opportunities.

Learn more

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