

IoT Signals Healthcare Spotlight

SUMMARY OF RESEARCH LEARNINGS
MARCH 2020

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BACKGROUND

The Internet of Things (IoT) is transforming the way people live and work. Beyond just the smart devices you use every day, IoT is revolutionizing the way companies do business – allowing them to become faster, smarter, safer, and more efficient.

Microsoft has been at the forefront of IoT, innovating and investing as IoT continues to gain traction worldwide. The IoT Signals report was created to give the industry a holistic view of the IoT ecosystem – providing insight into adoption rates as well as benefits and challenges.

The goal of the IoT Signals report is to better serve our partners and customers, as well as help business leaders develop their own IoT strategies.

This report focuses on two pieces of research – an initial round conducted in February 2019, which focused on IoT across industries and a follow-up in October 2019 that takes a deeper look into the healthcare industry.

METHODOLOGY

Microsoft commissioned Hypothesis Group, an insights, design, and strategy agency, to execute the IoT Signals research.

In February 2019, a 20-minute online survey was conducted with over 3,000 decision makers at enterprise companies across the US, UK, Germany, France, China, and Japan who were currently involved in IoT. The research included business decision makers (BDMs), IT decision makers (ITDMs), and developers from a range of industries such as manufacturing, retail/wholesale, government, transportation, healthcare, and more.

Following in October 2019, a 10-minute deep dive wave was conducted with 152 decision-makers specifically at healthcare organizations in the US, UK, and France. Similar to the initial wave, survey participants included business decision makers (BDMs), IT decision makers (ITDMs), and developers. Of the healthcare decision-makers we spoke with, 112 worked for Provider organizations, while 40 worked in Pharmaceuticals.

01 _____ **IoT IS DRIVING BOTH OPPORTUNITY AND OVERALL SUCCESS**

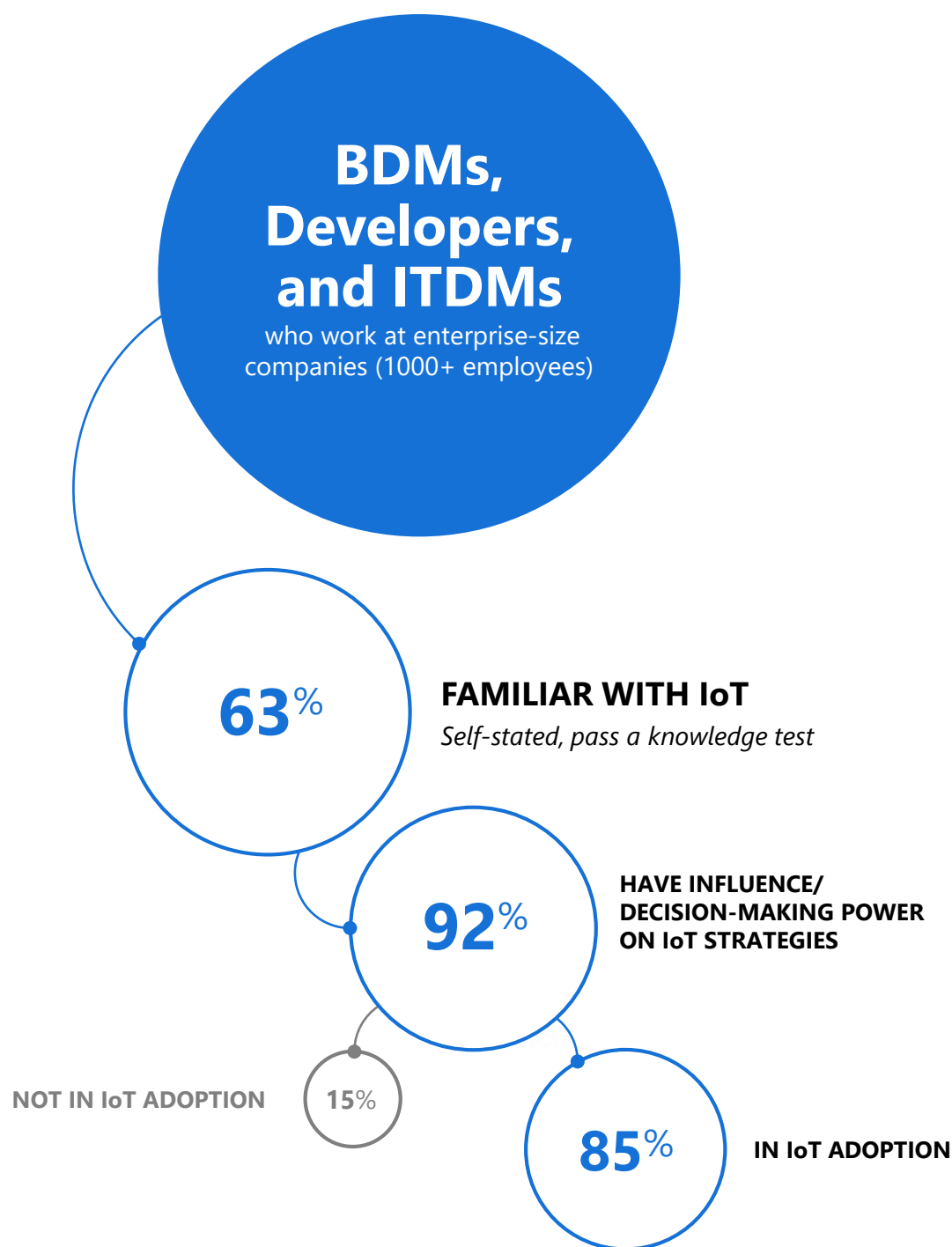
Among the IoT decision-makers we spoke to, 85% have adopted IoT. The most commonly mentioned reasons to adopt IoT include efficiency of operations and employee productivity. Once organizations adopt IoT, the top benefits align with the reasons they adopted – companies experience increased efficiency, yield, and quality. Due to these benefits, 88% of IoT decision-makers believe IoT is critical to their company's continued success.

02 _____ **SECURITY THREATS ARE NOT HINDERING ADOPTION**

Nearly all companies are concerned about security threats as they adopt IoT. However only 19% perceive security as a top challenge, falling below other challenges including complexity, budget, knowledge, and finding the right solution. Even for adopters who consider security a top concern, 93% are satisfied with IoT and most intend to keep using IoT in the future as they believe IoT will continue to be critical to the success of their company.

03 _____ **A LACK OF SKILLED WORKERS CAN HOLD BACK THE POTENTIAL OF IoT**

Despite its rapid adoption, 47% of current adopters feel that their companies don't have adequate workers and 44% don't have enough resources to see their projects through to realization. Companies with enough skilled workers are able to propel more IoT projects into the 'use' stage and reach it in less time, due in part to less failures during proof of concept.



IoT SIGNALS OVERALL RESEARCH LEARNINGS

IoT: THE BIG PICTURE

In the commercial arena, the Internet of Things continues to grow in popularity. Business decision makers, IT decision makers, and developers at enterprise-size commercial organizations are incorporating IoT into their businesses at high rates, and the overwhelming majority is satisfied with the business results. As an outcome, companies are increasingly eager to adopt IoT.

The enthusiasm for IoT adoption is global, and it also crosses industries. Among the enterprise IoT decision makers we surveyed, 85% say they have at least one IoT project in either the learning, proof of concept, purchase, or use phase, with many reporting they have one or more projects currently in 'use'. **(See Exhibit 1)**

Adoption rates are similar across surveyed countries (US, UK, Germany, France, China, and Japan) and core industries (manufacturing, retail/wholesale, transportation, government, and healthcare). **(See Exhibit 2)**

EXHIBIT 1

% IoT DECISION-MAKERS IN ADOPTION

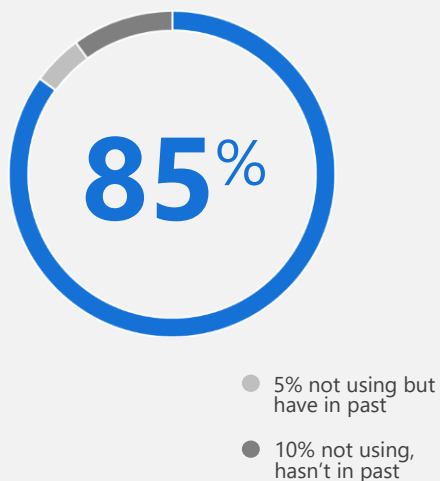


EXHIBIT 2

% IoT DECISION-MAKERS IN ADOPTION

BY MARKET

US	87%
UK	73%
Germany	88%
France	87%
China	88%
Japan	83%

BY INDUSTRY

Manufacturing	87%
Retail or wholesale	90%
Transportation	86%
Government	83%
Healthcare	82%

IoT growth shows no signs of slowing: adoption is projected to increase by 9 points over the next two years, meaning 94% of businesses will be using IoT by the end of 2021. **(See Exhibit 3)**

Companies who incorporate IoT into their businesses are happy with the results: 88% of adopters say IoT is critical to the success of their company **(See Exhibit 4)**. Nearly all decision makers are satisfied with IoT, most likely because they believe it has a strong return on investment (ROI).

As IoT influencers and decision makers look to the future, even more expect to adopt IoT and find new ways to use the technology. We heard from those in IoT adoption that, two years from now, they believe they will see a 30% ROI, inclusive of cost savings and efficiencies. The continued success of IoT will also rely on other innovations: decision makers believe that in the next two years, AI, edge computing, and 5G will be critical technological drivers for IoT success.

EXHIBIT 3

% WILL USE IoT IN NEXT 2 YRS

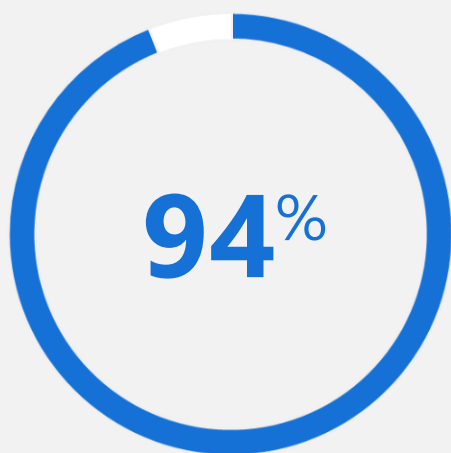
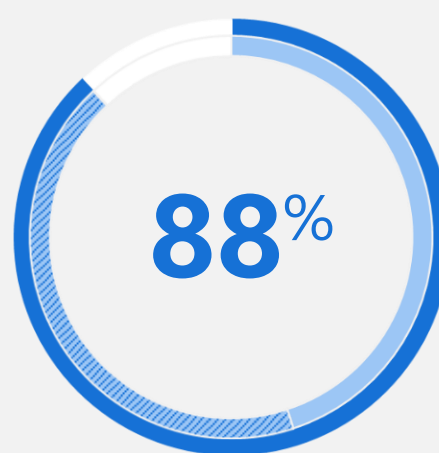


EXHIBIT 4

% IoT IS CRITICAL TO OVERALL SUCCESS
VERY & SOMEWHAT



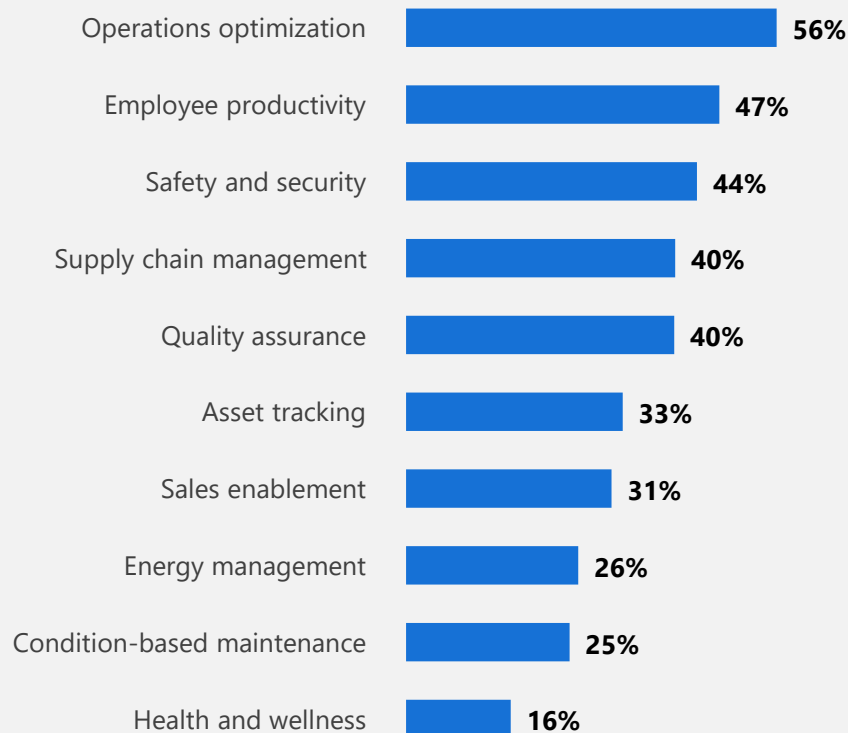
43% Very
45% Somewhat

WHY ADOPT IoT?

On average, companies cite three to four major reasons that led them to adopt IoT. Efficiency and productivity are key motivators; the top two reasons that companies implement IoT are operations optimization (56%) and improvement of employee productivity (47%). The next most common use cases are safety and security, which 44% of companies view as top reasons to utilize IoT. 30% to 40% of enterprise companies also adopt IoT to manage supply chain, assure quality, track assets, and enable sales. On the whole, BDMs and developers view IoT as a way to streamline processes and work more efficiently. **(See Exhibit 5)**

EXHIBIT 5

REASONS FOR IoT ADOPTION



While IoT has beneficial applications across industries, each industry prioritizes different use cases, according to its specific needs. In manufacturing, the top use cases for IoT are: automation (48%), quality and compliance (45%), production planning (43%), supply chain logistics (43%), and plant safety and security (33%). **(See Exhibit 6)**

For retail/wholesale companies, IoT is highly relevant for supply chain (64%) and inventory optimization (59%), while for transportation and government organizations equipment management and safety/surveillance are particularly important (~40%-55%). Within healthcare, IoT helps companies track patients, staff, and inventory (66%), as well as assists with remote device monitoring and service (57%). **(See Exhibit 7)**

EXHIBIT 6



MANUFACTURING TOP 5 USE CASES

Industrial automation	48%
Quality and compliance	45%
Production planning and scheduling	43%
Supply chain and logistics	43%
Plant safety and security	33%

EXHIBIT 7

ADDITIONAL TOP USE CASES BY INDUSTRY



RETAIL/ WHOLESALE

Supply chain optimization	64%
Inventory optimization	59%
Surveillance and security	48%
Loss prevention	44%
Energy optimization	40%



TRANSPORTATION

Fleet management	56%
Security, surveillance, and safety	51%
Manufacturing operations efficiency	40%
Vehicle telematics and infotainment	38%
Predictive maintenance	33%



GOVERNMENT

Public Safety	48%
Infrastructure and facilities management	40%
Regulations and compliance management	38%
Fleet and asset management	37%
Incident response	29%



HEALTHCARE

Tracking patient, staff, and inventory	66%
Remote device monitoring and service	57%
Remote health monitoring and assistance	55%
Safety, security, and compliance	53%
Facilities management	42%

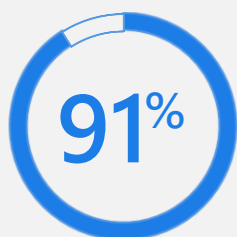
Once organizations adopt IoT, the top benefits align with the reasons they adopted – companies experience increased efficiency (91%), yield (91%), and quality (85%). Enterprise companies are quickly starting to see how IoT can deliver a return on investment by increasing productivity and production capacity, reducing business expenses, and lowering the chances of human error. IoT can also improve customer satisfaction and increase opportunities for companies to make better and more informed decisions. **(See Exhibit 8)**

Once organizations adopt IoT, they experience increased efficiency, yield, and quality.

EXHIBIT 8

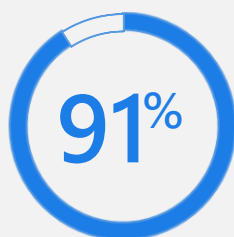
TOP IoT BENEFITS

1 INCREASE EFFICIENCY



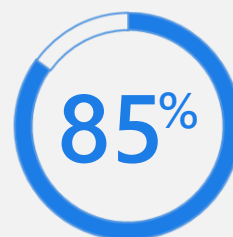
Improves overall efficiency	55%
Allows team to be more productive	42%
Saves time for team to focus efforts elsewhere	35%
Helps me be better informed and make better business decisions	33%
Enables new types of business models	26%

2 INCREASE YIELD



Increases production capacity	43%
Provides my business with cost savings	39%
Increases revenue	36%
Reduces business expenses	35%
Enables new types of customer offerings	27%
Enables new revenue streams	26%

3 IMPROVE QUALITY



Reduces chance for human error	45%
Increases customer satisfaction	44%
Increases company's competitive advantage	41%

WHAT ARE THE CHALLENGES OF IoT ADOPTION?

Despite its success, IoT is not without challenges. Both for companies striving to get IoT projects off the ground and for companies looking to use IoT more, the roadblocks are often the same: complexity and technical challenges, security concerns, and lack of talent and training.

Companies who want to utilize IoT more find that complexity and technical challenges are their biggest barriers: 38% of companies say these are the reasons they aren't using IoT more. Lack of budget and staff resources (29%), lack of knowledge (29%), and difficulty finding the right solution (28%) are the next most common roadblocks. Security is also a challenge (19%). **(See Exhibit 9)**

EXHIBIT 9

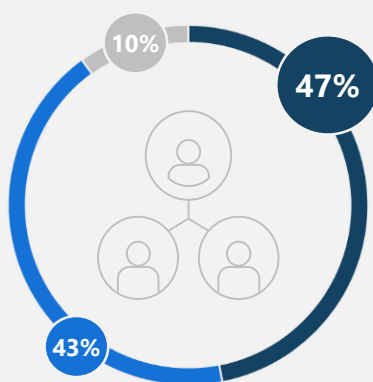
TOP IoT CHALLENGES



Lack of talent and training present challenges for almost half of IoT adopters. In this relatively new field, it's hard to find workers with the right skills and experience. 47% of companies that have adopted IoT report that they don't have enough skilled workers **(See Exhibit 10)**, and 44% don't have enough available resources to train employees. **(See Exhibit 11)**

EXHIBIT 10

TECHNICAL TALENT ASSESSMENT



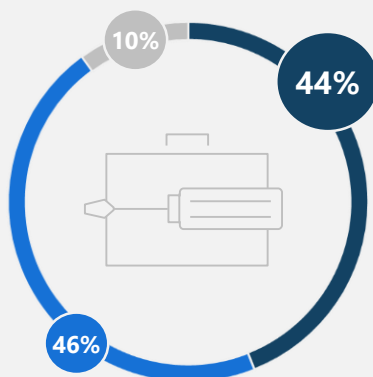
Not enough available skilled workers

Enough available skilled workers

No need for talent

EXHIBIT 11

INDUSTRY TRAINING ASSESSMENT



Not enough available resources to train workers

Enough available resources to train workers

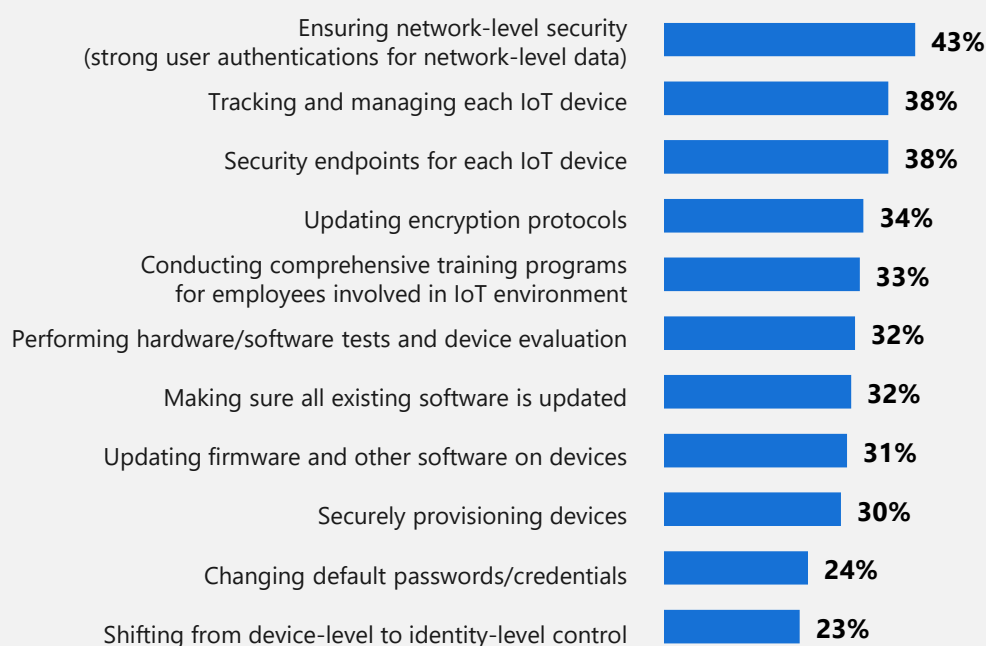
No need for training resources

Security concerns around IoT adoption are universal: 97% of companies are concerned about security when implementing IoT (though this is not hindering adoption). Collectively, the top security priority is software/firmware management (e.g. encryption protocols – 34%, hardware/software testing – 32%, and updating software and firmware – 31%). **(See Exhibit 12)**

IoT device management is another hot-button security issue. 38% of organizations are concerned about tracking and managing each IoT device as well as creating security endpoints for devices (i.e. the hardware device to which IoT information is communicated). Additionally, securing and authenticating accounts plays a factor – 43% of companies cite ensuring network-level security with strong user authentications for network-level data as their main concern. **(See also Exhibit 12)**

EXHIBIT 12

TYPES OF IoT SECURITY CONSIDERATIONS



Our findings show that IoT adopters believe around one-third of IoT projects fail in proof of concept (POC), often because implementation is expensive or the bottom-line benefits are unclear. Among those who have had IoT projects stall in the trial stage, the top reason is the high cost of scaling—32% of businesses cited this as the main issue with getting their projects off the ground. In other cases, it's difficult to justify moving forward on a project when the business benefits are not well enough defined: 28% of organizations reported that their projects failed because their pilots demonstrated unclear business value or ROI, and 26% of companies found it hard to justify a business case without short-term impact. **(See Exhibit 13)**

Additionally, lack of resources, IoT experience, and leadership buy-in can contribute to lower IoT success – companies who fall short in these areas have higher rates of POC failure and fewer projects in use versus those that don't.

EXHIBIT 13

REASONS FOR IoT FAILURE IN POC



WHO DRIVES IoT ADOPTION?

Because of IoT's complexity, an IoT strategy requires leaders to bridge organizational boundaries, communicate the strategic vision for IoT, and achieve broad alignment across all participating teams. Having a technology leader with end-to-end accountability can be critical to achieving success with IoT.

While C-suite buy-in is essential to get projects off the ground (and they are often the champions of IoT projects), IT and operations leaders as well as developers are important to facilitating and executing IoT use. As a business decision maker mentioned, "IT plays a large role in generating business stories for IoT and developing it."

FINAL THOUGHTS

Globally and across industries, IoT adoption enables companies to become more efficient, productive, and safe. However, there are also complexity, security, and talent challenges to overcome. Businesses with sufficient IoT knowledge, workers, resources, and leadership buy-in are more likely to get their projects past proof of concept, but even those with lower success rates are still committed to using IoT now and in the future, especially since ROI is projected to increase in the coming years. IoT is becoming indispensable to commercial organizations and, considering these findings as a whole, it's safe to say that the future looks bright for IoT.

Healthcare Spotlight



01 **IoT IS HELPING HEALTHCARE ORGANIZATIONS BECOME SAFER AND MORE EFFICIENT**

With the sensitive and highly regulated nature of work in healthcare, utilizing IoT for patient monitoring, quality assurance, and logistical support is very prevalent. IoT has emerged as a valuable tool that can help organizations ensure quality in these areas and further their levels of patient care. By helping reduce human error, improve safety conditions, and make organizations more efficient, IoT can ultimately serve to increase patient safety.

02 **TO IMPLEMENT IoT EVEN MORE, ORGANIZATIONS MUST TACKLE REGULATORY AND COMPLIANCE CHALLENGES**

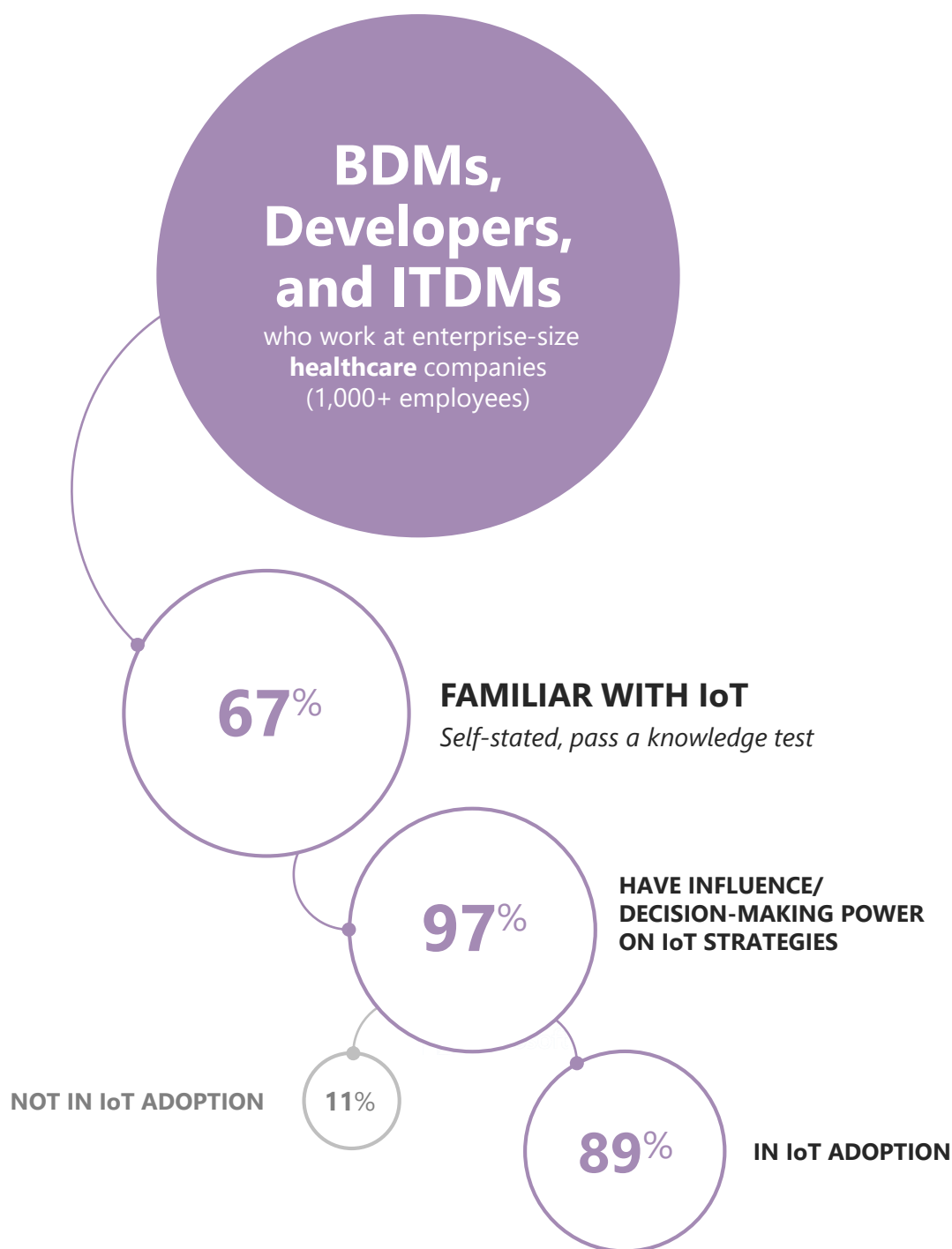
To facilitate even greater IoT adoption, healthcare organizations must continue to address the need to keep patient information private and comply to regulatory standards. Additionally, healthcare organization must prove the ROI of IoT and obtain additional IoT talent to boost the number of projects they're able to undertake.

03 **GLOBAL HEALTHCARE STANDARDS ARE TOP OF MIND AND BEING ADOPTED AT STRONG RATES**

Overcoming barriers around regulation is key overall for healthcare companies, and many are adopting numerous standards. Over eight in ten have adopted either HL7, DICOM, CMS Interoperability or FHIR, with HL7 and DICOM being most common.

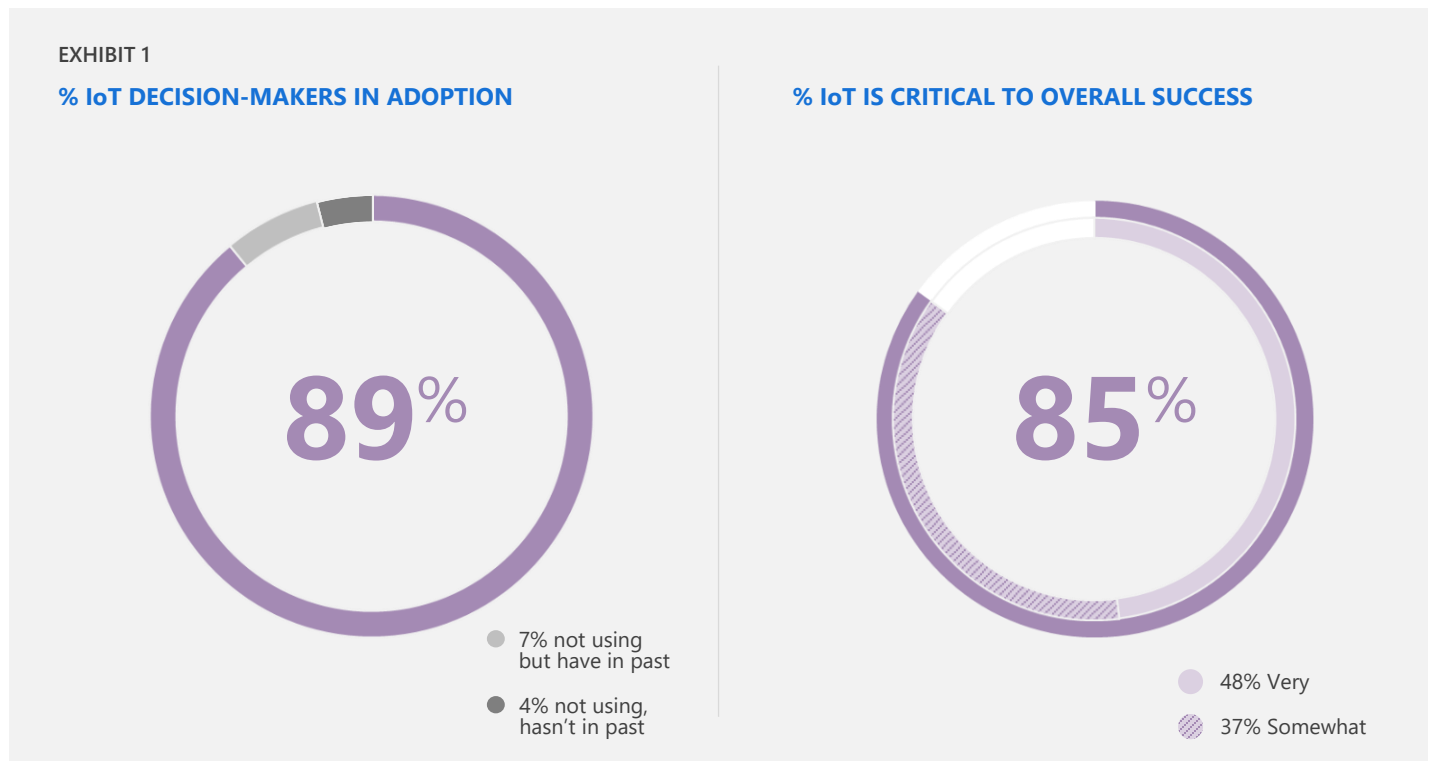
04 **THE FUTURE OF IoT IN HEALTHCARE WILL EXTEND BEYOND PATIENT CARE, WITH STRONG GROWTH IN OPTIMIZING LOGISTICS AND OPERATIONS**

While IoT usage for patient care will continue to grow and remain a top use case in the future, decision makers see strong potential to leverage IoT more to support the logistics and operational side of their organization. IoT usage is expected to grow significantly in facilities management and staff tracking, and decision makers also anticipate improved safety/compliance and efficiency through increased IoT implementation within supply chain management, inventory tracking, and quality assurance.



IoT IS HELPING HEALTHCARE ORGANIZATIONS BECOME SAFER AND MORE EFFICIENT

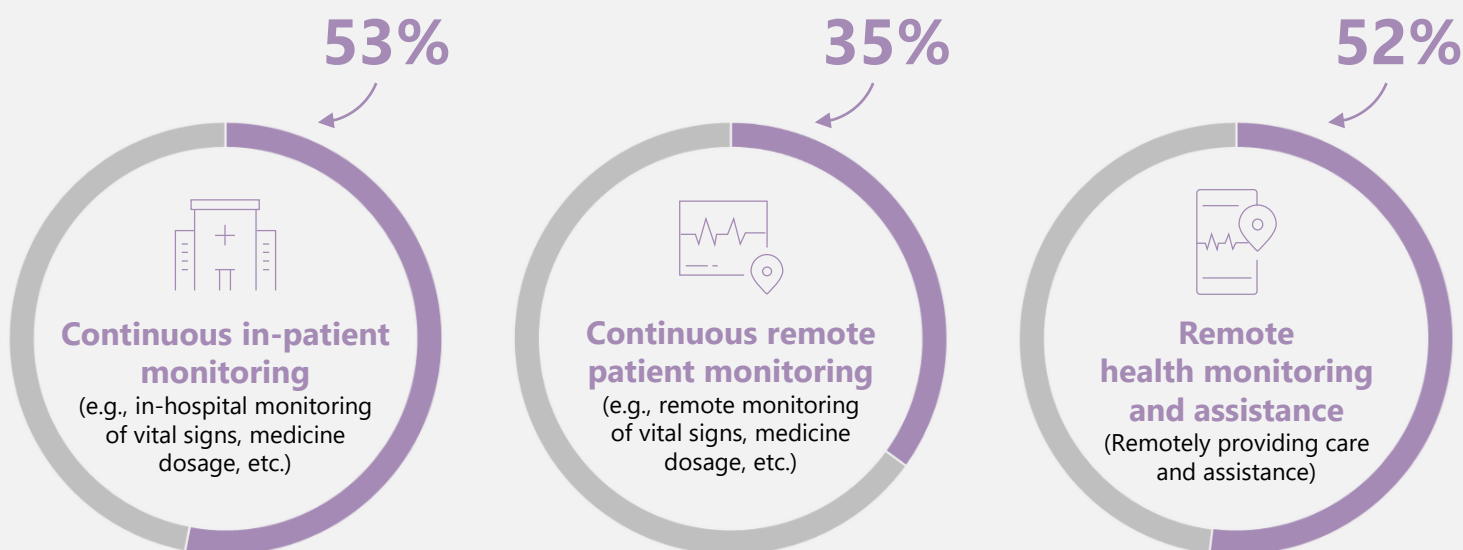
IoT technology is a pillar of today's healthcare industry. Among healthcare workers we surveyed, 89% say they have a project in either the learning, proof of concept (POC), purchase, or use (i.e., fully implemented) phase. **(See Exhibit 1)** Healthcare workers bank on IoT - 85% of IoT adopters say it is critical to the success of their company. **(See Exhibit 1)** In healthcare, it takes about 15 months for IoT projects to reach full activation, and our decision-makers say a quarter of the IoT projects they've undertaken are currently being implemented.



IoT is addressing numerous facets of healthcare delivery including patient monitoring, safety, and organizational logistics. Specifically, healthcare companies use IoT to monitor a patients' vital signs, both inside or outside the hospital (53% and 35%, respectively). Remote care, enabled by remote health monitoring and assistance, is another use powered by IoT technology (52%). **(See Exhibit 2)**

EXHIBIT 2

PATIENT MONITORING IoT USE CASES



IoT is also helping to make organizations and equipment safer. 55% of healthcare organizations use IoT to enforce internal safety, security, and compliance protocols – for example, tracking bacteria levels and hand hygiene monitoring, while 50% use IoT for quality assurance responsibilities such as conducting checks on equipment and tasks. **(See Exhibit 3)**

EXHIBIT 3

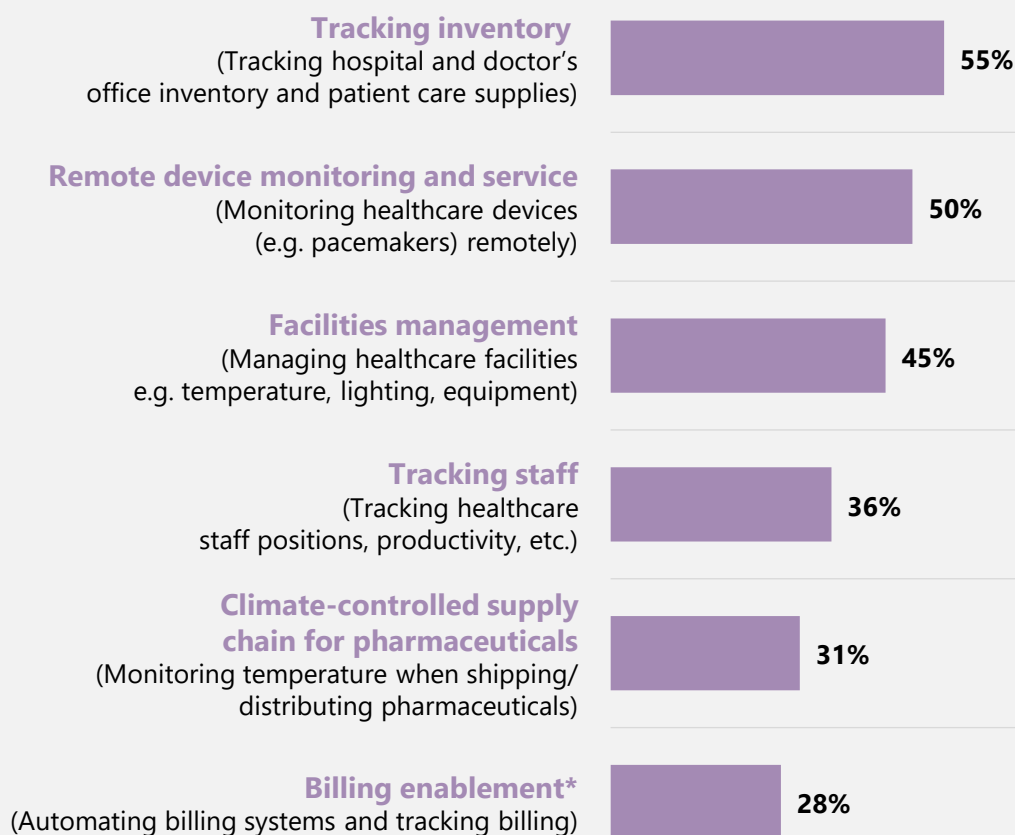
QA & SAFETY IoT USE CASES



IoT is often relied upon for logistical support – 55% of those we spoke with utilize IoT for tracking inventory such as doctor’s office and patient care supplies. Other common logistical use include monitoring services and devices (such as pacemakers) remotely (50%), and managing aspects of facilities such as temperature, lighting, and equipment (45%). Currently, IoT is less relied upon to track staff (36%) and manage other pain points in the process lifecycle, from billing (28%) to climate control for pharmaceuticals (31%). **(See Exhibit 4)**

EXHIBIT 4

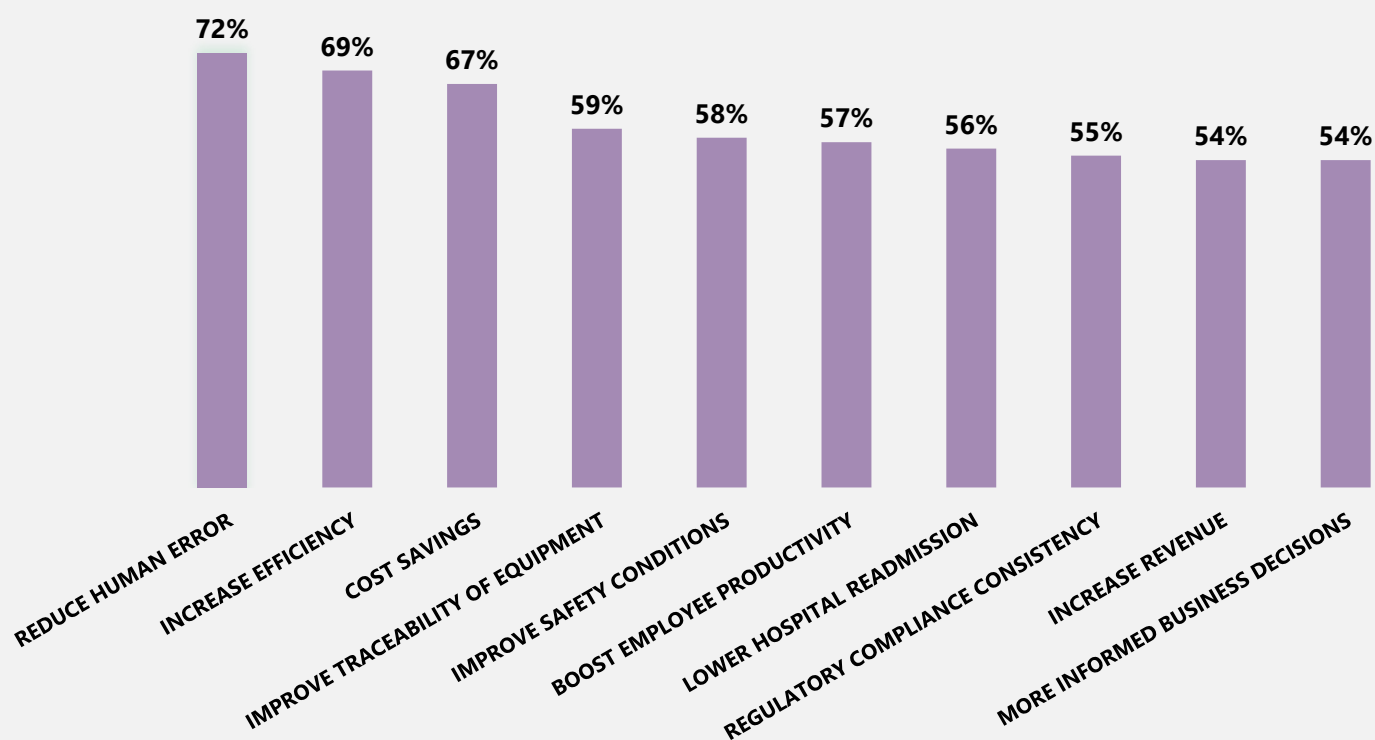
LOGISTICS IoT USE CASES



IoT tech provides unique value in the healthcare sector – reducing human error in high-stakes situations is chief among the many benefits cited (72%). Increased efficiency (69%) and cost savings (67%) are also top-of-mind. **(See Exhibit 5)**

EXHIBIT 5

BENEFITS OF IoT



TO IMPLEMENT IOT EVEN MORE, ORGANIZATIONS MUST TACKLE REGULATORY AND COMPLIANCE CHALLENGES

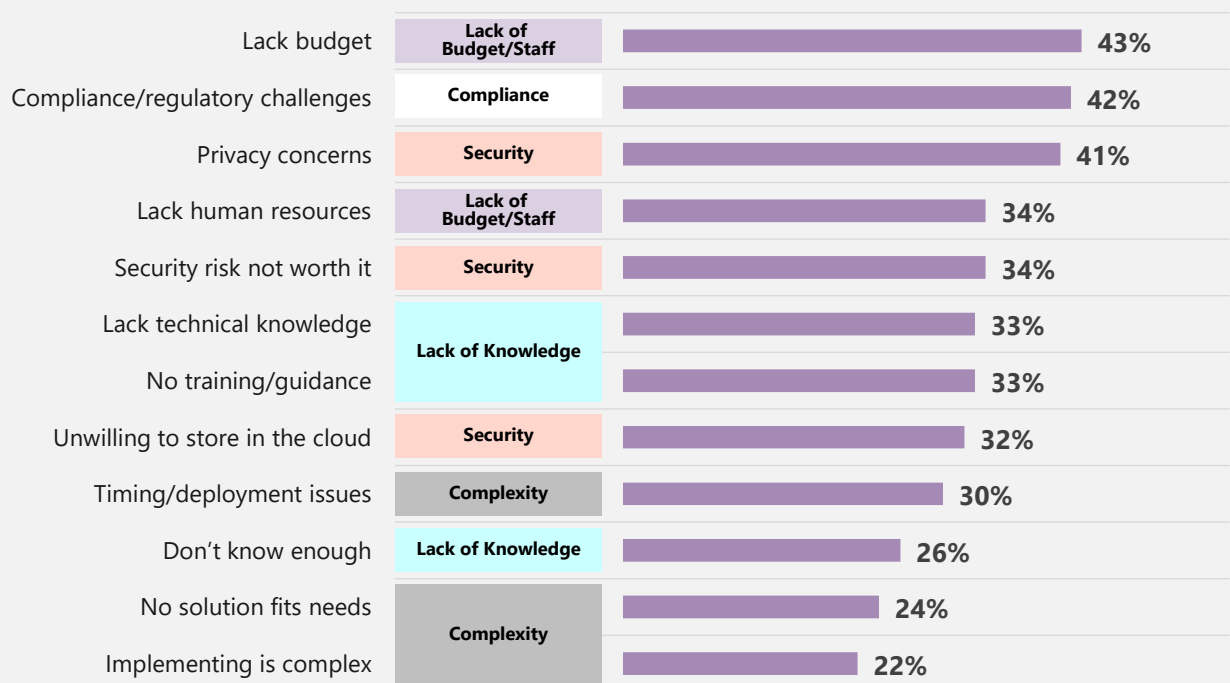
To facilitate even greater IoT adoption, healthcare organizations must continue to address the need to keep patient information private and comply to regulatory standards. Additionally, healthcare organization must prove the ROI of IoT and obtain additional IoT talent to boost the number of projects they're able to undertake.

Most adopters want to implement IoT even further (77%) but must overcome barriers first. Concerns around compliance and regulations, along with security and privacy concerns, inhibit further IoT adoption. In order to grow, IoT tech needs to ensure that all processes keep patient information private and comply with regulatory standards.

Additionally, healthcare organizations are facing a lack of budget and resources for IoT projects and need to illustrate the continued ROI in order to increase the numbers of projects they undertake. **(See Exhibit 6)**

EXHIBIT 6

BARRIERS TO FURTHER IoT ADOPTION



GLOBAL HEALTHCARE STANDARDS ARE TOP OF MIND AND BEING ADOPTED AT STRONG RATES

Overcoming barriers around regulation is key overall for healthcare companies, and many are adopting numerous standards. 86% of organizations have adopted at least one healthcare standard (**See Exhibit 7A**) (from among HL7, DICOM, CMS Interoperability, and FHIR), with the average being 2 adopted. HL7 currently has the highest adoption rate (49%), followed by DICOM (37%). (**See Exhibit 7B**)

EXHIBIT 7A

ADOPTION OF HEALTHCARE STANDARDS

14%

have not
adopted

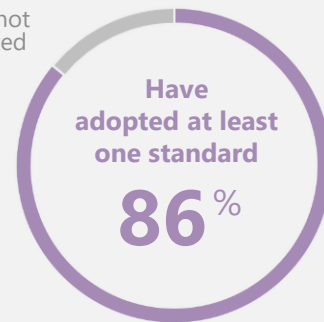
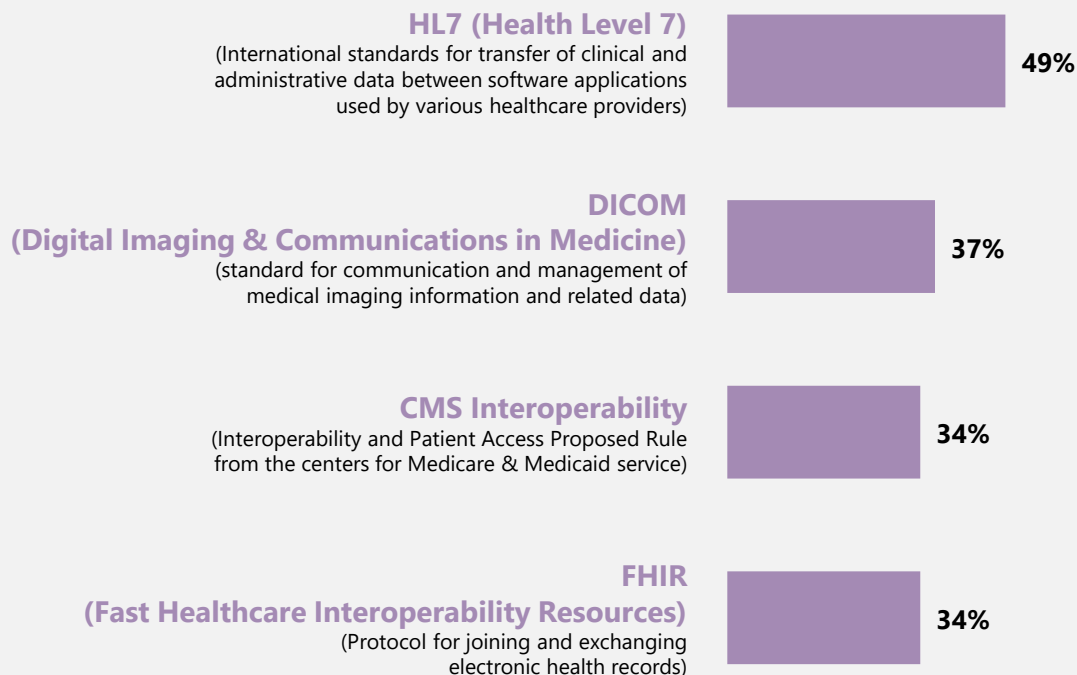


EXHIBIT 7B

HEALTHCARE STANDARDS ADOPTED

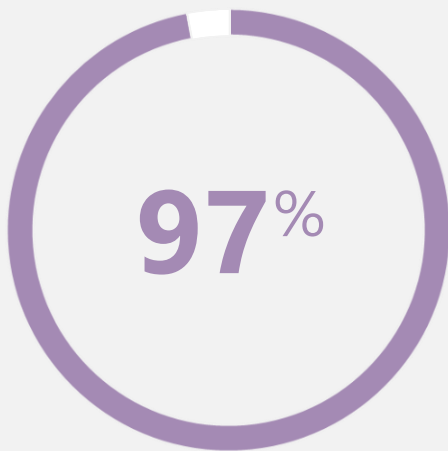


THE FUTURE OF IOT IN HEALTHCARE WILL EXTEND BEYOND PATIENT CARE, WITH STRONG GROWTH IN OPTIMIZING LOGISTICS AND OPERATIONS

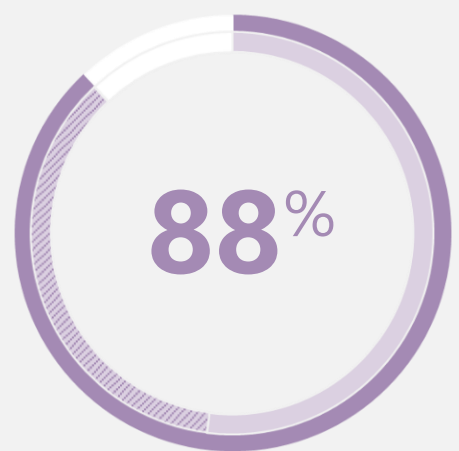
Workers expect IoT use to be near-universal by 2022 (97%), and 73% intend to use IoT more than today. This trend is mirrored by the uptick in the percentage of projects that will be in the “use” phase in the next two years (37% vs. 29% today). For healthcare workers, IoT technology is as critical in the tomorrow as it is today (88%), indicating IoT’s stable role in caring for the future. **(See Exhibit 8)**

EXHIBIT 8

% WILL USE IoT IN NEXT 2 YRS



% IoT WILL BE CRITICAL TO OVERALL SUCCESS IN NEXT 2 YRS



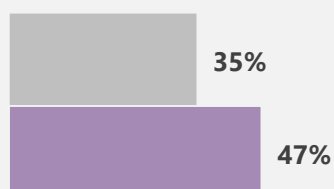
52% Very
36% Somewhat

IoT usage for patient care will continue to grow and remain a top use case in the future. **(See Exhibit 9)** Quality assurance and safety will reach higher saturation as well.

EXHIBIT 9

**PATIENT MONITORING
CURRENT VS. FUTURE USE CASES**

**Continuous remote
patient monitoring***
(Remote monitoring of vital
signs, medicine dosage, etc.)



+12



AMONG
PROVIDERS ONLY

**Remote health monitoring
and assistance**
(Remotely providing care and
assistance)



+11

**Continuous in-patient
monitoring***
(In-hospital monitoring of vital
signs, medicine dosage, etc.)



+10

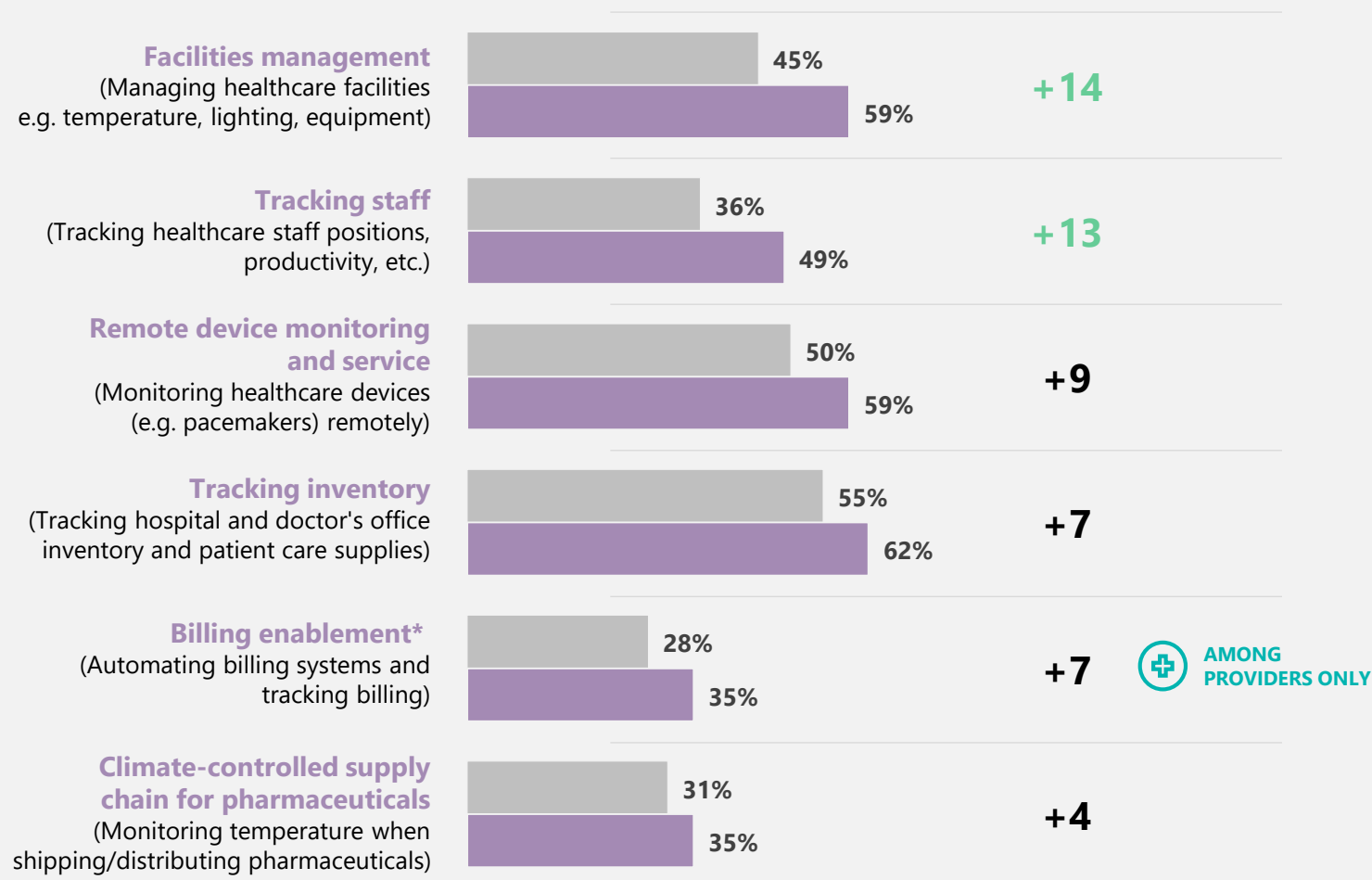


AMONG
PROVIDERS ONLY

However, decision makers also see strong potential to leverage IoT more to support the logistics and operational side of their organization. IoT usage is expected to grow significantly in facilities management (from 45% to 59% within 2 years) and staff tracking (from 36% today to 49% within 2 years). (See Exhibit 10)

EXHIBIT 10

LOGISTICS CURRENT VS. FUTURE USE CASES



FINAL THOUGHTS

IoT powers the healthcare industry, helping workers optimize many aspects of healthcare delivery, from safety to logistical support and patient monitoring. Healthcare decision makers see unique value in IoT, specifically for reducing human error during high stakes situations, and enabling efficiency and cost savings. That said, IoT technology could be adopted at even greater rates if concerns around regulatory compliance, security, and patient privacy are addressed. Resources are another concern – because budgets and resources are limited, healthcare organizations must prove sustained ROI to justify increased IoT project load. Even so, healthcare workers expect IoT use to become near-universal within the next two years. While key use cases such as patient care will continue to grow, decision makers also see high potential for IoT to support logistics and operations, including facilities management and staff tracking. Examining research as a whole, IoT will continue play an ever more critical role in improving healthcare process and delivery.

THE OBJECTIVES OF THE RESEARCH INCLUDED

- 1 Explore the benefits and the challenges of IoT adoption
- 2 Understand the revenue impact of adopting vs not adopting IoT
- 3 Project future adoption and uses of IoT

TO MEET THE SCREENING CRITERIA, IoT PROFESSIONALS NEEDED TO BE:

A business decision maker, IT decision maker, or developer at their company

Employed full-time at an enterprise-level company (1,000 employees or more)

Ages 18-66

Familiar with IoT

Involved in decision making for IoT

Within the Healthcare Spotlight, respondents also needed to work in the healthcare industry

OF THE MORE THAN 3,000 IoT PROFESSIONALS INTERVIEWED FOR THE INITIAL RESEARCH WAVE IN FEBRUARY 2019

In the US, approximately 1,000 Decision Makers and 200 Developers were interviewed

In Germany, Japan, China, France, and the UK: approximately 300 Decision Makers and 100 Developers were interviewed in each country

OF THE 152 HEALTHCARE IoT PROFESSIONALS INTERVIEWED IN OCTOBER 2019, ACROSS BDMS, ITDMS, AND DEVELOPERS

82 were interviewed in the US

53 were interviewed in the UK

17 were interviewed in France