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JABIL

CONNECTED HEALTH TRENDS

A SURVEY OF MANUFACTURING DECISION STAKEHOLDERS

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INTRODUCTION

Connected technology is integrating itself into every part our lives: smart security systems guard our homes; energy efficient lights illuminate our workplaces; food, a ride and almost anything else can be delivered to you with a tap on your phone. But one industry is dawdling far behind the curve when it comes to connectivity: healthcare.

It doesn't take an expert to see the advantages of connected health solutions: medical processes will become more efficient, doctors will more easily diagnose and treat patients and patients will be more empowered to take control of their own health. Instead of being reactive, healthcare becomes preventive, able to detect when someone is at risk for certain conditions. This proactive approach will diminish the number of hospitalizations and expensive treatments.

But significant progress must be made before this future becomes a reality. Research shows that connected healthcare noticeably lags other connected industries in terms of product development and implementation. Why? What are the barriers? Where are the biggest opportunities? This report constructively examines and analyzes the current state of connected healthcare.

The following report, sponsored by Jabil, is based on an online survey of 211 individuals responsible for decisions related to the delivery of their company's connected healthcare solutions. Participants answered a variety of questions related to adoption, opportunities and challenges faced in connected health.

In this survey, the term "connected healthcare solutions" refers to healthcare products and devices that utilize IoT technology to enable remote management, collect and report data or alert on usage. This includes — but is not limited to — items such as smart pill bottles, remote health monitoring and diagnostics, fitness trackers and connected care delivery systems. It does not include health tracking apps where data is entered manually.

This definition was provided to participants prior to answering topical questions related to these types of solutions and was part of the qualification process for participation in the study.

KEY FINDINGS

HEALTHCARE IS LATE TO THE INTERNET OF THINGS, BUT IT WILL GET THERE EVENTUALLY

- The most common types of investment toward future devices that companies may develop include on-body devices **(45%),** machine-to-machine communication **(37%),** environment monitoring **(37%)** and smart packaging or sensors **(35%)**
- Out of future possibility of development, companies prioritize machine-to-machine communication **(22%),** on-body devices **(21%),** environment monitoring **(17%)** and in-body devices **(15%)**
- All participating companies that have a healthcare device that can be connected will connect it
- **79%** of companies have put a product into users' hands, though often only as a prototype, but **80%** expect to be fully launched within three years

THERE IS SIGNIFICANT POTENTIAL BUT MANY BARRIERS SLOW ADOPTION

- Participants believe the biggest connected health opportunities include better treatment for illness **(27%),** early detection of symptoms **(22%)** and tracking patient behaviors **(15%)**
- Top three reasons participants believe healthcare lags other industries: healthcare is driven by proven outcomes **(56%),** it's complicated to get both doctors and patients to adopt a new device **(51%),** and it's too difficult to get regulatory approvals for anything that collects healthcare data **(43%)**
- Industry hurdles are the most problematic, with **98%** reporting industry hurdles to delivering connected health solutions
- Only **5%** say they have solved all of their key issues in delivering connected health devices
- **One in five** companies have pulled back a connected healthcare solution, usually because of regulatory agencies

DATA AND PARTNERSHIPS WILL BE KEY TO CONNECTED HEALTH PROGRESS

- Data from connected healthcare solutions will be useful for several reasons, including identifying and solving problems with devices and connectivity **(53%),** understanding use models to guide product development **(49%),** driving general healthcare outcome research **(46%)** and sharing data with healthcare providers **(42%)**
- **51%** plan to collect data through a public cloud infrastructure, **39%** plan to use a local device, **36%** will use their own infrastructure and **31%** will utilize a device that they produce themselves
- Healthcare providers were viewed as the greatest beneficiaries of data **(69%),** followed by product development companies **(57%)** and research labs **(51%)**
- The most important partners will be manufacturing partners with expertise in connected devices **(65%),** technology partners **(63%)** and partners with expertise in government approval processes **(50%)**

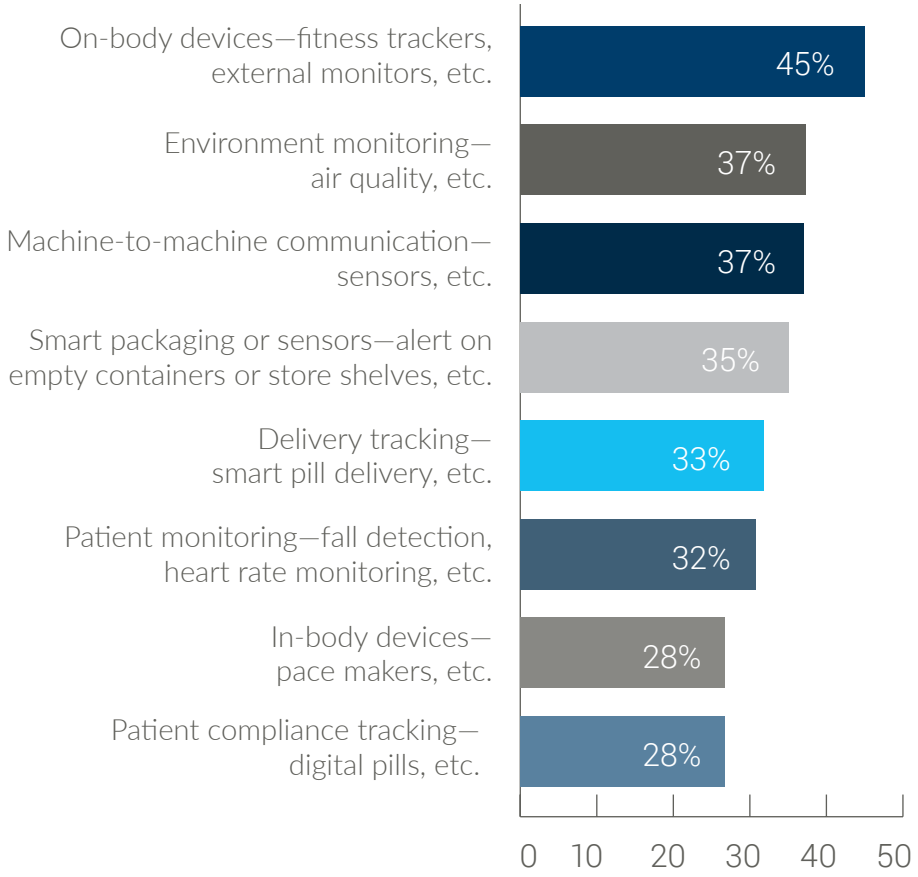

HEALTHCARE IS LATE TO THE INTERNET OF THINGS, BUT IT WILL GET THERE EVENTUALLY

WIDE RANGE OF CONNECTED DEVICES FOR HEALTHCARE SOLUTIONS POSSIBLE

The potential types of connected healthcare devices are as diverse as medical conditions and treatment options. Any device that can capture data to maximize efficiency can be connected. Some connected solutions aim to give patients more control over their health, others are designed to improve health facility operations. The possibilities go on. Some of these solutions will be more useful and easily applied than others.

Although there are plenty of opportunities in all categories, participants saw the most opportunity in on-body solutions (45%), which allow patients to monitor their own health, and may also be more easily adopted since many customers are already familiar with on-body devices, such as fitness trackers. The second largest opportunity was in machine-to-machine communication (37%), which can be used to enable more devices and applications, and environment monitoring (37%).

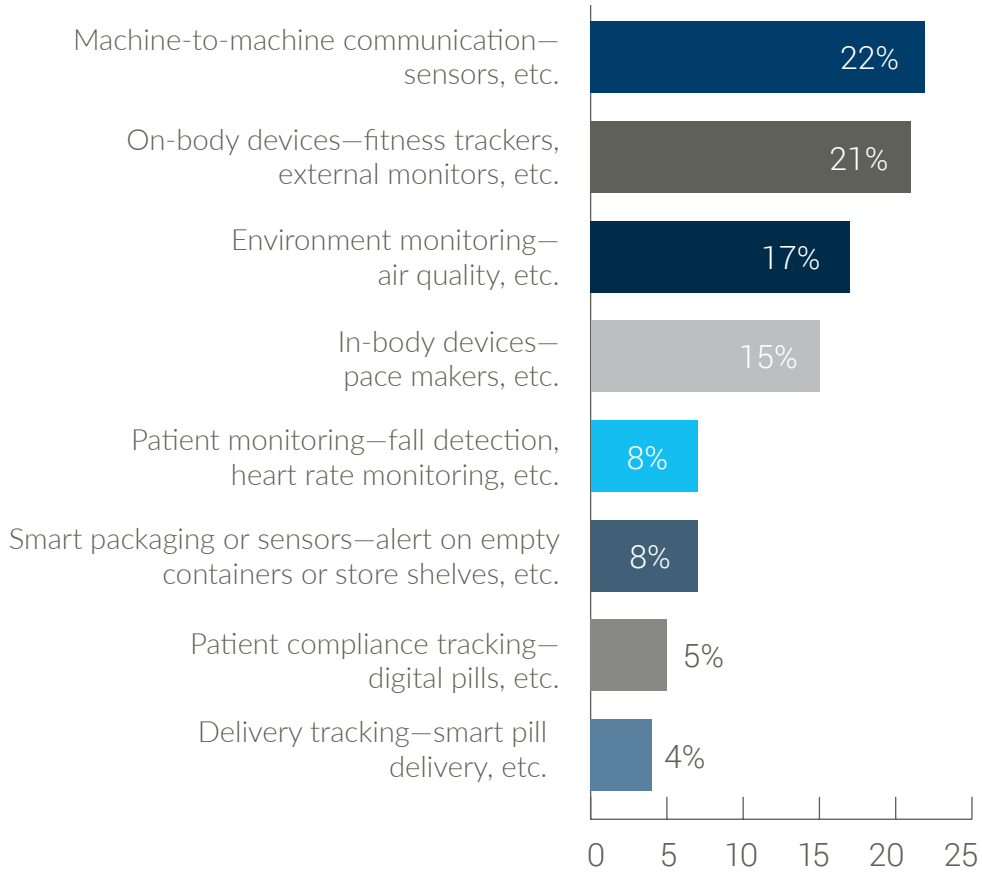
What type of connected healthcare solutions might your company eventually develop?



MACHINE-TO-MACHINE COMMUNICATION AND ON-BODY DEVICES TOP THE LIST

Although survey participants clearly indicated that there is more opportunity for on-body devices than machine-to-machine communication, when asked about their priorities, respondents answered that machine-to-machine communication slightly outranks on-body devices. This could be due to the potential usage of machine-to-machine communications to enable more devices. In-body devices also ranked much higher in priorities than in opportunity.

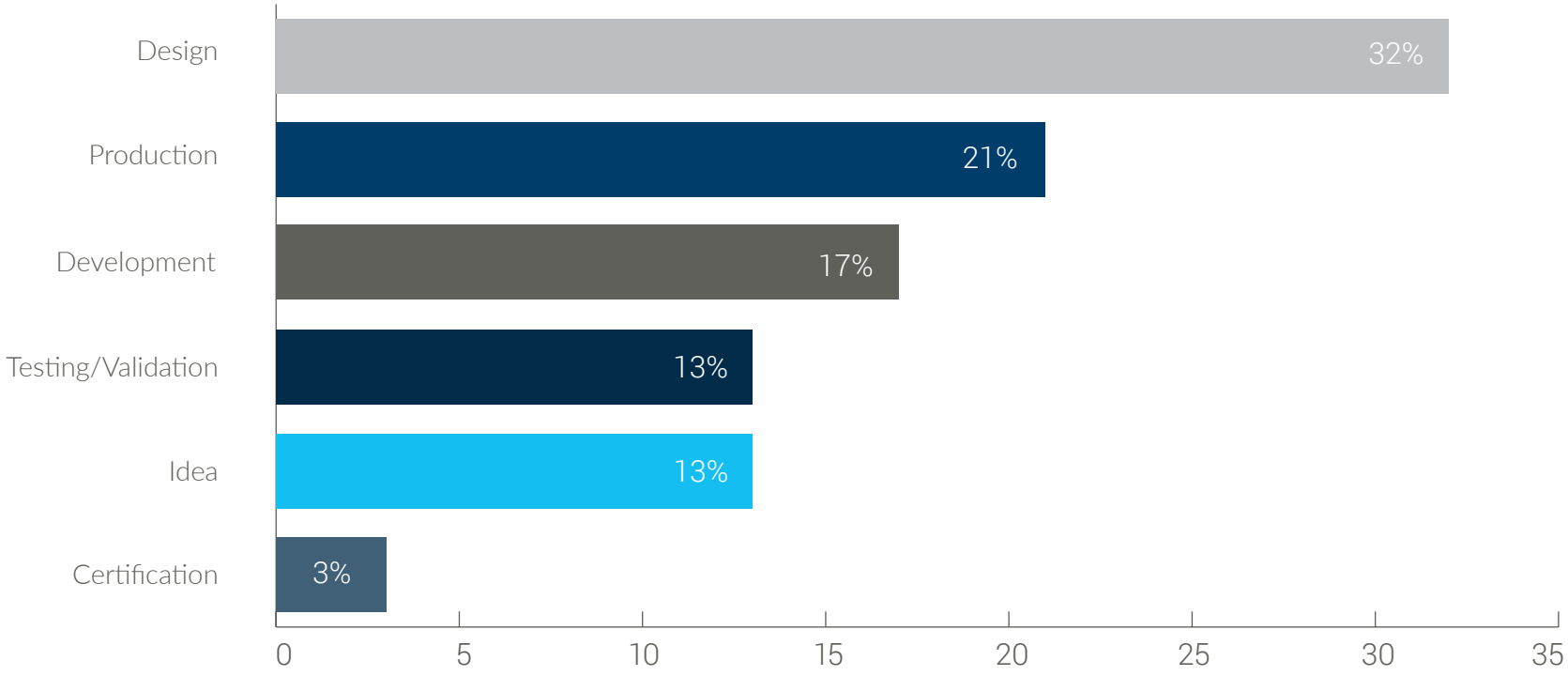
Which of these types of connected healthcare solutions is the top priority for your company?



ALL THAT HAVE A HEALTHCARE DEVICE THAT COULD BE CONNECTED WILL CONNECT IT

Although connected health has a long way to go, given the significant potential of connected health to save and improve lives, it is unsurprising that all survey participants affirmed that they are at least looking onto the possibility of connecting devices. Participants cite reasons such as the ability to deliver innovative new product and service offerings (53%), enable new business models (44%), gain access to new markets (42%) and improve existing solutions (40%), companies are busy brainstorming and developing connected health solutions.

What is the status of your company's development of connected healthcare solutions?

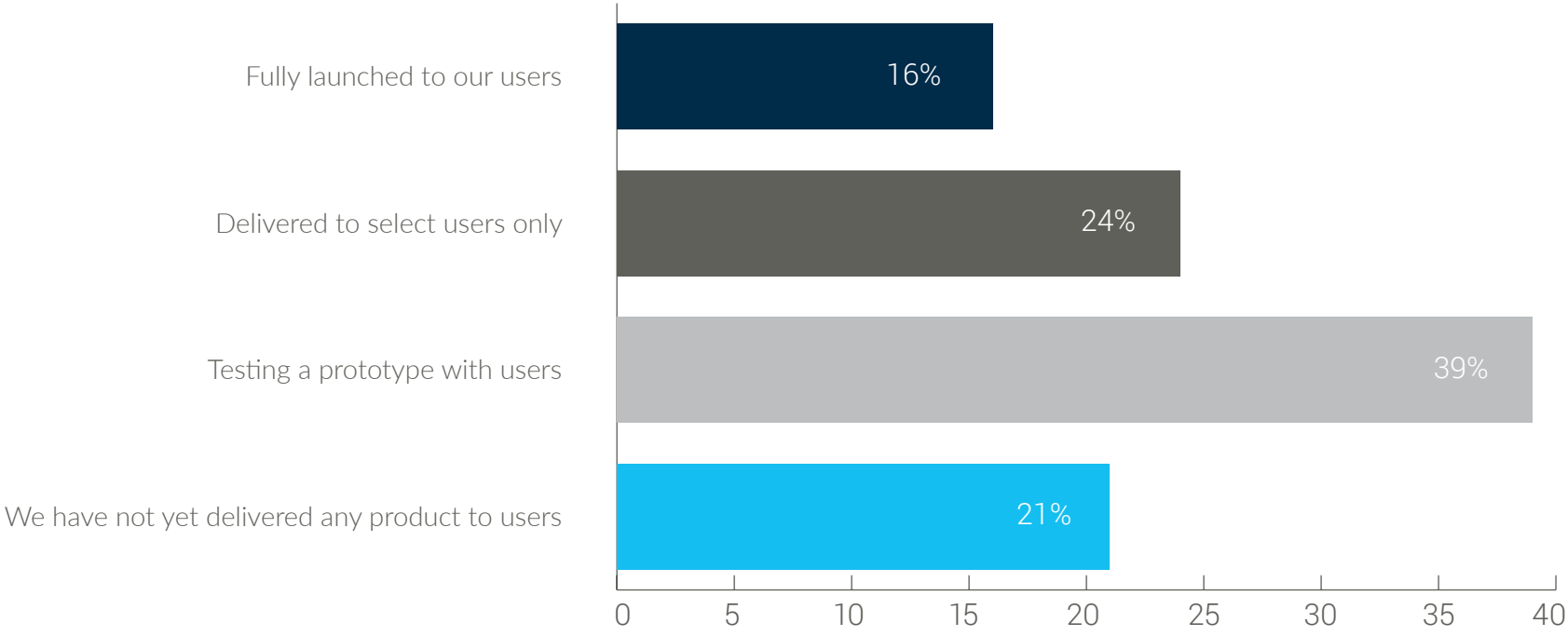


THE TECHNOLOGY IS PROGRESSING

Spurred by a range of motivators, companies are engaged in producing connected health solutions. To unlock the great potential of connected health, 79% of respondents affirmed that they have put a product into users' hands, although 39% are still in the prototype stage.

However, 80% of companies expect to be fully launched within three years, with one in four reporting that they are already fully launched and 22% anticipating a full launch within a year. Only 13% predict that it will take four to five years, a mere 4% think that it will take more than five years and 3% don't know.

What is the status of your company's connected healthcare solution delivery to customers?

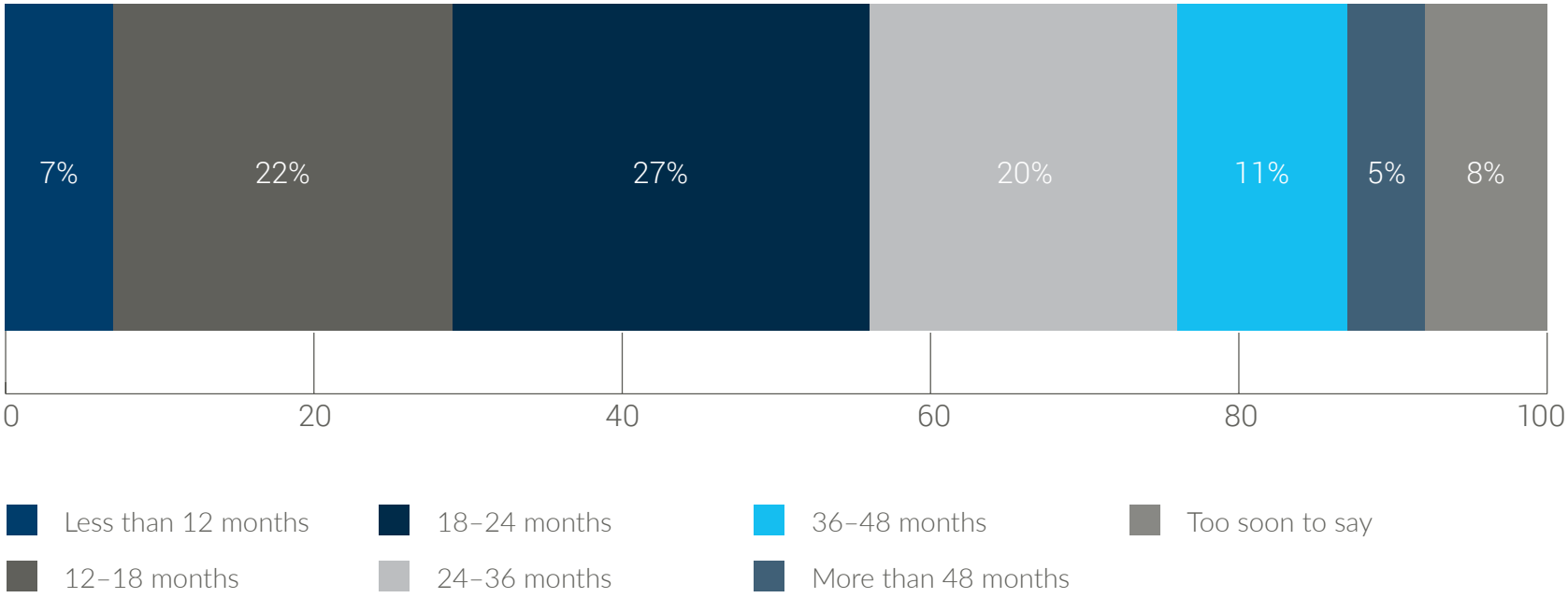


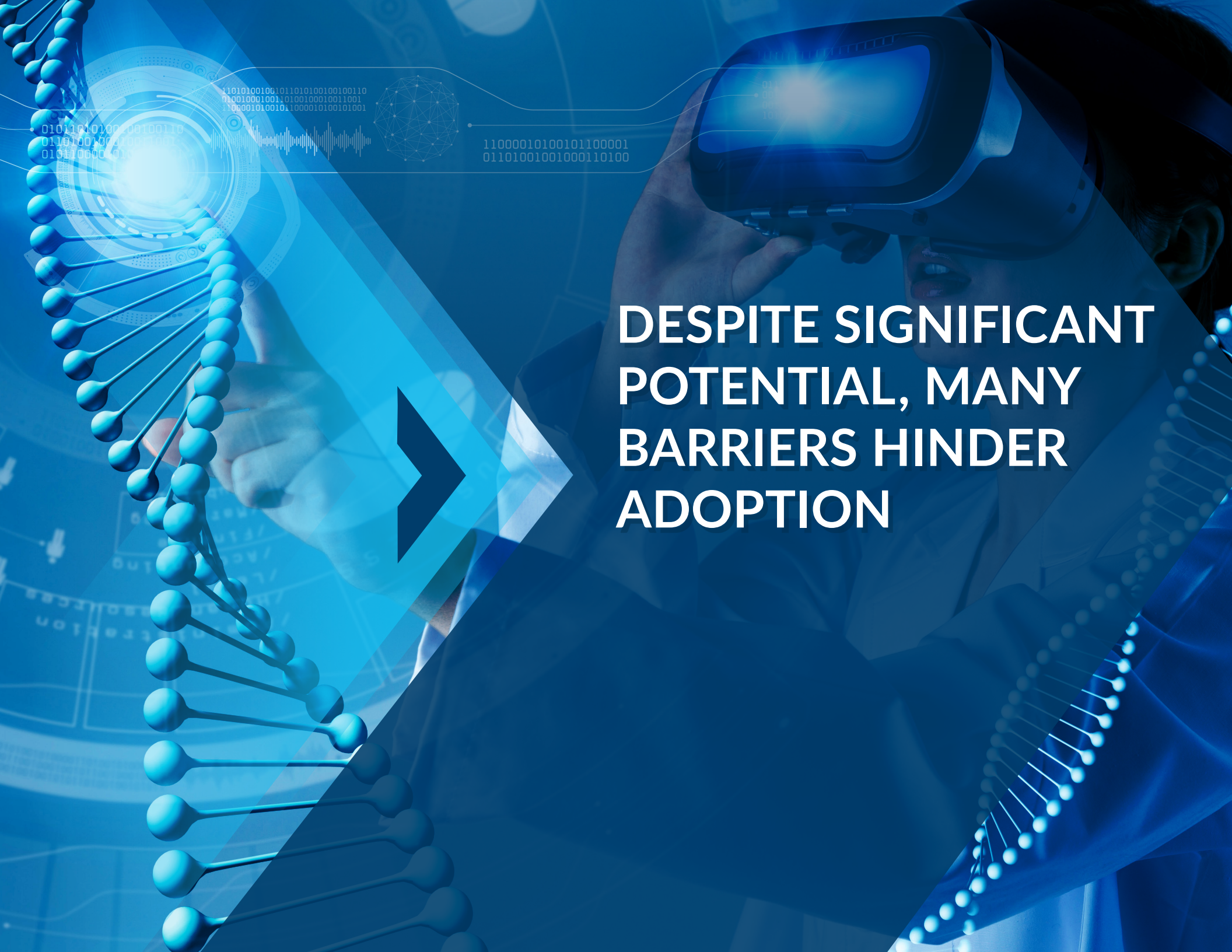
PRODUCT DEVELOPMENT AND LAUNCH TIMELINES VARY

Overall, the length of time for development and launch cycles greatly vary, with most solutions taking anywhere from 12-18 months to double that time.

However, companies that are smaller have an advantage; their production cycles are typically shorter. Whereas only 2% of companies with more than 5,000 employees said that their product development and launch cycle was less than 12 months, 15% of companies with 1,000-5,000 employees reported that this timeline was feasible.

On average, how long is your connected healthcare solution product development and launch cycle?





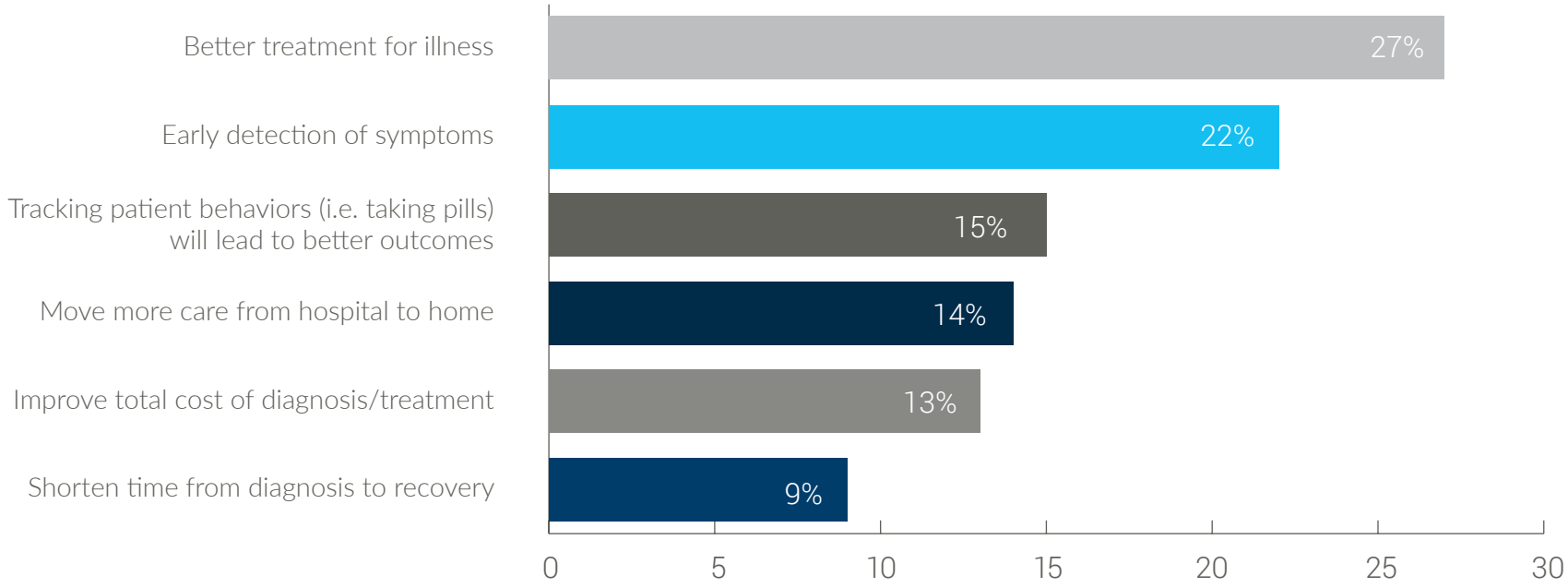
DESPITE SIGNIFICANT POTENTIAL, MANY BARRIERS HINDER ADOPTION

100% THINK THAT CONNECTED HEALTH WILL MAKE A DIFFERENCE

Although the potential applications of connected health vary, survey participants unanimously agreed that connectivity and smart devices will make a difference in healthcare over the next 10 years. Interestingly, the top opportunity (better treatment for illness) is a reactive measure, whereas the second biggest opportunity (early detection of symptoms) leans more toward preventative, being able to stop an illness from worsening.

The next biggest opportunities empower patients to take control of their own health. Suddenly, the patient becomes an administrator, thus playing a much more active role in his/her overall health.

Where do you see the biggest opportunity for connected healthcare to make a difference in the next decade?

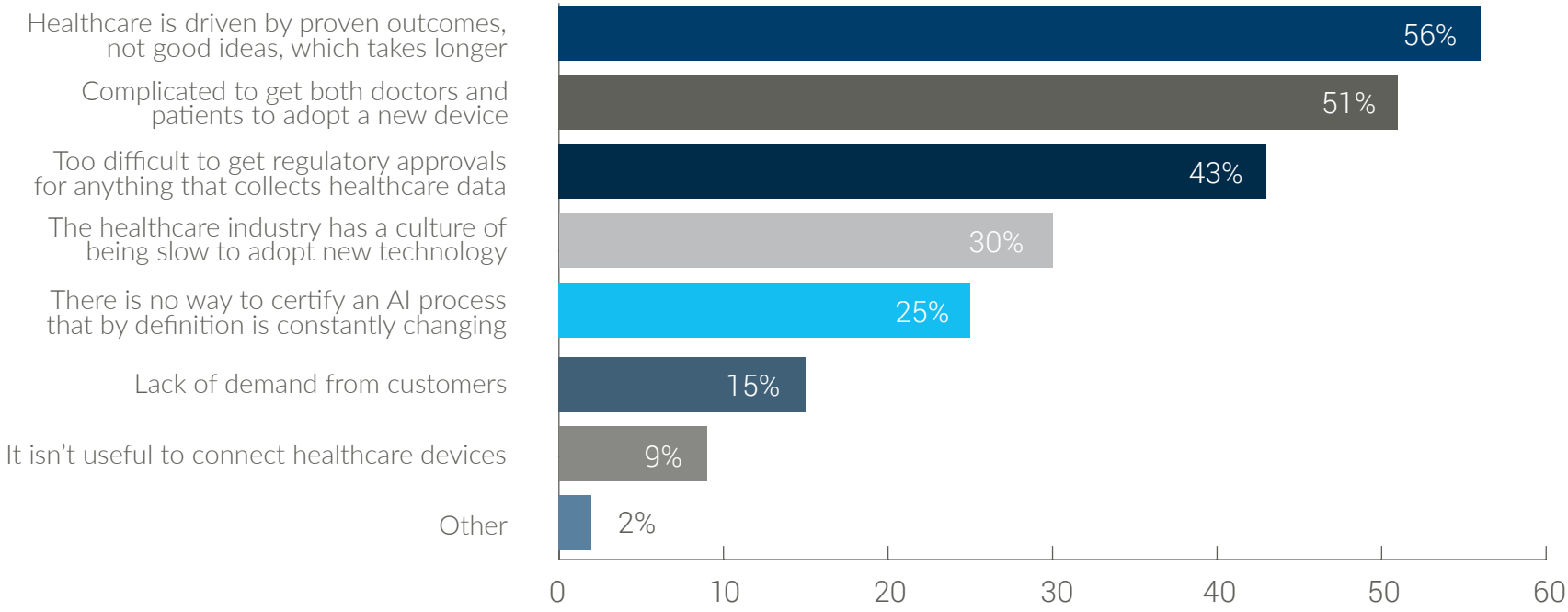


CONNECTED HEALTHCARE LAGS OTHER INDUSTRIES

More and more industries are becoming connected. Homes are being run by voice-activated assistants. Building lights are automatically turning on and off. There are even visions of smart cities where apps connect people with neighborhoods, the government and traffic updates.

Significant progress has been made in all those areas. And although there has been some progress made in connected health, participants unanimously agree that connected health is lagging behind other industries, stating reasons such as the fact that healthcare is driven by proven outcomes (56%), it's complicated to get both doctors and patients to adopt a new device (51%) and it's too difficult to get regulatory approvals for anything that collects healthcare data (43%).

In your opinion, why is connected healthcare further behind than other connected industries?

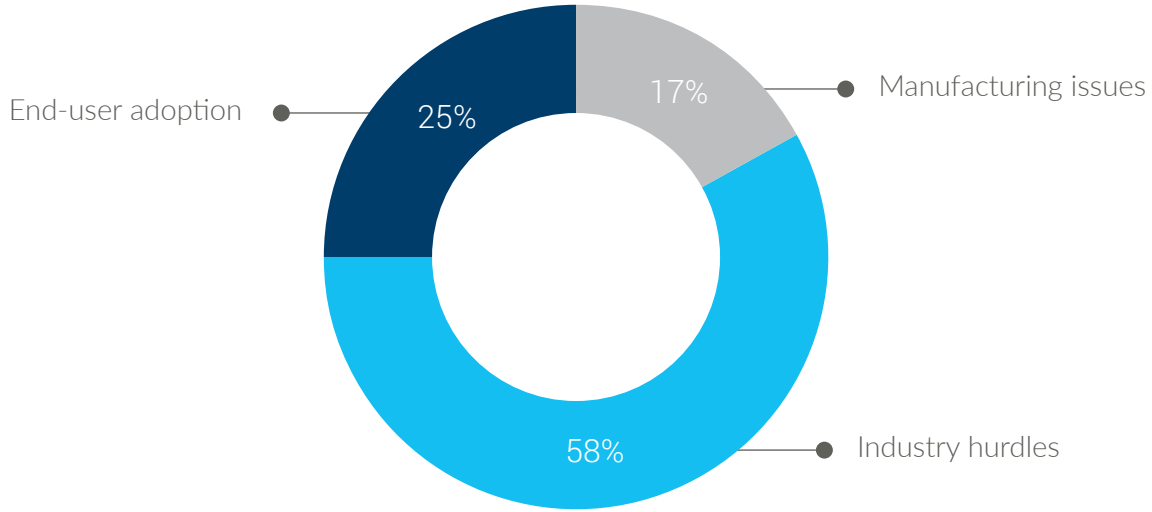


INDUSTRY HURDLES ARE THE MOST PROBLEMATIC FOR DELIVERING CONNECTED HEALTHCARE

All survey participants mentioned issues with user adoption (99%), particularly because of concerns about privacy and security (51%), ease of use (49%) and adoption cycle issues (38%). They also indicated manufacturing problems (95%) like undeveloped technology (57%), high manufacturing costs (44%) and supply chain obsolescence (28%). However, survey participants overwhelmingly agreed that the largest barrier was industry hurdles. Notably, companies with FDA-approved solutions were more likely to cite industry hurdles.

Ninety-eight percent of participants listed industry challenges, which include regulatory processes that are too rigid for constantly changing technology solutions (57%); unresolved liability issues (46%); HIPAA, GDPR and other data governance and privacy rules being too hard to meet with connected devices (42%); providers feeling data overload (32%); and a lack of clarity on who will pay for devices (29%).

Of all these types of challenges, which creates the biggest barrier to delivering connected healthcare solutions?

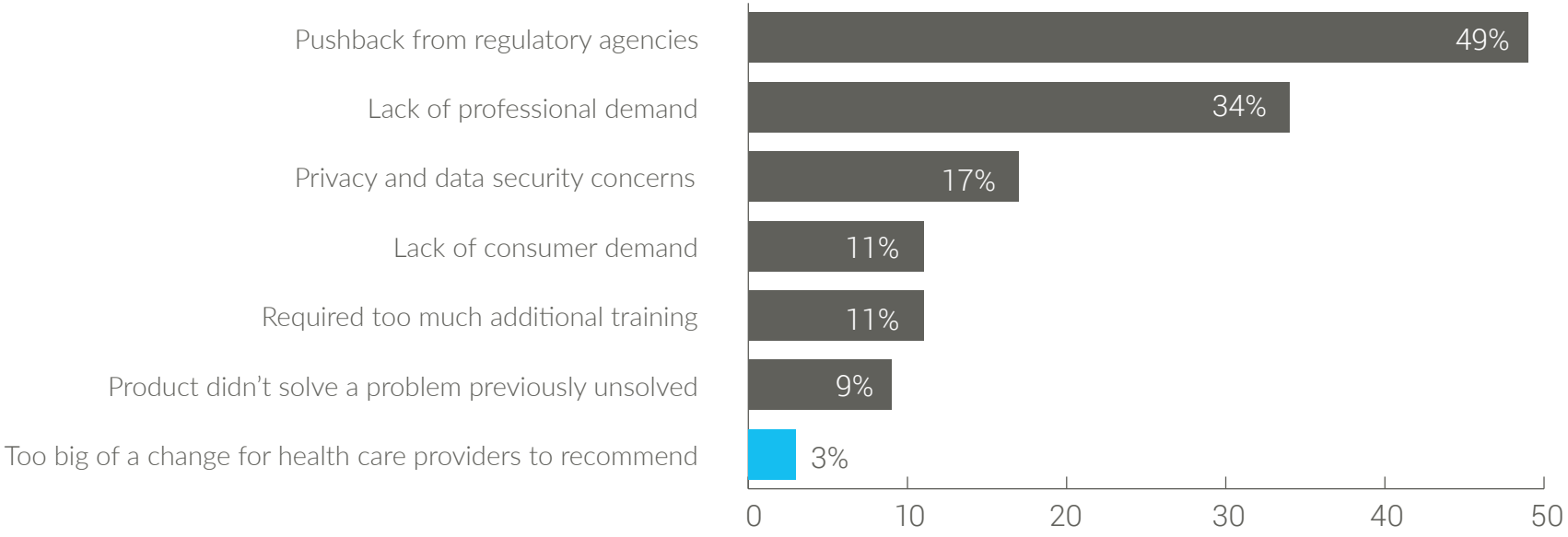


REGULATIONS CAUSE THE MOST PULL-BACK

Overall, one in five companies have reported pulling back a healthcare solution that solved technology, production and compliance issues. Companies plagued by manufacturing issues were much more likely to pull back devices than those facing end-user adoption or industry issues. Certain products, such as patient monitoring and compliance tracking and smart packaging, were most likely to be pulled back or never launch. Smaller companies (1,000-5,000 employees) and those requiring FDA approval were also slightly more likely to retract a developed product.

The top single reason that companies have pulled back a solution is because of regulatory pushback (49%). This far outranked the next two leading causes, lack of professional demand (34%) and privacy and data security concerns (17%).

Why did your company not move forward with this connected healthcare solution even though production, technology and compliance issues had been solved?

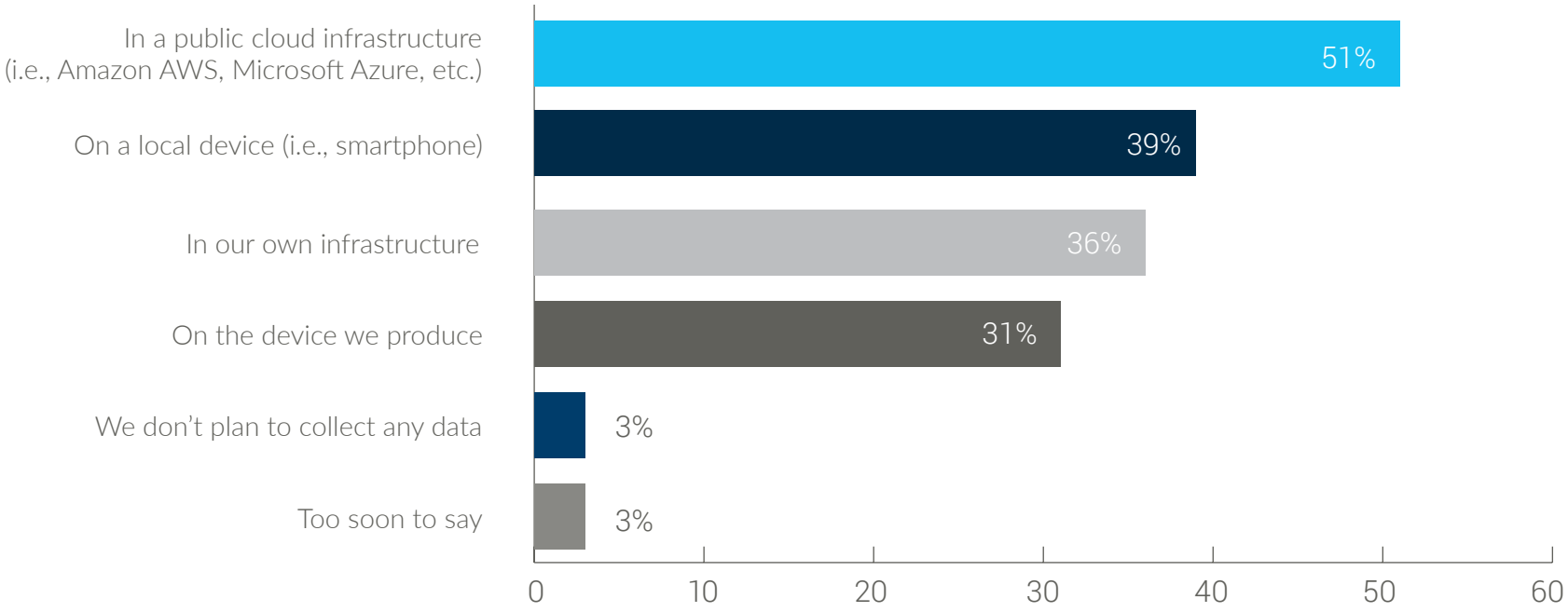


KEYS TO MOVING FORWARD: DATA AND PARTNERSHIPS

99% REPORT DATA FROM CONNECTED HEALTH SOLUTIONS WILL BE USEFUL

Data is becoming one of the biggest commodities in any industry. It makes sense that almost all participants agree that it will be useful. Although they are still split on how exactly to collect data, most companies are leaning toward a public cloud infrastructure (51%), followed by a local device (39%), their own infrastructure (36%) and on a device they produce (31%).

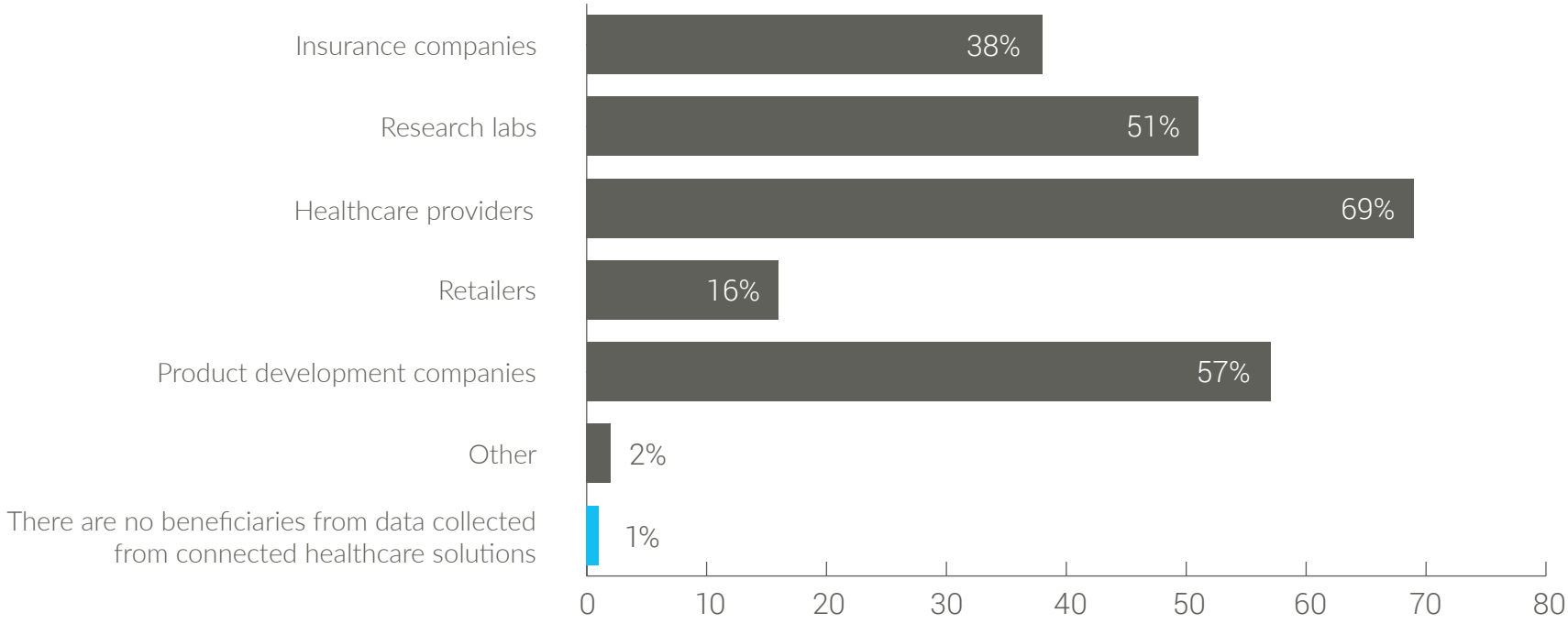
How does your company plan to collect data generated by connected healthcare solutions?



HEALTHCARE PROVIDERS WILL BE THE GREATEST BENEFICIARIES FROM DATA COLLECTION

Data collected from devices will help all healthcare professionals, but companies also see the value of data collection in helping them better serve customers. The information collected from healthcare devices will be distributed to a variety of sources. Almost 70% of experts agree that healthcare providers will benefit the most from data, which will enable them to understand patients' behaviors and how to better treat them. Product development companies will also gain significant insights from collected data, such as how to improve their products. Other beneficiaries include research labs, insurance companies, retailers and others, such as advertisers and patients.

How does your company plan to collect data generated by connected healthcare solutions?

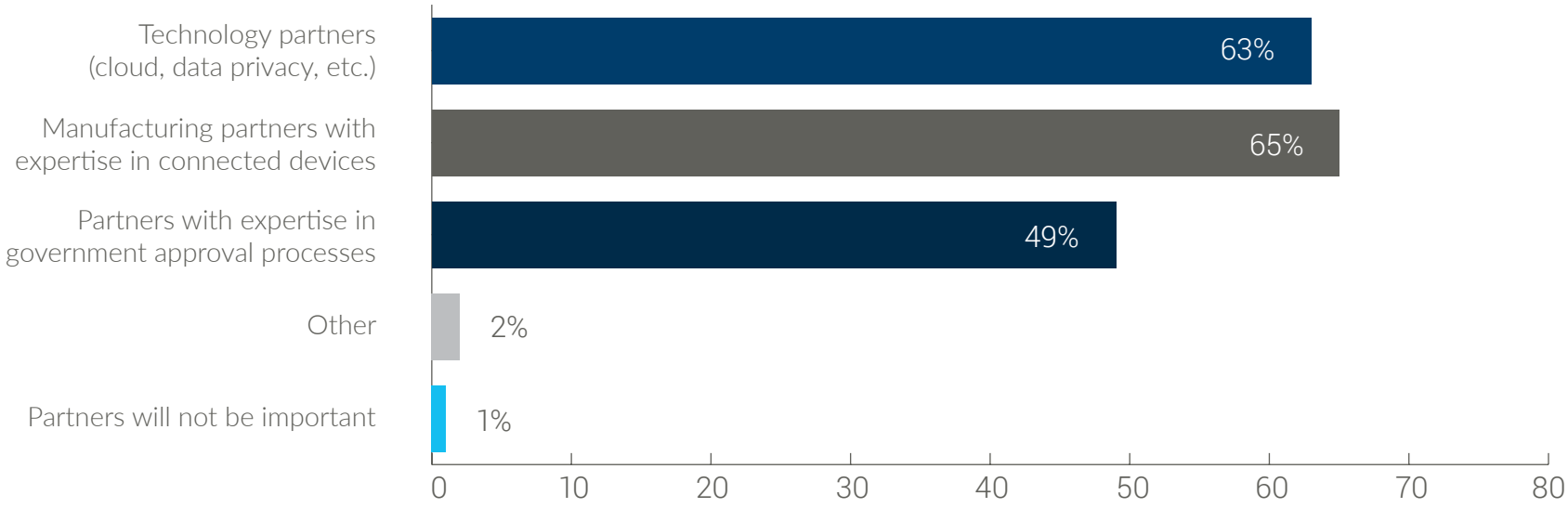


PARTNERS CAN PUSH THE INDUSTRY FORWARD

Partners may be one of the best resources for overcoming challenges and moving the connected health industry forward, as they can contribute valuable experience and knowledge in unfamiliar areas of technology and business. Industry decision makers consider manufacturing partners with expertise in connected devices the most potentially beneficial partners. This makes sense, considering that manufacturing issues cause many solutions to be pulled back. Forty-five percent of respondents who had a connected healthcare solution that solved technology, production and compliance issues stated that manufacturing issues was a factor in recalling the device, far more common than industry hurdles (21%) or end-user adoption (8%).

Technology partners with knowledge in cloud and data privacy also rank high. Partners who can help solutions slip through the red tape and general tangle of government approval processes will prove helpful in terms of overcoming industry prohibitions.

What types of partners will be important to bringing connected healthcare solutions to market?



DEMOGRAPHICS

SURVEY METHOD AND PARTICIPANTS

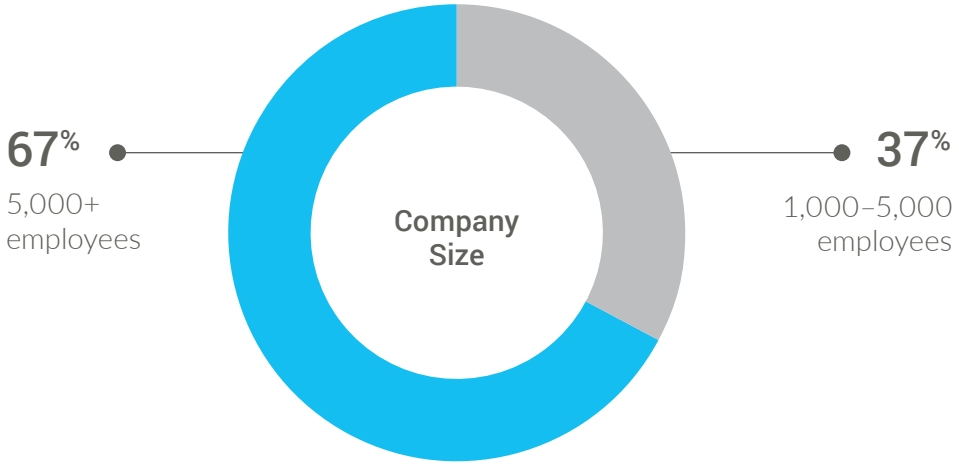
An online survey was sent to manufacturing decision makers. All participants were responsible for decisions related to the production of IoT (Internet of Things) connected devices for healthcare in one of the following categories:

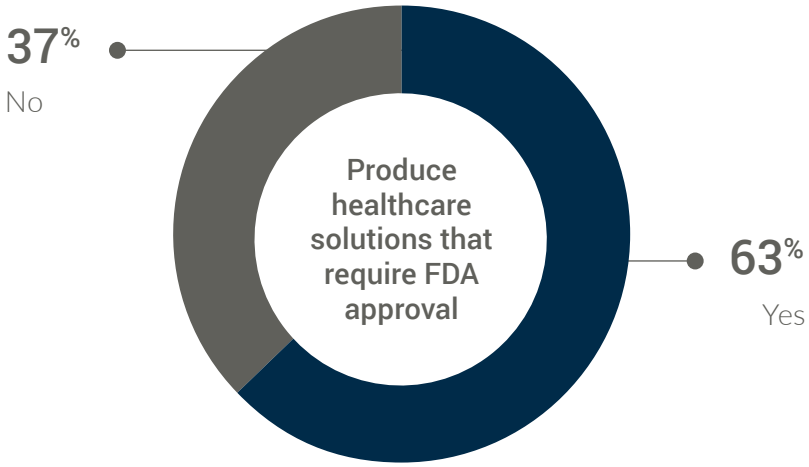
- **On-body devices**
- **Machine-to-machine communication**
- **Environment monitoring**
- **Smart packaging or sensors**
- **Delivery tracking**
- **Patient monitoring**
- **Patient compliance tracking**
- **In-body devices**

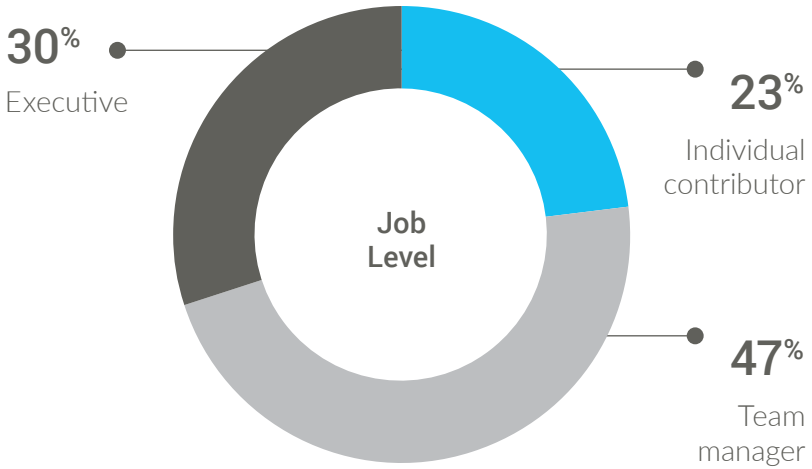
Participants worked at companies with 1,000 employees or more, and held a variety of direct decision-making roles, including business leadership, engineering, operations, supply chain and procurement. Questions were asked on a range of topics related to the adoption, opportunities and challenges in delivering connected healthcare solutions.

A total of 211 qualified individuals from around the globe completed the survey. Participants included a mix of roles, job responsibilities, types of devices manufactured and company sizes.

SURVEY METHOD AND PARTICIPANTS







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