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DIGITAL HEALTH TECHNOLOGY TRENDS

A Survey of Digital Health Industry Stakeholders

DECEMBER 2024

Digital technologies in healthcare improve patient outcomes through more efficient delivery of care. Whether for diagnostic tests, imaging machines, medical devices, surgical instruments, orthopedics, or diabetes management, if something can be done remotely, or through a sensor with digital connectivity, it is being embraced with multiple benefits across healthcare's ecosystem of patients, providers, and payers.

Data is the lifeblood of medical discovery. The effective management and harnessing of data through on-device technology play an increasingly powerful role in healthcare. Connected medical devices can generate a continuous stream of health data purposed for patient support, preventing or predicting poor outcomes, and otherwise broadening perspectives for greater therapy insights. Artificial Intelligence (AI) and Machine Learning (ML) are poised to revolutionize healthcare through enhanced diagnostics accuracy and improved disease prediction and progression analysis.

To gain strategic insights into the current and future state of medical technology, Jabil has continued its partnership with SIS Research International to survey decision makers at leading healthcare companies with existing or planned digital healthcare solutions. The majority of the 200 participants polled hold positions with C-suite, and director level seniority and represent a dynamic roster of companies across healthcare, including global industry leaders reporting more than $10 billion in annual sales.

Since Jabil's first digital healthcare survey in 2018, the healthcare sector has been challenged by and weathered a range of disruptive factors including the COVID pandemic, as well as ongoing impacts from geopolitical tensions on supply lines. In many ways, however, these dynamics have served as a catalyst for improved resilience in preparation for what's next.

Over the past decade, digital technology's impact within healthcare has broadened significantly, adding more demands upon the technical requirements for manufacturing. Among the evolving set of challenges tracked by Jabil's surveys over the years — like smaller product architectures (miniaturization) or connectivity protocols — the leading technical domains identified as critical to keeping pace in the industry are optics and sensors.

In 1991, Mark Weiser (considered now the father of ubiquitous computing) opened his groundbreaking Scientific American article "The Computer for the 21st Century," with these words, "The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it."

Today's digital health industry is testament to the power of constantly evolving sensor and optics technologies in delivering this seamlessness, increasingly, to healthcare. Jabil's 2024 survey bears out the continuation of the trend, with additional context: Innovations in medical technology, precision medicine, and digital health are reshaping the delivery of care, offering new opportunities for early diagnosis, personalized treatment, and improved patient outcomes.

Healthcare markets continue to be challenging, particularly as companies adapt to increasing demands for lower cost-of-care models. Efficiency, scale, and agility are more important than ever in bringing new and improved products to the patients who need them — suggesting that the industry's growing adoption of manufacturing partnerships will likewise increase.

Key Findings

State of Digital Health Solutions

- **58%** of the company's digital healthcare solutions are currently in the development stage (**36%**) or testing stage (**22%**)
- **59%** of the top solutions developed or in planning are in the diagnostics sector
- **51%** of digital healthcare devices support remote patient monitoring
- **45%** of digital healthcare solutions are utilized in support of chronic disease management
- Product development and launch cycles span **25 months** on average
- **Nearly unanimous affirmation** of digital healthcare value statements
  - **Enables** vital patient data collection and analysis
  - **Supports** continuity of care, improving patient outcomes
  - **Facilitates** connections between patients and providers

Key Findings

Medical Device Technologies: Challenges and Opportunities

- **73%** cite increasingly complex product architectures as a primary manufacturing challenge
- **#1** most significant benefit of advanced connectivity technologies: Lower latency – approaching "real time" engagement through faster data transmission
- Wi-Fi connectivity is the most widely implemented technology in healthcare devices (**93%**)
- **98%** agree that artificial intelligent (AI) and machine learning (ML) advancements will transform the healthcare sector
- **93%** believe their company can seize the AI opportunity; yet there is no clear consensus on which AI/ML technologies will have the most impact
- **67%** identify device and product user experience as a primary concern
  - Healthcare *Consumerization* – increasing demand for easy-to-use, customizable, **patient-centric solutions**

Key Findings

Manufacturing Solutions Partnerships Improve Competitiveness

- **85%** affirm that incorporating digital health technology is vital to their organization's delivery of healthcare products or services
- **72%** of respondents expect manufacturing partners to assist in navigating changing technology, supplier, and regulatory landscapes
  - Geopolitical factors and supply chain resilience are **primary concerns**
- **3** technology domains identified as most likely to be outsourced to manufacturing partners
  - **53%** — Optics and sensors
  - **42%** — Technical solutions related to tolerances, materials, chemistry, power management, etc.
  - **33%** — Connectivity technology
- Plastics/polymers remain the leading materials used in additive manufacturing among **97%** of those polled

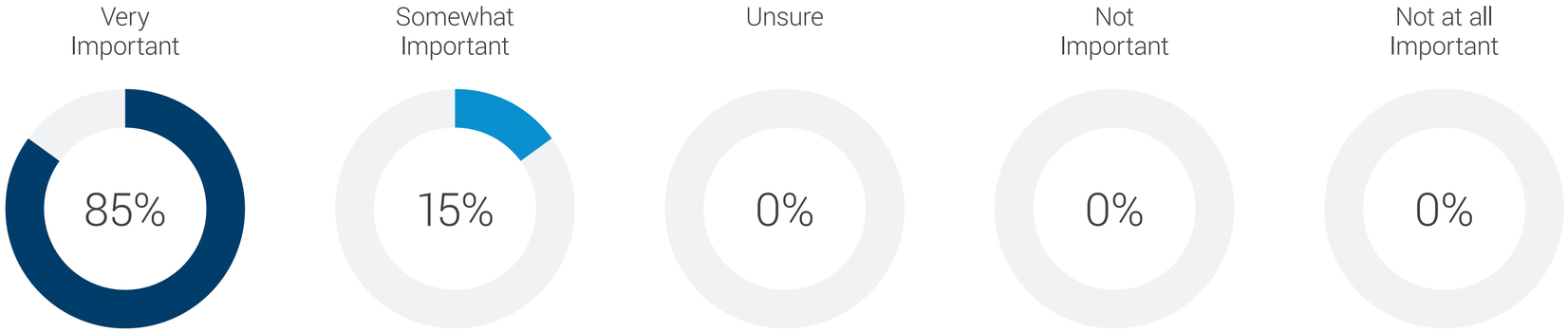
*As you review the graphic representations of survey results within this report, please keep in mind that not all percentages may add up to 100 due to rounding or because questions permitted multiple answers.

The State of Digital Health Solutions

Importance of Digital Health Technology to Product Franchise

Digital health connects and empowers people and populations to manage health and wellness in ways that are quantifiable, cost-effective, and convenient. Applications for connectivity, data capture, and processing power can be found in all healthcare product domains. It is no surprise then to see 100% of respondents confirm the importance of digital health technology to their organization's product roadmap or delivery of service. 85% were emphatic, selecting "Very important"; while the remaining cohort (15%) responded as "Somewhat important."

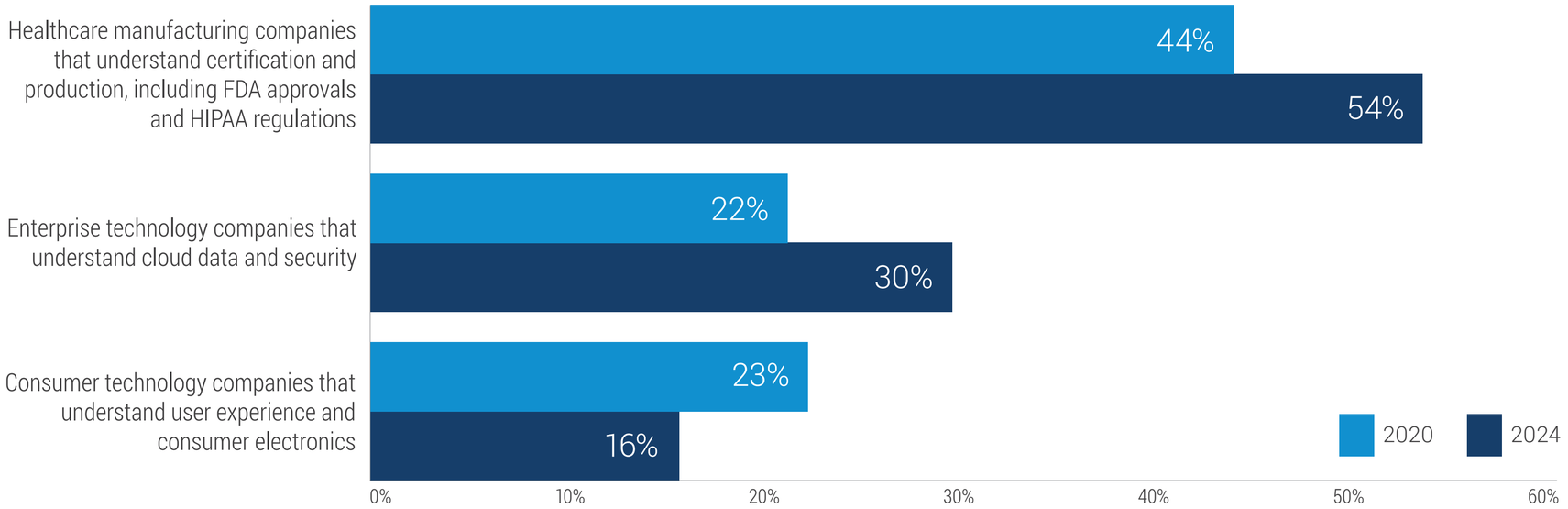
How important is **digital health technology** innovation to your organization's delivery of healthcare products or services?



Whose Expertise Best Enables Commercializing Digital Health Innovation

Even as healthcare moves towards a more patient-centric model, accommodating individual preference and ease-of-use concerns in product design and development, healthcare's original equipment manufacturers (OEMs) continue to identify themselves as the primary shaper of how innovations are incorporated. 54% of digital healthcare solution providers affirm the importance of regulatory intelligence and specialized medical manufacturing expertise in commercializing innovative technologies into healthcare devices. Those selecting "outsiders" like enterprise or consumer technology companies as drivers of innovation declined from 56% (as reported in 2020 survey) to only 46%. Leading consumer-facing technology companies excel in their own markets and are indeed impacting healthcare product roadmaps, but whatever premium was awarded their abilities to extend dominance into healthcare (as suggested in earlier surveys) has retreated — perhaps, in deference to the complicated and specific requirements of strictly regulated markets.

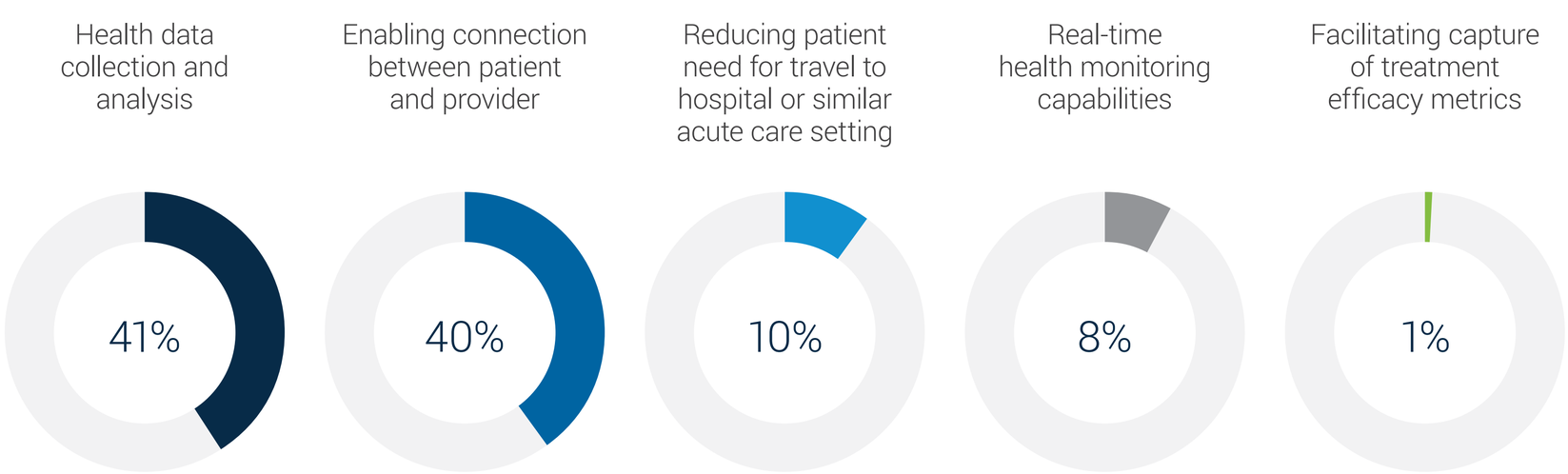
Who will drive **transformational technology innovation** in the digital health industry?



Benefits of Digital Health Solutions to the Healthcare Ecosystem

Digital healthcare devices leverage the power of sensors, optics, and compute capabilities to provide continuity of care. Technologies that enable vital healthcare applications, such as patient monitoring and diabetes management, help close the distance between patient and provider. The real-time biometric data captured by digital healthcare devices can be used either directly by the user or uploaded to the cloud or connected platform for a variety of purposes, including coaching, intervention, analysis, and even within clinical trials administration. In healthcare markets like the United States that are increasingly following a value-based cost model for care delivery, digital healthcare technology helps track efficacy metrics essential for the reimbursement landscape. Additionally, clinical testing will increasingly find value in digital health tools' ability to deliver adherence and compliance data.

Which of the following **benefits** of digital healthcare devices are most important to your product franchise?



Expanding Breadth of Digital Technology in Healthcare

Digital technology has transformed diabetes care, which in just the years since our initial survey in 2018, has moved from blood glucose monitoring (BGM) to continuous glucose monitoring (CGM) for much easier and less intrusive self-management of the disease. Advancements in sensor technology and connectivity protocols, as well as more intuitive user interfaces, are the primary drivers of this evolution. Across healthcare, more disease states and treatment programs are leveraging digital technology for improving outcomes. Diagnostic equipment, remote patient monitoring, and other chronic disease management make up the lion's share of today's connected products.

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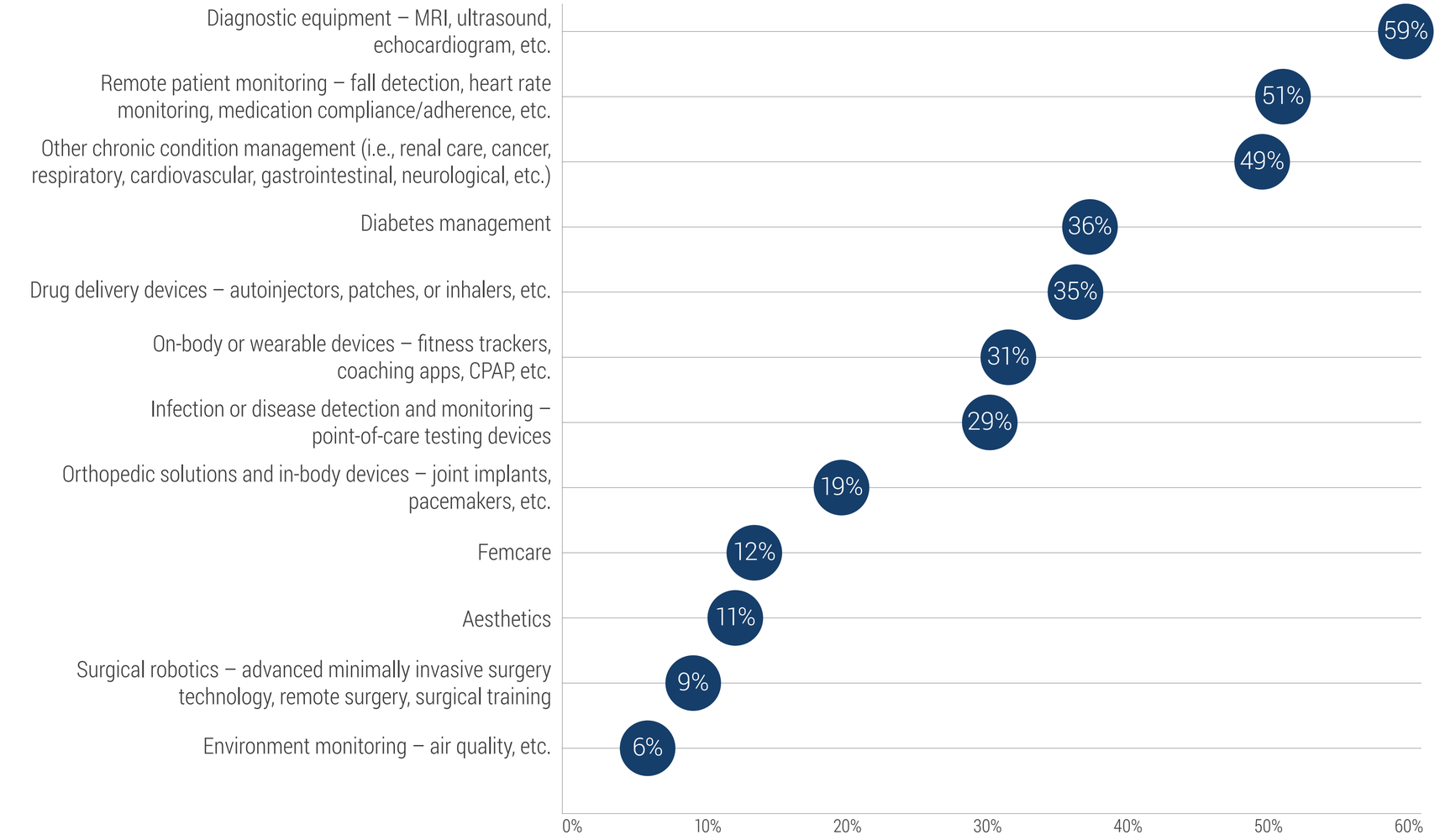
Expanding Breadth of Digital Technology in Healthcare

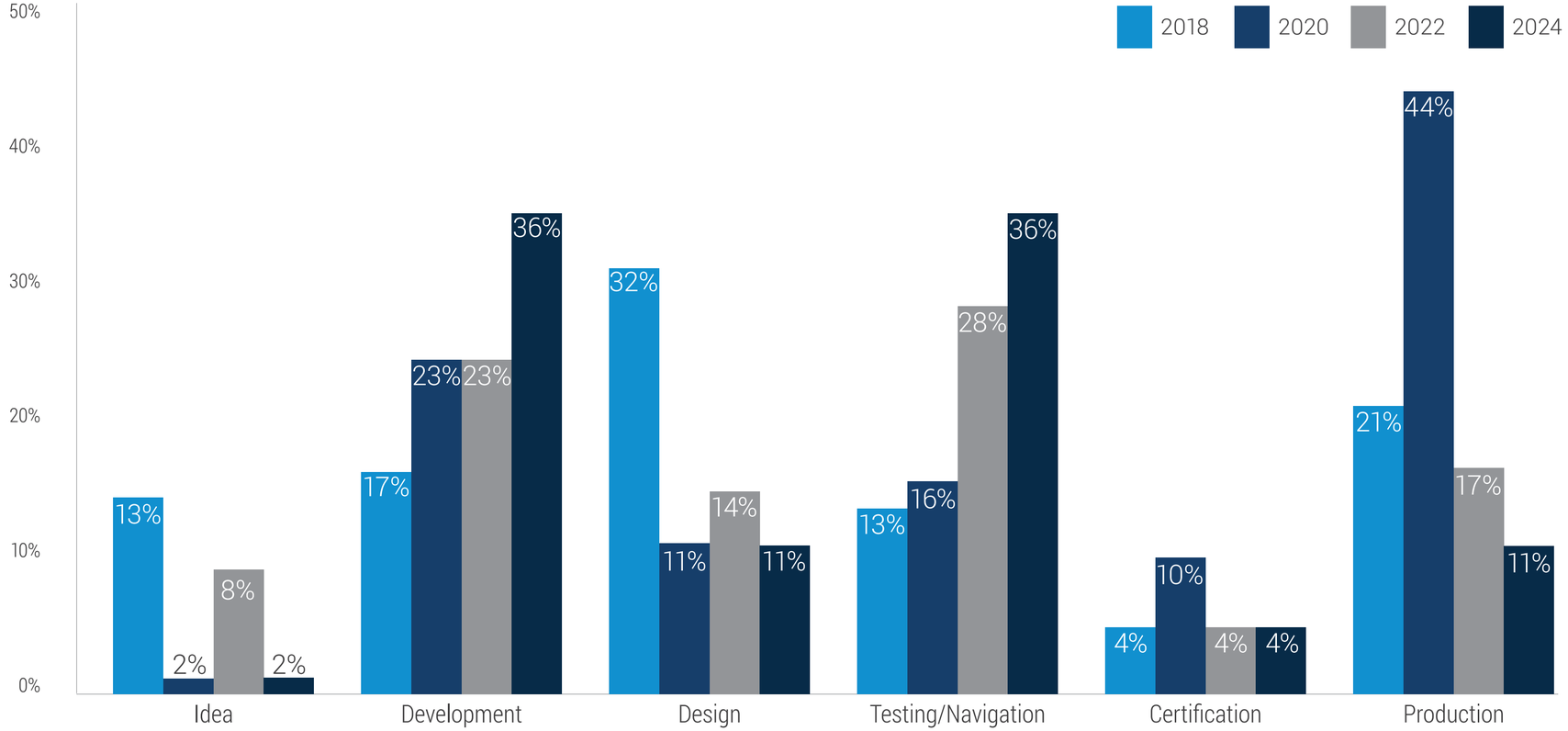
What **type of digital healthcare solutions** does your company develop or plan to develop? Choose all that apply.



The Bulk of Projects are in the Development or Testing Phases

Compared to prior surveys, this year's participants reported a much greater percentage of digital healthcare solutions as being either in the Idea or Development phase — a total of 38% overall. It is possible that a higher number of research and development personnel in this year's survey roster accounts for this increase — or, the related possibility, that more R&D projects are being funded presently across healthcare as COVID-era impacts are subsiding. Also, of note this year, Testing/Validation registered its highest percentage level over four surveys, at 36%.

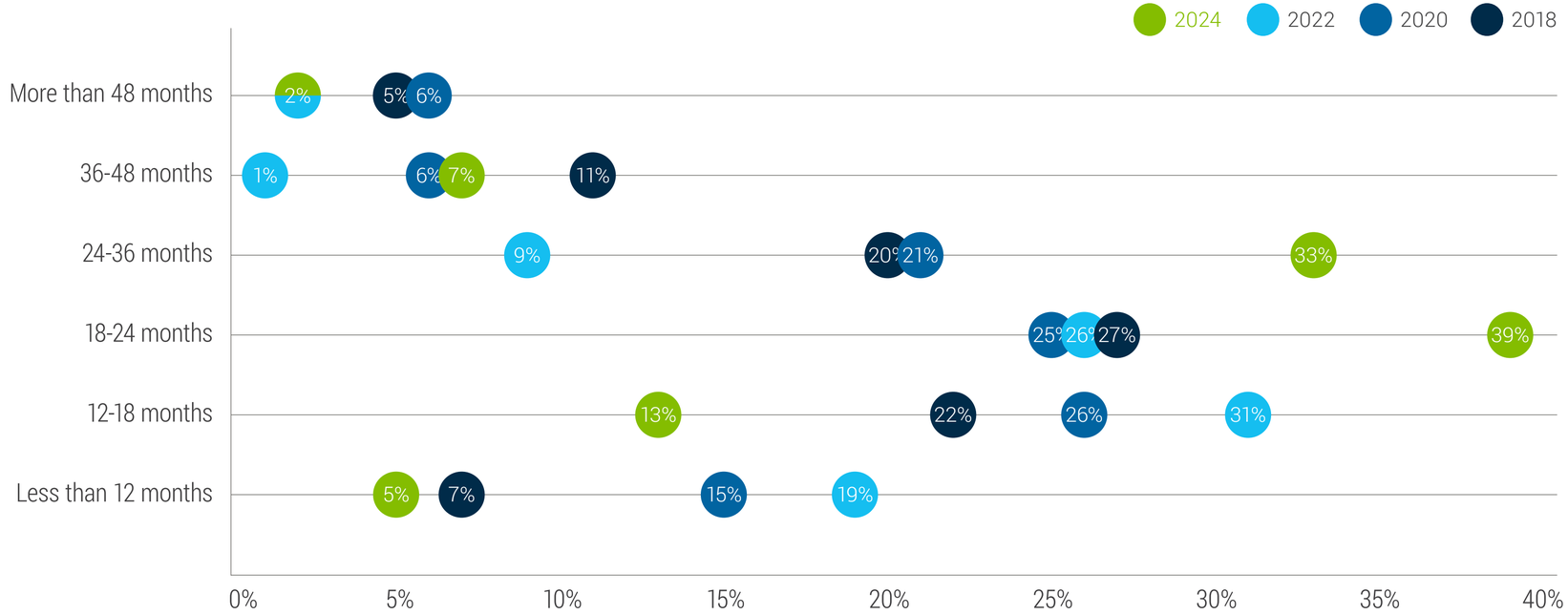
What is the **status** of your company's development of digital healthcare solutions?



Launch Cycles Have Broadened Slightly

The overall average reported on length of time from product development to launch came to just over two years (24.8 months), slightly longer than the 18–24-month development cycle metric that has held steady for the last few reporting cycles. Even as healthcare solutions providers have taken steps to better align their digital product development cycles with customer expectations, what this year's survey might reveal is a shift toward a slightly longer development ramp as compared to the accelerated pace of 2020 and 2021 — years when the industry's response to COVID catalyzed agility and speed to market performance within the sector.

On average, how long is your company's **product development and launch cycle** for digital healthcare solutions?

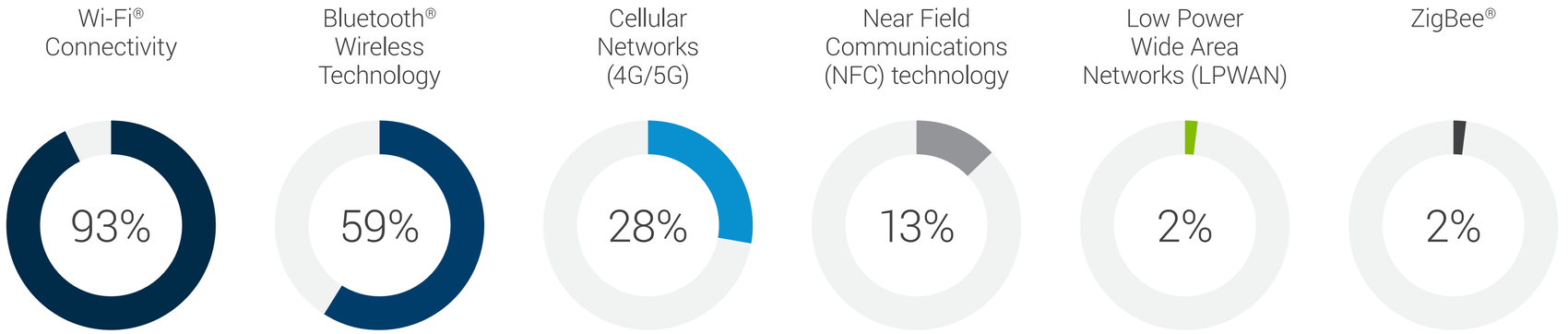


Medical Device Technologies: Challenges & Opportunities

Connectivity Technologies — Many Options But Two Clear Preferences Emerge

Wi-Fi® technology is well suited to dynamic healthcare use environments, connecting providers with patients across a variety of environments. The technology was identified as such with 93% selecting it as “Most important” of various technologies delivering connectivity. Companies developing product roadmaps with futureproofing as top of mind can rely on Wi-Fi’s capabilities for accommodating coverage, capacity, and efficiency demands, without sacrificing must have competencies like interoperability, security, and ease of use. Bluetooth® wireless technology is cited by 59% as “Most important.” Satisfying many of the same requirements as Wi-Fi, the technology’s low power consumption performance makes it ideal for medical equipment such as blood glucose, blood pressure, and respiratory rate monitors, as well as any applications for in-home or remote patient monitoring.

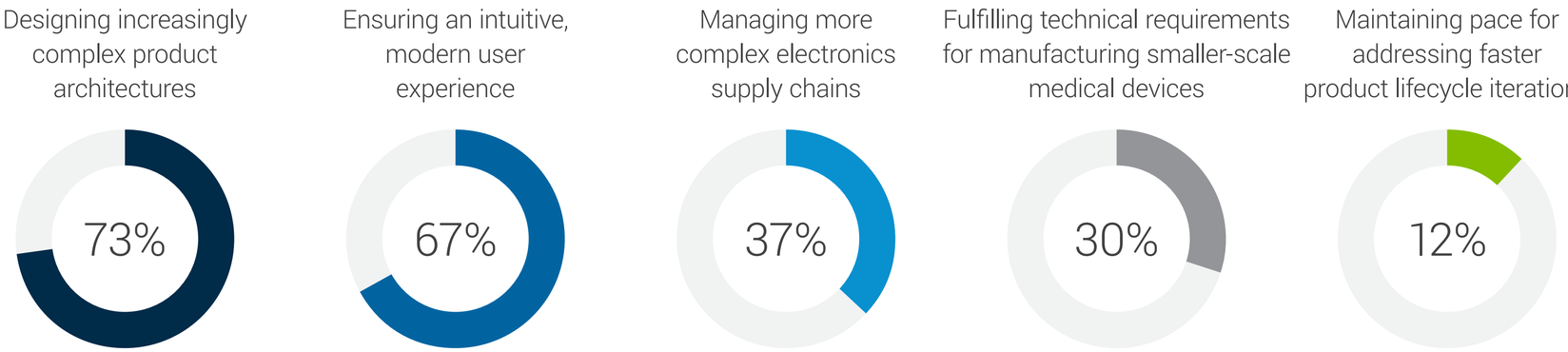
Which connectivity technologies are you currently **implementing** into your healthcare devices?



Challenges Bringing Connected Care Devices to Market

When asked what slows or impedes development and delivery of digital healthcare solutions, three out of four respondents affirmed increasingly complex product architectures as their primary challenge. The second highest challenge — identified by two out of three respondents — was ensuring an intuitive and modern user experience, which reflects the increasing preference for easy-to-use solutions. Across all device domains, but certainly within pharma delivery, digital health devices' capture of user data is invaluable for tracking compliance and adherence as well as efficacy of treatment. Put differently, user experience holds a premium value across the ecosystem, encompassing patient, provider, and payer. 30% cited fulfilling technical requirements as a key challenge along with complexity and UI design. Each of these answers points to the importance of the design and development phases of the product lifecycle for simplifying and improving device performance. Product lifecycle and supply line management, although smaller percentages, still reflect their prominence as potential roadblocks for OEMs delivering successful connected care devices to their markets.

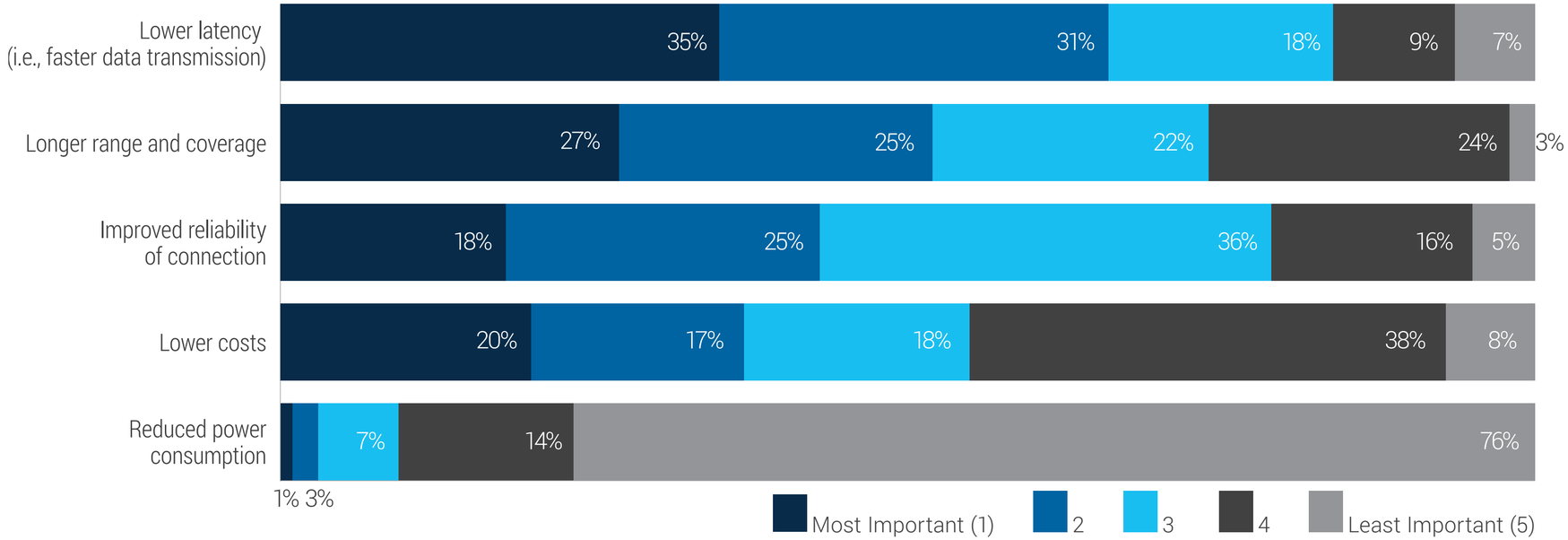
What are the **challenges** of delivering connected care devices within your domain?



Digital Devices Need Speed and Performance Delivered at Low Cost

Presented with five choices of technology performance *must haves*, participants were asked to rank them from Most to Least important. Ranked choice questions require subtle analysis. Just because something is slotted as #5, (Least important) does not mean that it is NOT important. Different product solutions have different requirements, a recipe for response divergence layered even further by the distinct roles of project stakeholders represented in the survey. Faster data transfer – as identified within the choice "Lower latency" — garnered a combined Most or 2nd Most Important value, equaling 66%. The only other option earning a combined 1st and 2nd Most Important value above 50% is "Lower costs."

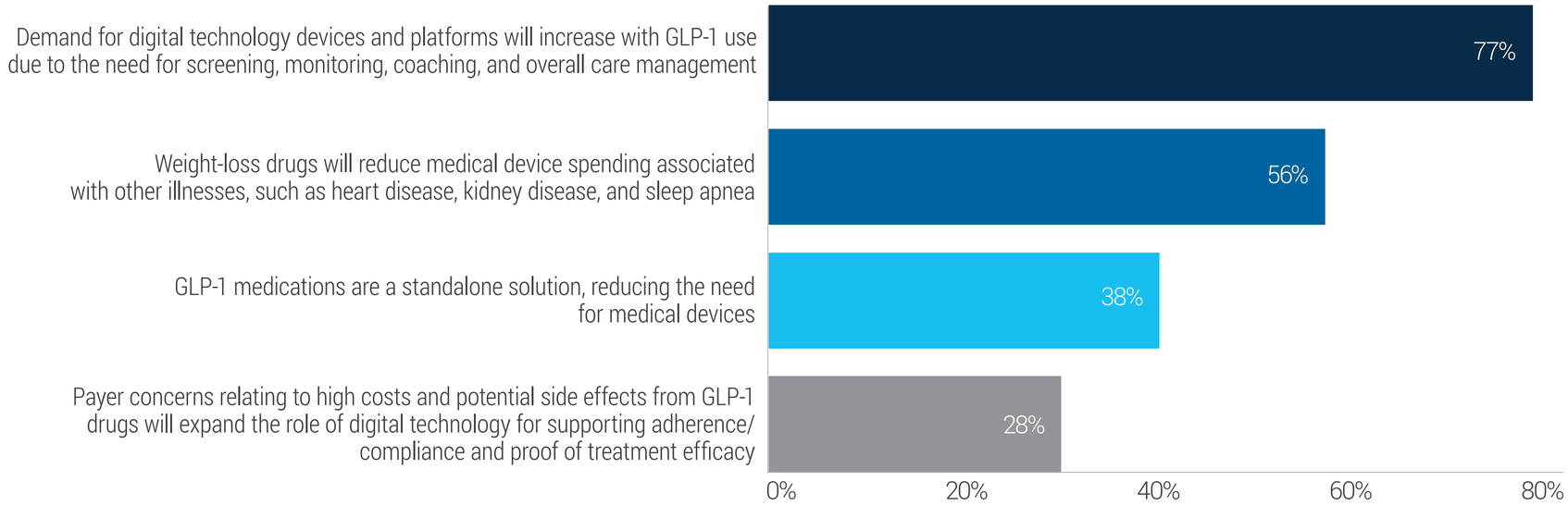
Rank the **benefits** of advancing connectivity technologies in terms of importance to the products within your domain. (1 = most important, 5 = least important)



Impacts Upon Digital Healthcare

In just the brief time that GLP-1 pharmaceuticals have been prescribed for weight loss, numerous analysts have opined that this class of drugs will very likely disrupt certain areas of the MedTech industry, while others say MedTech can "live side-by-side" with the weight-loss drugs. We asked our survey participants to weigh in on the discussion. Nearly four out of five affirm the need for digital health technology as a support infrastructure for these treatments, providing diagnostics services, as well as ongoing monitoring, coaching, and overall care management. A smaller, but not insignificant percentage (38%), believe that GLP-1 medications will reduce the need for medical devices. Stay tuned as this dynamic story unfolds.

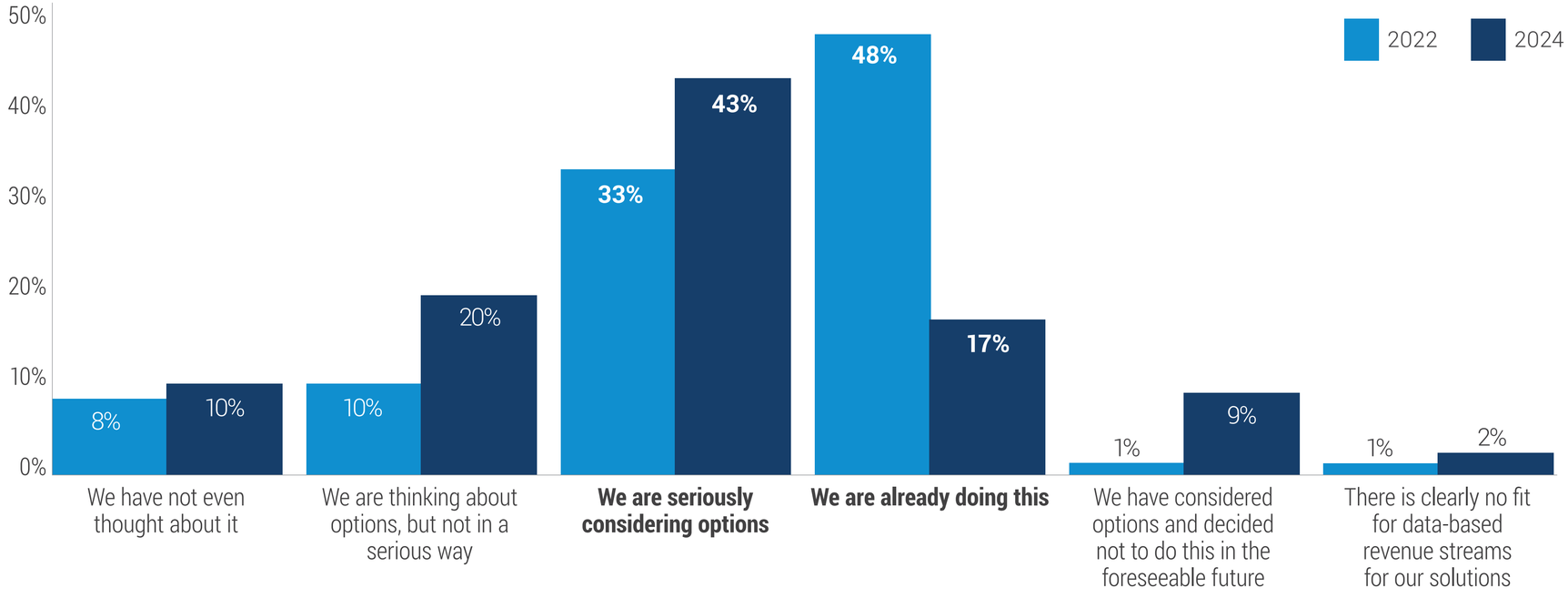
What are the likely **impacts** upon digital health from the evolving uptake of GLP-1 pharmaceuticals? (GLP-1 agonists like Ozempic, Mounjaro, and Wegovy, which are used for diabetes and weight loss) (check all that you agree with)



Opportunities Enabled by Digital Health Technologies — Data-Based Revenue Streams

Another potential opportunity provided by digital healthcare solutions is for companies to re-purpose the data collected to create additional revenue streams (e.g., by selling to research labs or marketing firms). The comparison between this year's survey and the last one dramatically illustrates the growing recognition of data's value by healthcare companies, with the '*Yes, we see value*' responses growing from 60% to 80% over the last two years. Two years ago, roughly a third of participants' responses indicated no clear commitment to leveraging data, where that percentage as captured in this year's survey is only 18%. Meanwhile, nearly half in this year's survey answered: We are already doing this.

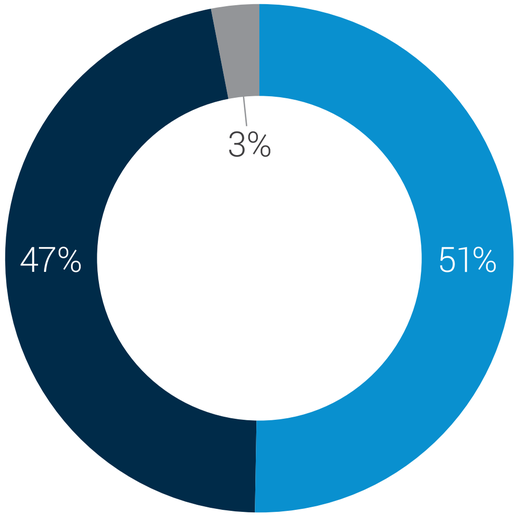
Has your organization considered using data collected to create **additional revenue streams**? Choose the one answer that most closely applies.



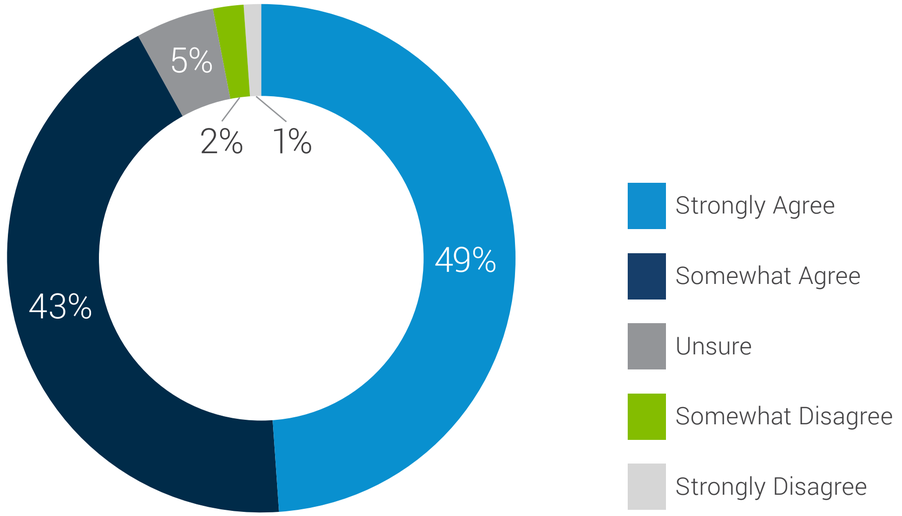
AI-Enhanced Healthcare Applications —Powerful Impacts Yet to Be Harnessed

Digital health technology promises to close the distance between patient and provider, helping to ensure both treatment consistency and continuity of care. AI capabilities are poised to deliver even more effectively on this promise. Considering the various jobs, and analytic tasks across the healthcare sector, some will be more amenable to AI automation providing immediate and dramatic improvements. At the same time, healthcare, more than any other industry sector cannot be incautious regarding the technology's potential for error, i.e., "hallucinations." New in this year's survey, we asked a series of questions to gain insights on our participants' engagement with AI, now and in the future. Responses are almost unanimous for the first two questions, affirming that AI will be transformational, and further, that their companies have what it takes to harness AI's opportunities.

Rate your agreement with this statement: "AI and machine learning advancements are set to transform the healthcare sector."



Rate your agreement with this statement: "My company has the internal talent and expertise to capture the AI opportunity."



AI-Enhanced Healthcare Applications—Early-Stage Strategies are Evolving

Projections on where AI technology will have the most impact are spread evenly across the three options that described healthcare delivery modalities, indicating that respondents give equal weight to how the technology will be applied to improve healthcare. AI's potential transformation of costly and time-consuming drug discovery received a more skeptical response, with only 8% slotting this application as being most impactful in the industry. As AI capabilities become more sophisticated, they will no doubt drive explosive growth in applications across healthcare, but distinguishing fact from fiction is paramount before the industry embraces the technology in synch with current hype. AI competency, meanwhile, will be acquired and put in place through a range of in-house and external sources. As a regulated industry, healthcare's standards for trust, accuracy, and consistency are non-negotiable.

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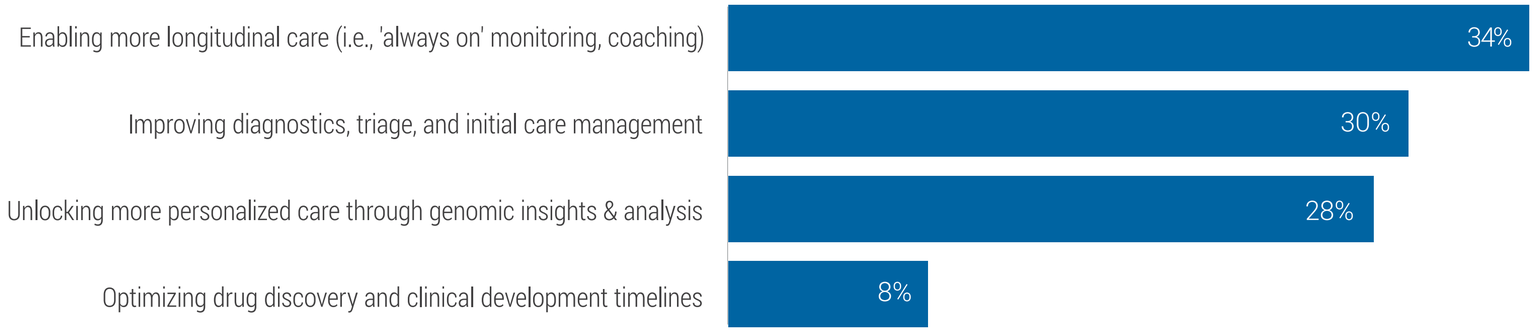
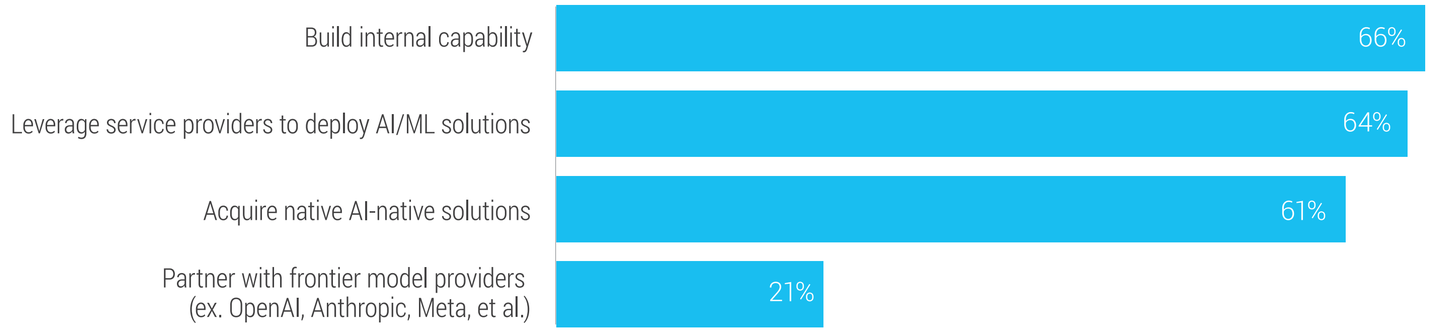
AI-Enhanced Healthcare Applications—Early-Stage Strategies are Evolving

Where will emerging AI/ML technologies be the most **impactful**?



How do you plan to **achieve** your AI goals?

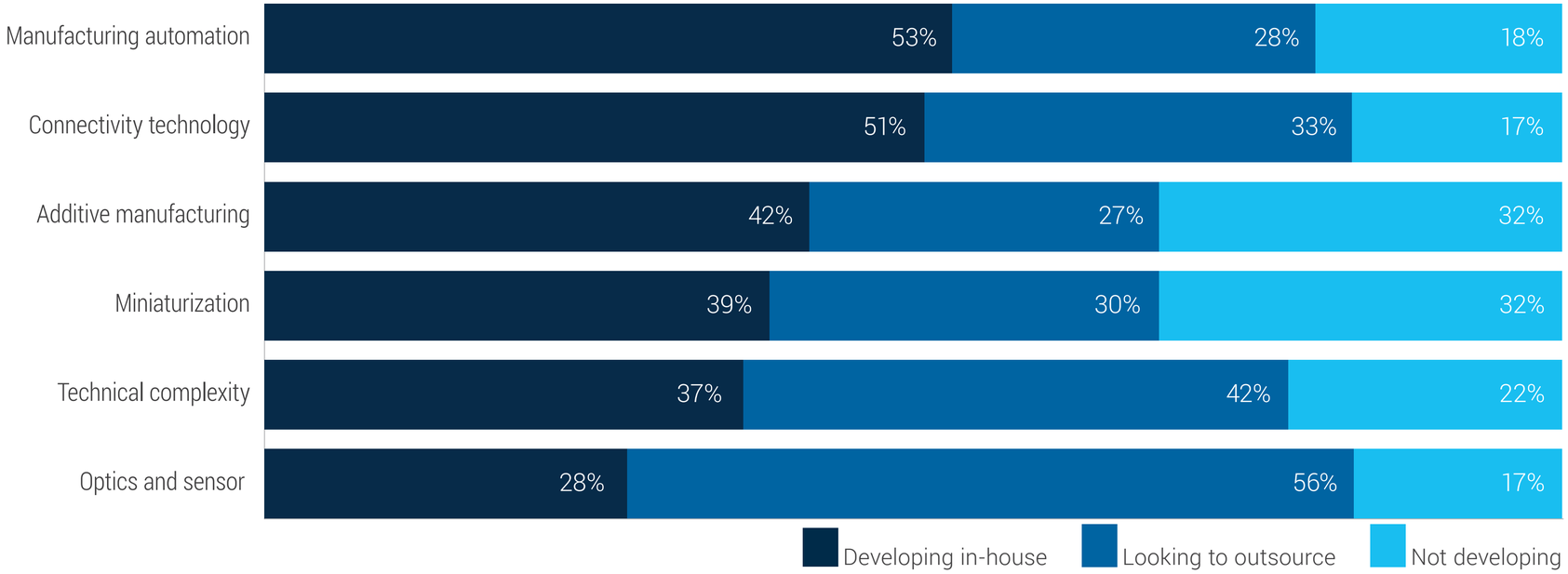


Manufacturing Solutions Partnerships Improve Competitiveness

Outsourcing Expands for Specialized Technical Capabilities

Outsourcing for manufacturing solutions continues to experience significant growth with some estimates targeting more than a $500 billion valuation for the contract manufacturing market by 2030. Specialized capabilities are often the deciding elements for companies choosing between in-house or outsourced solutions. Our survey identified optics and sensor technologies as having the highest potential for outsourcing, selected by 56% of participants, while the next highest percentage (42%) was for technical complexity, such as expertise in managing tolerances, materials, chemistry, and power management requirements. Meanwhile, manufacturing automation and connectivity technology are identified as being most likely kept in-house indicating, possibly, that for many of the participants, their needs for support developing new capabilities in these more mature technologies has plateaued.

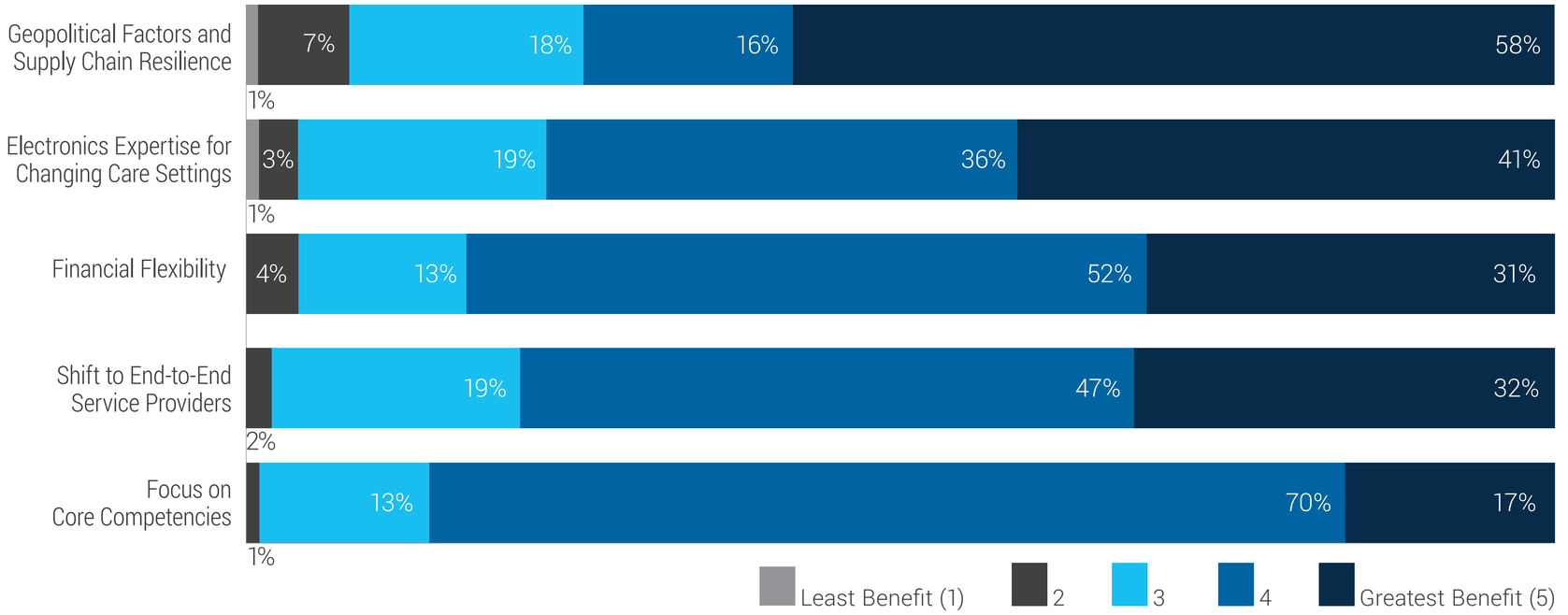
Which **technology domains** are you developing in-house, which are you looking to outsource, and which are you not developing?



Outsourcing Builds Resiliency Aligning Expertise Where it Counts Most

Almost all digital healthcare solutions providers indicated that they would turn to manufacturing partnerships for expertise across numerous areas, validating the idea that specialization optimizes overall performance. Almost nine out of ten emphasized the value of external sourcing for freeing up their own internal resources to focus on core competencies. The next largest percentage (i.e., a combined ranking of 1 and 2 on a five-part scale, highest to lowest) identified the benefits of greater financial flexibility by having manufacturing executed by an external partner. Not surprising, given the impact of recent global tensions on supply lines, geopolitical factors and supply chain resilience has the highest percentage (58% as a #1 ranked choice) among the five listed benefits of manufacturing partnerships.

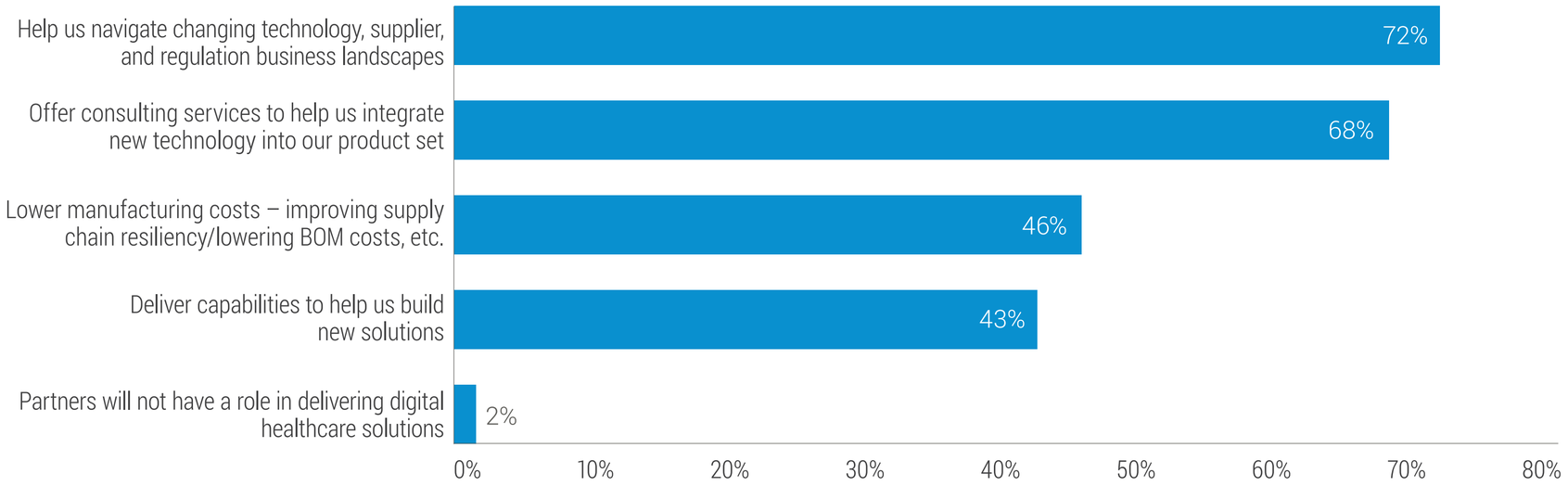
Rate the **benefits** of working with a manufacturing solutions provider in terms of impact?



Partners Will Play a Range of Roles in the Delivery of Solutions

Manufacturing partners are expected to play diverse roles in helping companies deliver digital healthcare solutions. Since inaugurating our biennial digital healthcare survey in 2018, the industry's embrace of outsourcing has steadily increased and now represents the majority of companies being polled. Almost three quarters say they need help navigating changing technologies, supplier, and regulatory landscapes, which is a 50% jump from our 2022 survey when only one out of two respondents selected this option. Financial performance is top of mind, as well, with 46% citing a manufacturing partner's impact on lowering manufacturing costs as being critical. Expectations for manufacturing partners to deliver capabilities related to building new solutions dropped from 63% in 2022 to just 43% in this year's survey — a decline not out of line with reports across the broader economy of tighter budgets, leaner staffing, and unbalanced inventories.

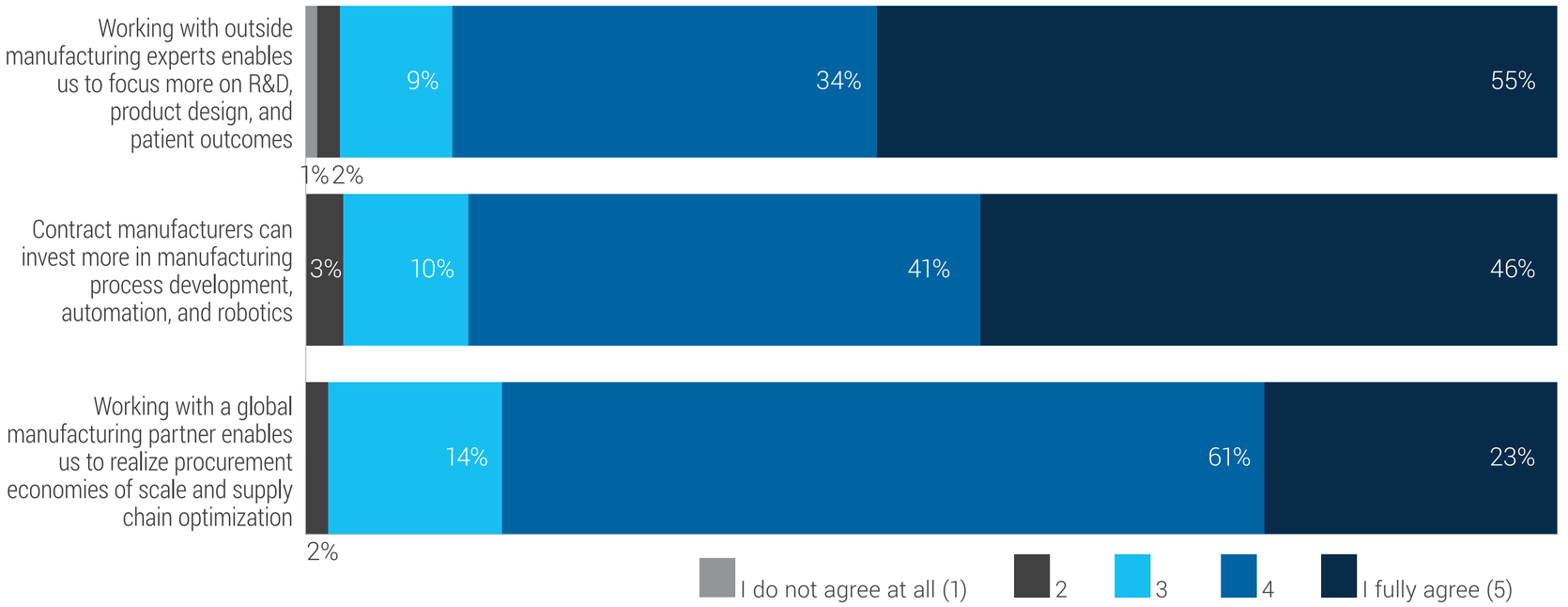
In the face of **accelerating technology innovation**, what role do you expect your manufacturing partners to play in delivering digital healthcare solutions? Choose all that apply.



Manufacturing Partnerships Unleash and Optimize

Seeking further context on the value opportunity for healthcare OEMs enabled by outsourcing, participants were asked to indicate their level of agreement with three different statements describing specific values provided by manufacturing partnerships. Despite slight differences between the top two (of five) levels of agreement, all three questions secured 84% or more — a definitive affirmation of the benefits of the outsourcing model. Of the three benefits statements, realizing procurement economies of scale and supply chain optimization scored the highest overall average — 4.4 out of 5.

Please indicate your level of agreement with each of the following statements.



Macro Trends Framing the Path Ahead for Digital Healthcare

This last question looks to assess how new and existing product developments in the digital health sector are impacted by the following five healthcare macrotrends, defined as:

- Consumerization
- Value-based care
- Personalized or precision medicine
- Shifting care delivery settings
- Non-traditional healthcare companies

Ease of use and cost concerns again scored the highest as represented by the greater than 50% polling registered by the Consumerization and Value-based care macrotrends (i.e., ranked as either first or second choice out of five). The lowest importance among the five trends is assigned to the increasing role of software as part of medical device functionality and patient experience — capabilities that will most likely be delivered through partnerships with non-traditional healthcare companies, such as consumer electronics firms.

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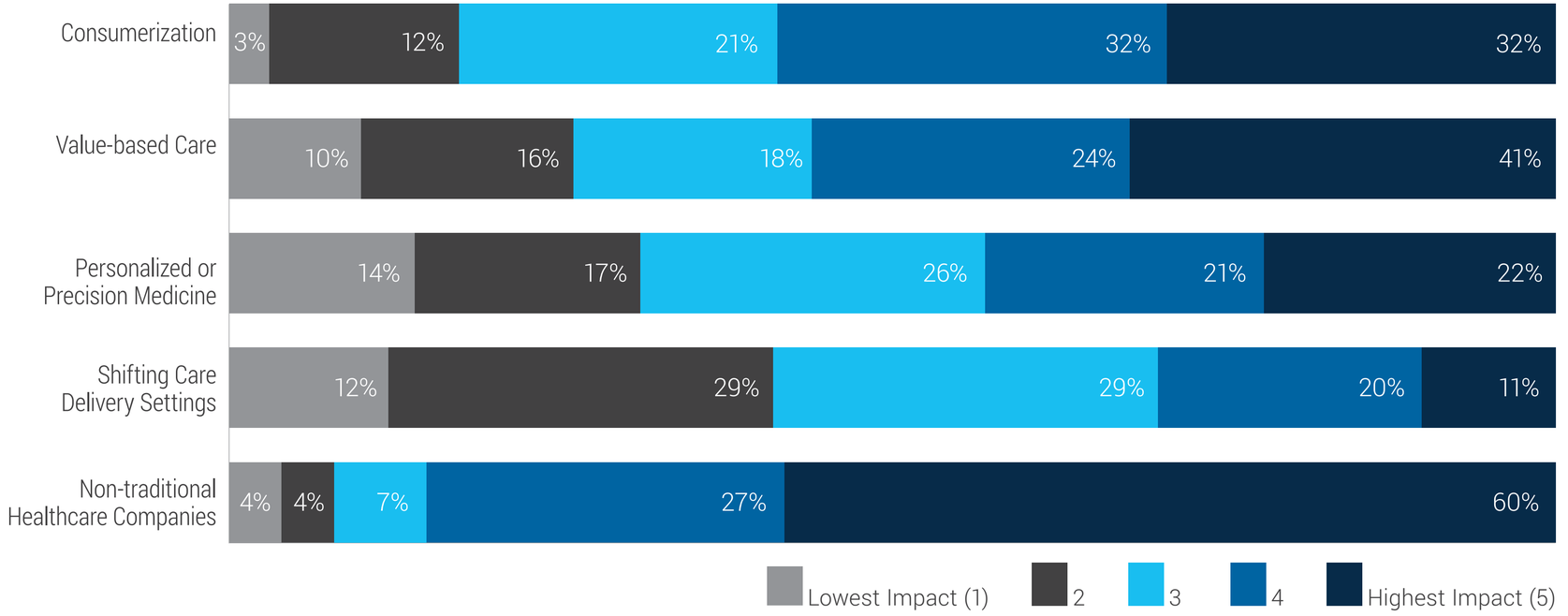
Macro Trends Framing the Path Ahead for Digital Healthcare

Please rank the following **macro trends** in order of the degree of their impact upon new product innovation within healthcare.



Survey Participants and Methodology

Goals and Methodology

RESEARCH GOAL

The purpose of this survey was to capture hard data and insights from applicable healthcare companies regarding digital healthcare device and platform solutions and based upon these inputs provide analysis of the emerging technologies impacting strategic manufacturing investment decisions within the healthcare industry.

METHODOLOGY

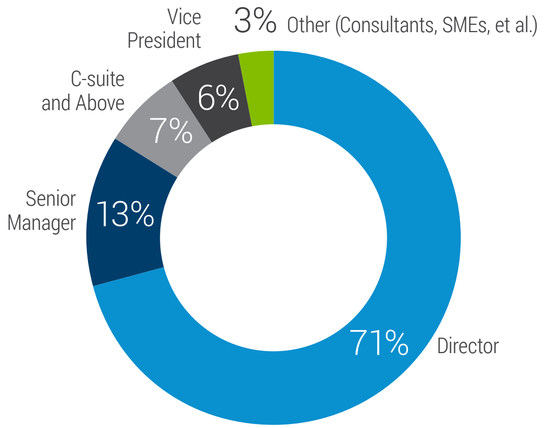
Healthcare industry professionals, from engineering and design to marketing and sales, were invited to participate in the online survey. A variety of questions were asked on topics including types of devices they currently produce, those they plan to develop, and technologies that are being incorporated into their product development strategies. Additionally, macrotrends impacting the industry were referenced as well as the increasing shift to manufacturing partnerships for meeting various challenges presented by the market.

PARTICIPANTS

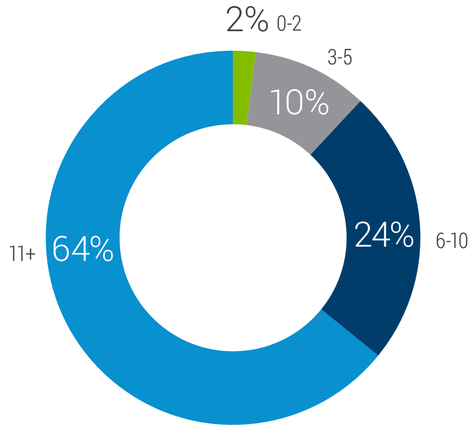
A total of 200 qualified individuals participated in the survey. All were decision makers for digital healthcare product solutions and medical device domains being transformed by innovative technologies, including diagnostics, surgical devices, health and wellness products, pharmaceutical delivery, and orthopedics. The geographic scope included the Americas, Europe, the Middle East and North Africa, and Asia-Pacific.

Survey Participants

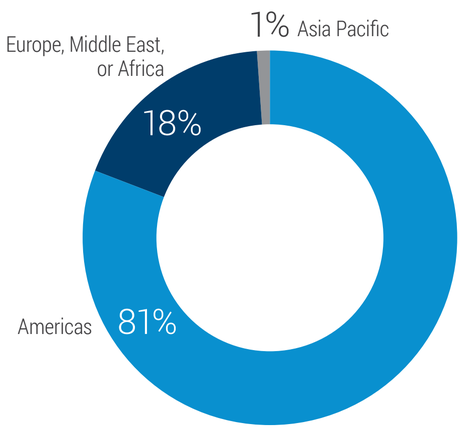
What is your level of seniority at your company?



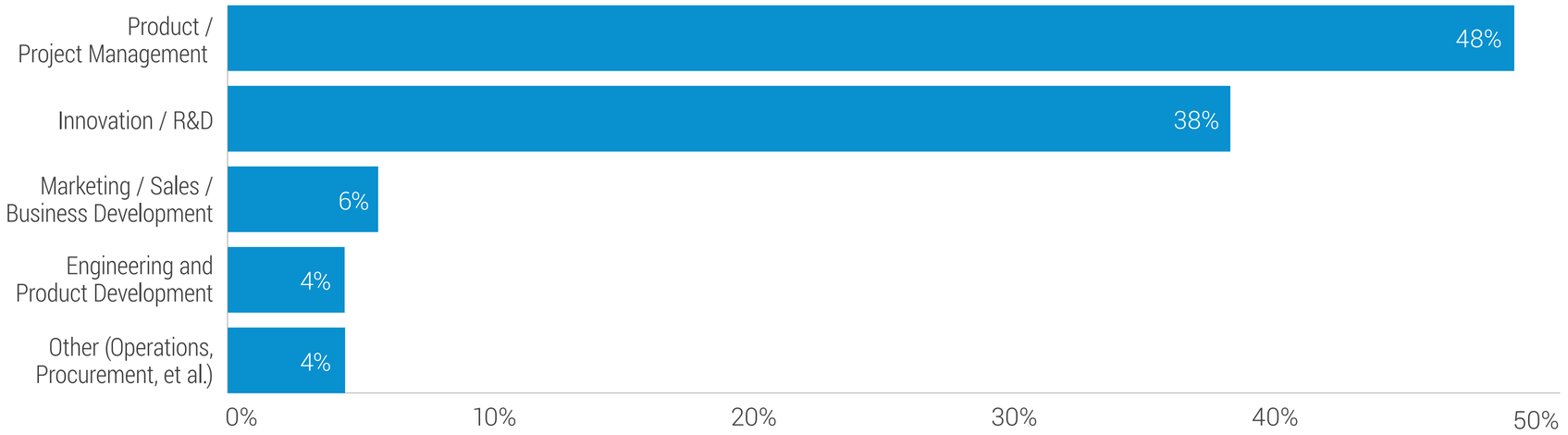
How many years of healthcare industry experience?



Region



Role



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At Jabil (NYSE: JBL), we are proud to be a trusted partner for the world's top brands, offering comprehensive engineering, manufacturing, and supply chain solutions. With over 50 years of experience across industries and a vast network of over 100 sites worldwide, Jabil combines global reach with local expertise to deliver both scalable and customized solutions. Our commitment extends beyond business success as we strive to build sustainable processes that minimize environmental impact and foster vibrant and diverse communities around the globe.

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JABIL

Jabil is a flexible, high-velocity additive manufacturing partner that meets specialized materials requirements — helping customers improve how they design, make, and deliver products. From ideation to industrialization, we enable design freedom, accelerate time-to-market, and ensure compliance to industry certifications.

Our Minnesota-based Innovation Center is at the forefront of the industry, formulating and producing high-quality materials. Polymer formulations, compound developments, and material system integration are completed from start-to-finish under one roof. Highly experienced additive manufacturing engineers, chemists, materials scientists, and production experts leverage Jabil's innovations in materials science to oversee each step of the beaker-to-box process of developing customized powders and filaments, all under an ISO 9001-2015 quality management system.

In addition to advancements in materials, Jabil continues to extend its global additive manufacturing platforms and solutions to complement its world-class manufacturing capabilities. Jabil has deployed hundreds of 3D printers — from desktop models to highly sophisticated industrial systems — to address a vast range of prototyping, tooling, and volume-scale production demands.

Jabil's rapid tooling operations, additive manufacturing labs, and tech centers in North America, Europe, and Asia are augmented by AS9100-, ISO 13485-, and ISO 9001-certified production centers for aerospace, healthcare, and other rigorous applications. Jabil is well positioned to integrate the best of additive and traditional manufacturing to produce differentiated parts and products using innovative materials, proven Design for Additive Manufacturing (DfAM) principles, and industry-leading manufacturing processes, as well as vendor-agnostic technologies and machines.

Learn More about Additive Manufacturing