Looking Glass

Bringing the future of healthcare delivery into focus

thoughtworks

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Introduction

There are hundreds of ways that technology is transforming the way healthcare is delivered and managed. We're here to help you understand which could have the biggest impact on patient outcomes and your operations — and which are most deserving of your attention and your modernization budgets.

With an ever-growing global network of consultants and clients, Thoughtworks has a broad view of today's evolving technology landscape. We know what's changing, we understand the opportunities new capabilities are creating, and we can help you turn them into a competitive advantage.

Earlier this year, we created our first Looking Glass report, examining more than 120 technology trends through six "lenses" to help businesses understand what those trends could mean for them. Now, we're taking that analysis a level deeper, looking specifically at what some of these trends could mean for the healthcare sector, and how they're shaping the future of healthcare delivery.

In this report, we'll look in detail at trends through the two lenses we feel are most relevant to the healthcare industry today: the augmentation of human capabilities and experiences, and the evolution of human-machine interactions. We're calling these our **sharp focus lenses**. The other lenses in our Looking Glass report are still pertinent, but their impact in healthcare is not as immediate — we've dubbed these our **soft focus lenses**. In this report, we wrap up by distilling the overall impact of these trends on the future of the healthcare sector.

Throughout the report, you'll find information on current and emerging technology trends, all contextualized for the healthcare industry. You'll see how big consumer trends translate into opportunities in your sector, and you'll gain vital insight to help you prioritize transformation projects and drive positive change proactively.

Page 19 has the specific technology trends we believe are most likely to impact healthcare that we believe need to be anticipated, analysed and adopted.

Contents

Sharp focus lenses

Lens one: Humanity, augmented

Powerful new data-based tools are revolutionizing the way we make decisions and empower people. In healthcare, these technologies aren't just creating new data streams and enabling more personalized care experiences, they're putting individuals in charge of their own healthcare journeys and supporting the effective delivery of proactive and preventative care.

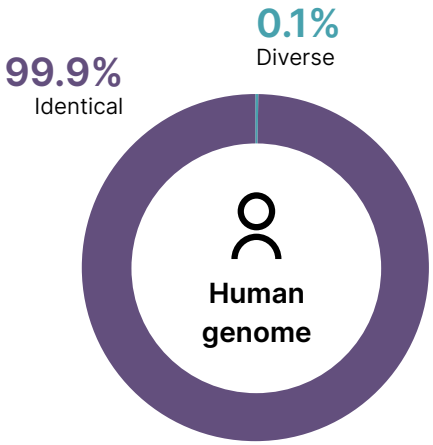
Through the Looking Glass

Artificial intelligence (AI), machine learning (ML), and the devices and tools that gather the data that power them are augmenting human lives and experiences in ways previously thought impossible. With the right capabilities, these technologies can create continuous streams of virtually any kind of data and process it quickly to improve human experiences.

In practice, this trend is actually a convergence of multiple trends and key developments in different technology areas that have come together to create something truly game-changing. Connected devices like wearables enable the continuous capture and reporting of data. Decentralized data platforms support the rapid processing of that data, while keeping individuals in control of personal information. And AI, ML, and real-time analytics derive insights from the data and translate it into actions at speed.

On the surface, some use cases in this area may appear novel. For example, using something like an individual's Apple Watch to gain a broader view of their fitness and lifestyle, while powerful, may not sound revolutionary. But, the real power of this trend is in what it represents — a shift away from snapshot views of an individual's health, taken only when they're in need of care, and towards **continuous, proactive visibility of their wellbeing**.

"What is normal for me, isn't normal for you — the first step in proactively managing health is understanding what is normal for you, not looking at an aggregation of everyone else."



We are all different, but 99.9% of the genome for all humans is identical. Our diversity is in just the 0.1 percent that is different. This subtle difference determines what we look like and what our risks might be for various diseases.

Source: https://www.genome.gov/about-genomics/fact-sheets/Genetics-vs-Genomics

Key trends in focus

Wearables

Wearable tech of all kinds has an important role to play in connecting individuals and healthcare providers. Remote monitoring devices have supported healthcare delivery for years, but a new generation of consumer wearables have normalized their use, capturing data all year around.

Natural language processing

Natural language processing (NLP) technology interprets people's spoken and written language, enabling them to have conversations with automated systems that feel natural. It plays an important role in digital healthcare services to reduce administrative costs, provides more effective support for clinical decision making and helps organizations offer empathetic support at scale, around the clock.

Decentralized data platforms

Decentralized data platforms enable the secure exchange of data without individuals ever losing control or surrendering their privacy. These platforms have huge potential to solve data ownership challenges, tackle the problems of managing monolithic siloed systems, and help healthcare providers and payers integrate and use data from diverse sources more easily. Additionally, this is a prerequisite for overcoming the challenges of interoperability between healthcare systems.

Real-time analytics

Real-time analytics tools take live streams of data, infer meaning from them, and translate them into valuable insights and actions. As the volume of healthcare data grows, real-time analytics is becoming a critical technology for diagnosis and detecting issues with patients — supporting proactive interventions by understanding changing patterns in an individual's health that personalizes healthcare delivery.

Robotics

Robots have long been friends of doctors and other medical staff in successfully executing programmable, repetitive, precise tasks that could be prone to human-error or fatigue. With recent advancements in AI, data-driven approaches, people's willingness to adapt to newer methods of interaction, and the impact of the pandemic, we're seeing a steady increase in suitable use cases for the deployment of robots. From mainstream functions such as leading or assisting in surgeries, to fulfilling auxiliary needs such as restocking, disinfecting rooms, delivering meals, and dispensing medications, robots are finding their place in more and more aspects of care delivery and management.

The opportunities in healthcare

Together, the technologies augmenting human lives and human intelligence are creating powerful opportunities for healthcare organizations, including:

Expanding your view of patient health

Traditionally, healthcare organizations have had to make decisions and maintain records based purely on snapshots of patient health — what has been observed directly by healthcare professionals or reported by the patient. But today, connected technology and wearables are helping to change that.

With devices able to record and process health and wellbeing data in real time, care providers may soon be able to gain a far broader view of patient health. Critically, this will help practitioners use data about a patient's body in good health to determine when something might be wrong.

As the variety and capabilities of those devices increases, healthcare providers have the opportunity to **make personalized healthcare for the individual a reality**.

The remote capture and analysis of data, enabling better preventative care

With that "always-on" view of patient health comes powerful opportunities to deliver proactive and preventative care. Data streams from connected devices and digital healthcare tools can help you identify trends and offer preventative care before patient health deteriorates.

This has the potential to completely revolutionize how care is delivered. For decades, the primary model of care delivery has revolved around waiting for a patient to report an issue, then working to remedy it.

By using data streams and connected tools to enable preventative care delivery, organizations can unlock entirely new operating models, and potentially save a huge number of lives.

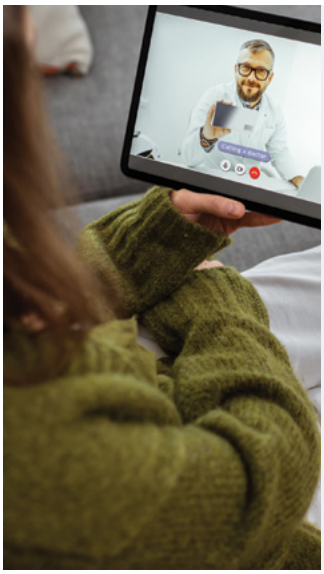
"We need to stop thinking of other organizations as living in different worlds and start to see them as potential partners, finding ways to augment each other with data. Recognizing those benefits requires bold thinkers who are willing to do challenging and complicated things and make that investment."

Emily Gorcenski, Principal Data Scientist and Head of Data, Thoughtworks Germany

Delivering personalized medicine and making personalized decisions with greater confidence

Personalized medicine isn't a new concept. But, the technologies augmenting human lives and human intelligence represent a significant step towards satisfying, personalized care delivery at every touchpoint. A better understanding of patient health brings the ability to make smarter choices for that patient.

It's feasible that in just a few years we'll see a model where practitioners are already completely aware of the situation a patient is facing before they meet with them for the first time. For the practitioner, that provides the ability to offer the right care, fast. And for the patient, it removes the need to repeat information multiple times to multiple professionals, and increases confidence in the care they're offered.



The future of healthcare will...

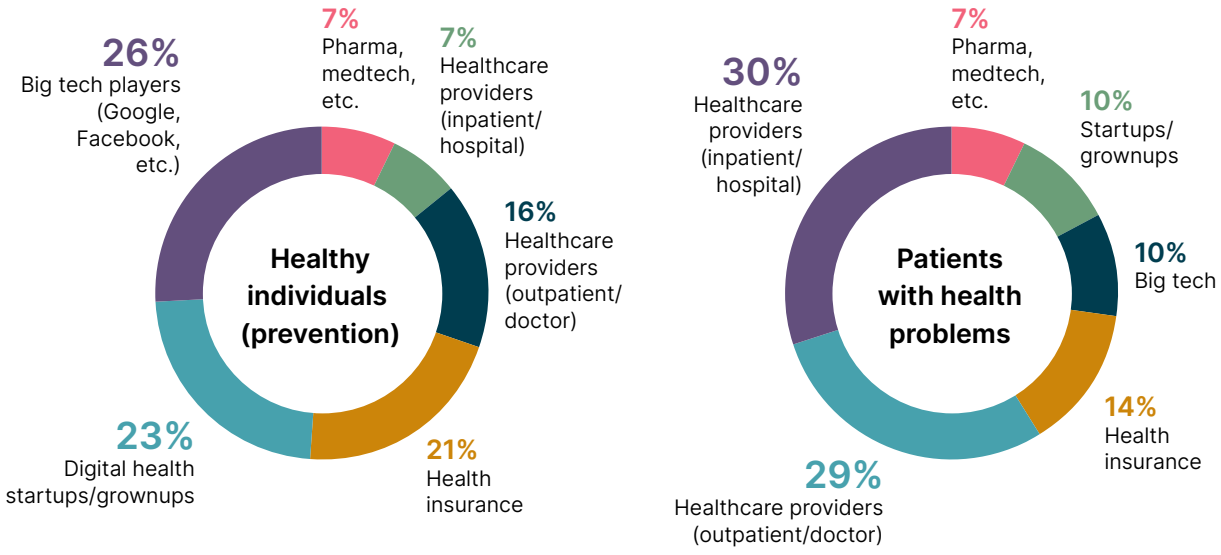
"... see a permanent shift in the way an individual consumes healthcare services to a state of "digital healthcare", with the expectation of smart, empowered care, available anywhere and anytime."

Ashok Subramanian, Head of Technology, Thoughtworks UK

Providers in best position to "own" patient

Preferred points of access for healthy individuals and patients

Who is the preferred partner for patients with health problems and healthy people?



Source: https://chimecentral.org/wp-content/uploads/2021/01/Trends-in-EMR-Interoperability_CHIME_KLAS.pdf

Sharp focus lenses

Lens two: Evolving interactions

As technology augments our lives in new ways and interfaces become ubiquitous, the ways that humans interact — with each other and with machines — is changing dramatically. In healthcare, that's challenging providers to keep up and deliver the experiences patients expect. But, it's also creating opportunities to improve the **accessibility, inclusivity, and equality** of healthcare services.

Through the Looking Glass

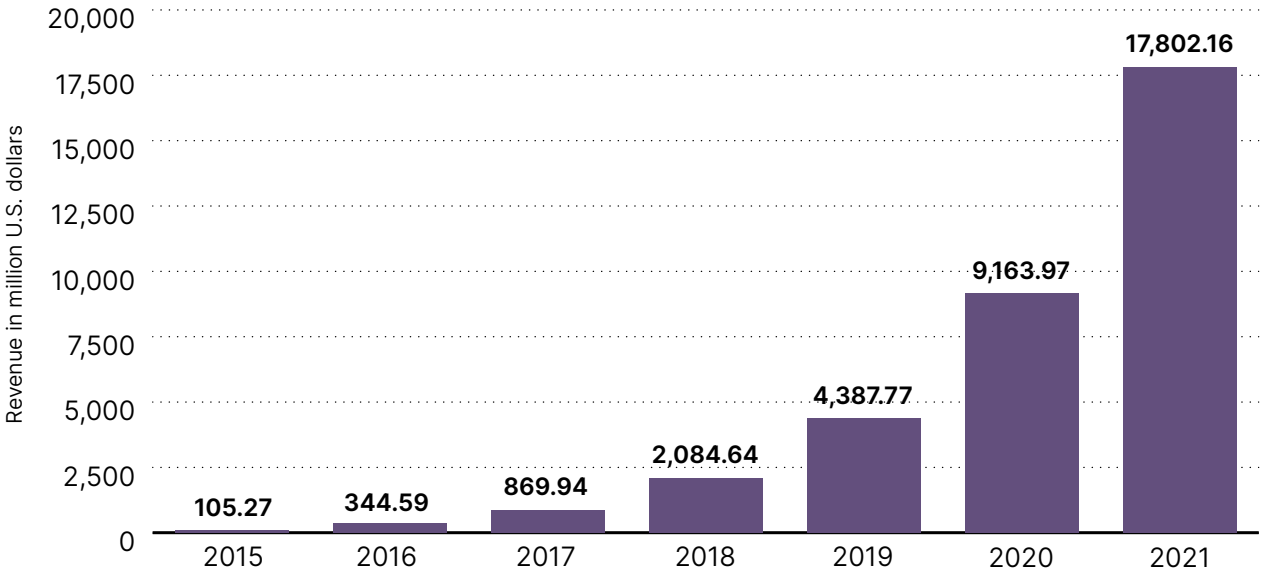
Many recent changes in human-to-machine and human-to-human interactions can be attributed to the proliferation of smart devices, and their growing capabilities. According to Juniper Research, use of voice assistant devices is set to almost double between now and 2024 — rocketing to **8.4 billion interactions per year**. That's largely because voice recognition technology is rapidly advancing and we're becoming accustomed to using voice recognition tools on our smartphones and connected devices.

But this lens isn't just about the new ways that we interact — it's also concerned with new expectations and standards around interaction. Data-rich interactions, driven by capabilities like voice recognition and automated assistants, are becoming commonplace, but our expectations of data privacy and how data is handled during interactions are on the rise.

To succeed, healthcare payers and providers must understand the opportunities presented by new engagement and interaction methods. But, they must also be ready to meet the privacy and data protection demands of an increasingly security-conscious population, and a growing number of international and domestic regulations.

Projected size of the global market for wearable devices in the healthcare sector from 2015 to 2021

(in million U.S. dollars)



Source: https://www.statista.com/statistics/607982/healthcare-wearable-device-revenue-worldwide-projection/

Key trends in focus

Privacy-aware communication

Privacy-aware communication helps you ensure the data in your communications is managed ethically, and that personal information is protected. In healthcare, as interactions become increasingly distanced and digitized, privacy is set to become an extremely important issue, and will need to be built into all communications and engagements by design.

Voice as a ubiquitous interface

The digital assistants in our connected devices have made voice a strong engagement option for virtually every patient, wherever they are. As interfaces become ubiquitous throughout our lives, interacting with systems by voice is set to become a very natural part of our daily lives.

Brain-computer interfaces

Brain-computer interfaces enable people to communicate with machines without physical input. This technology has huge implications for patients who would otherwise be unable to interact with digital tools, and can completely transform their lives.

Gesture recognition

Advances in gesture recognition technology are helping make digital interactions more accessible and convenient for everyone. Capturing micro-gestures enables people to use methods like sign language to interact with digital tools and services.

Computer vision

Computer vision detects objects in vast quantities of visual data. In healthcare, computer vision can power convenient diagnosis experiences, where patients remotely submit images related to their symptoms or conditions, and AI automatically provides a provisional diagnosis and directs them towards the right help immediately.

Upgradable human

There are numerous technologies available today that augment human capabilities — sensory, cognitive, motor, physiological and environmental — available as “add ons” or wearables. As these technologies start to be seamlessly woven into the human body — there needs to be a focus on upgradability — to ensure the continually evolving technologies available don’t render the human obsolete.

The opportunities in healthcare

The evolving interactions between patients and care providers, and patients and machines, are creating many opportunities for organizations in the healthcare industry, including:

Securely gathering and using valuable patient data

New ways to gather, manage, and operationalize patient data have the potential to completely transform the way healthcare is delivered. With more complete data on patient health, professionals can make huge advances in the understanding, diagnosis, and prevention of many conditions and ailments.

But, data security and privacy demands represent major challenges. New forms of digital interaction present an opportunity to build privacy and consent into digital experiences in a way that keeps patients in control while giving care providers the data they need to deliver the best care.

Transforming lives with technology that helps people communicate, move, and interact

New technologies are enabling humans to interact with machines and interfaces in incredible ways. From the recognition of micro gestures like eye movements, to direct brain-computer interaction, these technologies have major implications for patients with movement limitations and other conditions that hinder their ability to use other interfaces.

These tools can help patients within those groups communicate with care providers, communicate with others, and control technologies designed to support and improve their quality of life.

Technology advancements in healthcare have reduced the cost of sequencing the human genome

$100M in 2001

$100 in 2021

Source: https://www.genome.gov/about-genomics/fact-sheets/Sequencing-Human-Genome-cost

Accelerating diagnosis and enabling remote diagnosis

AI and computer vision together have the potential to transform how conditions and ailments are diagnosed. With the ability to capture high-resolution images and videos now embedded into every patient's smartphone, we're **not far from a world where patients can submit their own visual data** to a care provider's systems, then automated systems can provide a reliable diagnosis based on what they see. However, those technologies also carry a **noted risk of overdiagnosis**, which can put pressure on healthcare providers and lead to negative patient experiences.

Improved accessibility of essential healthcare services, and the shift towards contact-free GP appointments

With clear and accessible data about a patient's symptoms, their past health, and their current circumstances, many appointments could be resolved entirely through automated technology.

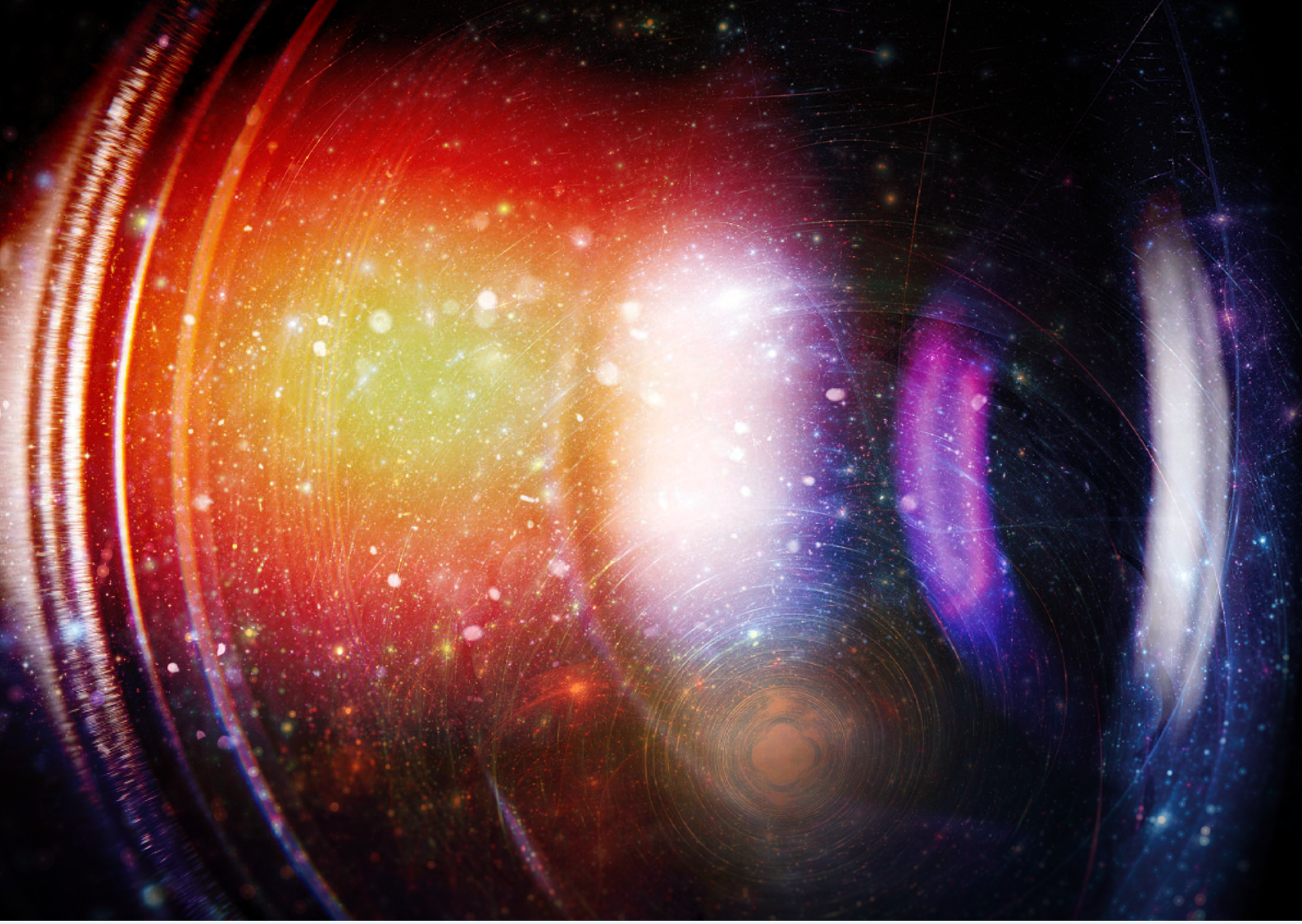
Today, a huge amount of time is wasted — for patients and practitioners — on general appointments that end in immediate referral to a specialist. By applying the right technologies, many of those appointments could be automated, helping everyone receive the care they need faster, and freeing up vital resources to keep healthcare accessible for all.

One important factor to note here is that reducing the barriers to accessing general practitioners will naturally lead to an increase in engagements and interactions — particularly with younger patients that otherwise may not seek care. It's worth considering how that shift in demand could impact the overall accessibility of care for those most in need.

The future of healthcare will...

"... see the upgradable human. As we rely more and more on technology assisting and augmenting us, we need to think carefully about the upgradability of that technology so we don't become obsolete!"

Scott Davies, Tech Principal, Thoughtworks UK



Soft focus lenses

There are several trends that are still important to take into consideration as you plan for the future.

Soft focus lens #1: Accelerating towards sustainability

Sustainability is a rising imperative across all industries, and finding opportunities to improve it in healthcare can be challenging. Fortunately, the rise of digital healthcare services can play a positive role in accelerating healthcare organizations towards sustainability goals.

By streamlining how care is delivered, enabling more care to be provided remotely, and sharing information between professionals more intelligently, there's an opportunity to remove many touchpoints from the average patient's healthcare journey. That increases the efficiency of your operations, and can enable you to serve more people faster, and with fewer resources.

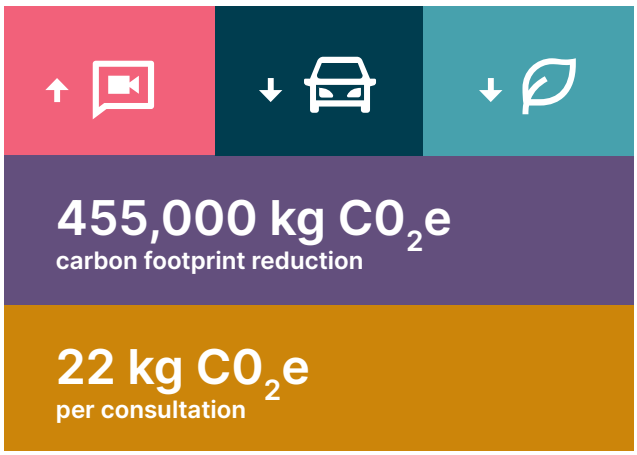
Interoperability and standards have an important role to play here. By enabling the consistent and compliant exchange and storage of digital records, they provide the foundation for accelerated digital healthcare experiences. Without them, the experiences patients receive can quickly become frustrating and inconvenient.

The opportunity at a glance

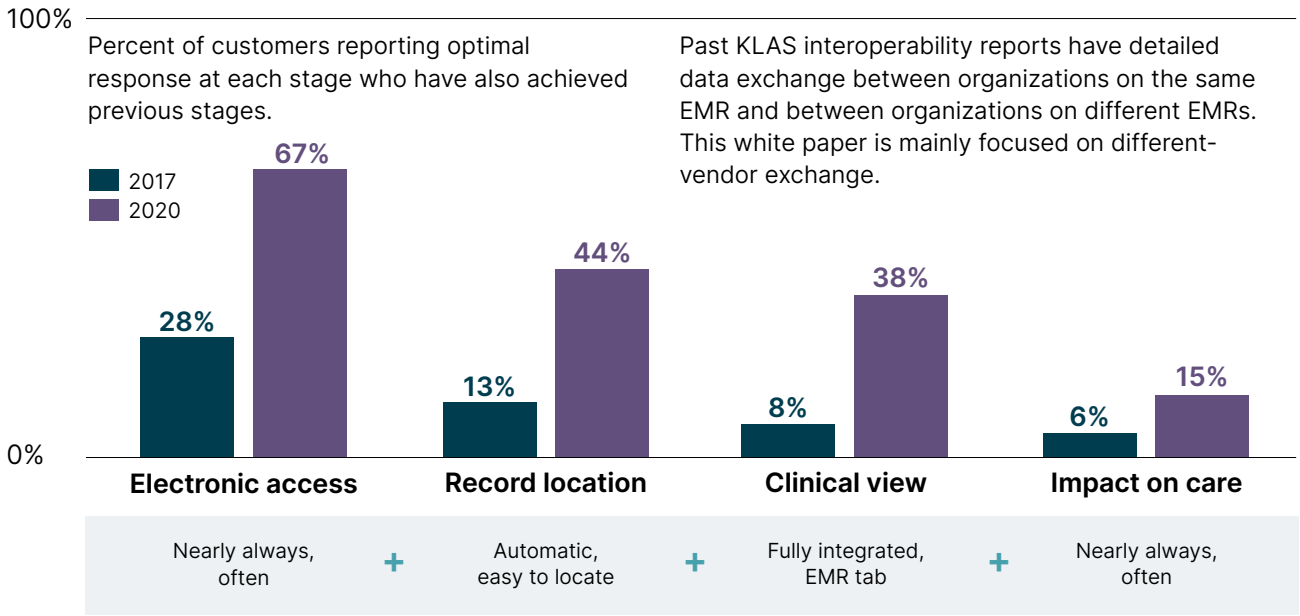
- In the past, due to the siloed nature of healthcare data, patient journeys weren't seamless and have created islands of data aligned to each professional engagement. By improving the way that data is used, managed, and shared, you can replace many of those steps with better sharing of data, resulting in improved patient outcomes.
- Wearables, smart systems, and ecosystems can all play a role in helping to augment healthcare workforces and provide timely access to better quality data to improve the efficiency of how care is delivered.

In a study conducted in Portugal, video consultations led to a reduction in patient travel, reducing the carbon footprint by 455,000 kg CO_2e (22 kg CO_2e per consultation).

Source: https://www.rcpjournals.org/content/futurehosp/8/1/e85



Industry progress toward deep interoperability
2017 vs. 2020



Source: https://chimecentral.org/wp-content/uploads/2021/01/Trends-in-EMR-Interoperability_CHIME_KLAS.pdf

Soft focus lens #2: Morphing of the computing fabric

The boundaries of computing are expanding, pushing the edges of what's possible. The emerging computing environment provides the opportunity to tap into unprecedented data analysis and processing power to serve the needs of the business more effectively.

In healthcare, this shift is enabling organizations to build computing and data structures designed to support always-on digital healthcare delivery. By incorporating new devices at the edge of the network and using ubiquitous connectivity to capture more data that can power digital ecosystems of connected services, healthcare organizations can transform how data is captured and care is delivered.

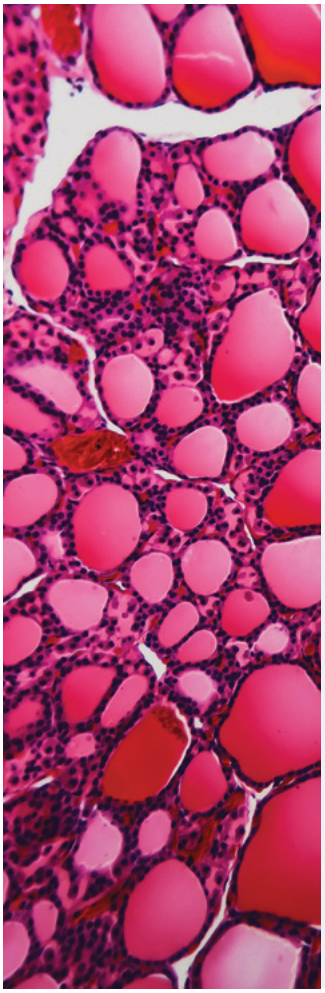
The opportunity at a glance

- The morphing of the computing fabric is creating opportunities to build smarter, future-ready infrastructures designed to bring diverse data and digital services together, enabling the capture and analysis of more patient data, and the creation of deeply personalized healthcare services.
- Ubiquitous connectivity, blockchain technology, digital ecosystems, and even nanotechnology can all play a role in the creation of secure, data-driven healthcare services.

Soft focus lens #3: Coopetition forces platforms into ecosystems

Many of the largest and most powerful organizations across industries are built around connected ecosystems of diverse services. Take a company like Amazon, for example. A huge factor behind Amazon's success is the range of interconnected services it delivers through its ecosystem.

With few organizations able to deliver ecosystems of that size on their own, many are turning to partnerships and coopetition to deliver them together. The healthcare industry is perfectly set up to capitalize on the coopetition approach, as it already involves close collaboration between parties to enable consistent delivery of care and support for patients.



The opportunity at a glance

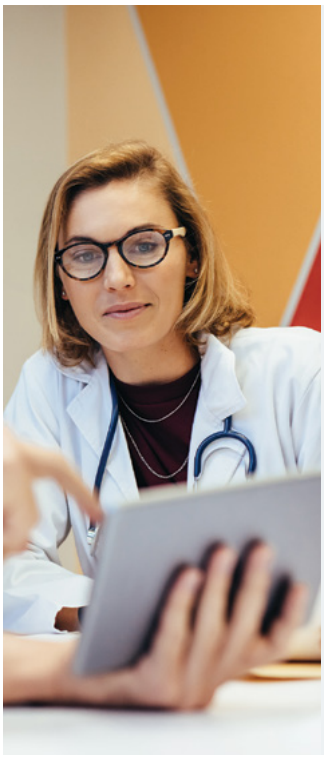
- Healthcare providers, partners, and payers can work together to create connected ecosystems of services that are easier and more satisfying for patients to access. A strong example is the Integrated Care Systems (ICS) that have been created in the UK to deepen collaboration between the NHS, local authorities, and voluntary care and support providers.
- By working together, individual organizations can co-deliver the kinds of complete journeys offered by the biggest global players, and support every aspect of a patient's healthcare journey through a single ecosystem.
- Who do you trust with your data? By bringing greater clarity in how patient data will be used, the purposes for which it will be shared will engender trust, increase uptake and alleviate privacy concerns. This is now possible with **open source tools and libraries** that enable transformation and computation on encrypted data sets giving users even greater confidence that their information will remain private and secure.

Soft focus lens #4: The expanding impact of hostile tech

Data and digital systems are critical to modern healthcare delivery and management. As a result, the industry finds itself one of the biggest and most valuable targets for hackers, data thieves, and other malicious actors.

In the healthcare industry, downtime doesn't just cost money — it can cost lives. That has made the industry a popular target for ransomware attacks, because the attackers know that the critical nature of healthcare systems makes organizations very likely to pay their demands.

Healthcare organizations have a duty to protect patient data, and are increasingly mandated to do so by tightening regulations. But, they must also safeguard their systems, and use advanced security capabilities to protect against constantly evolving threats.



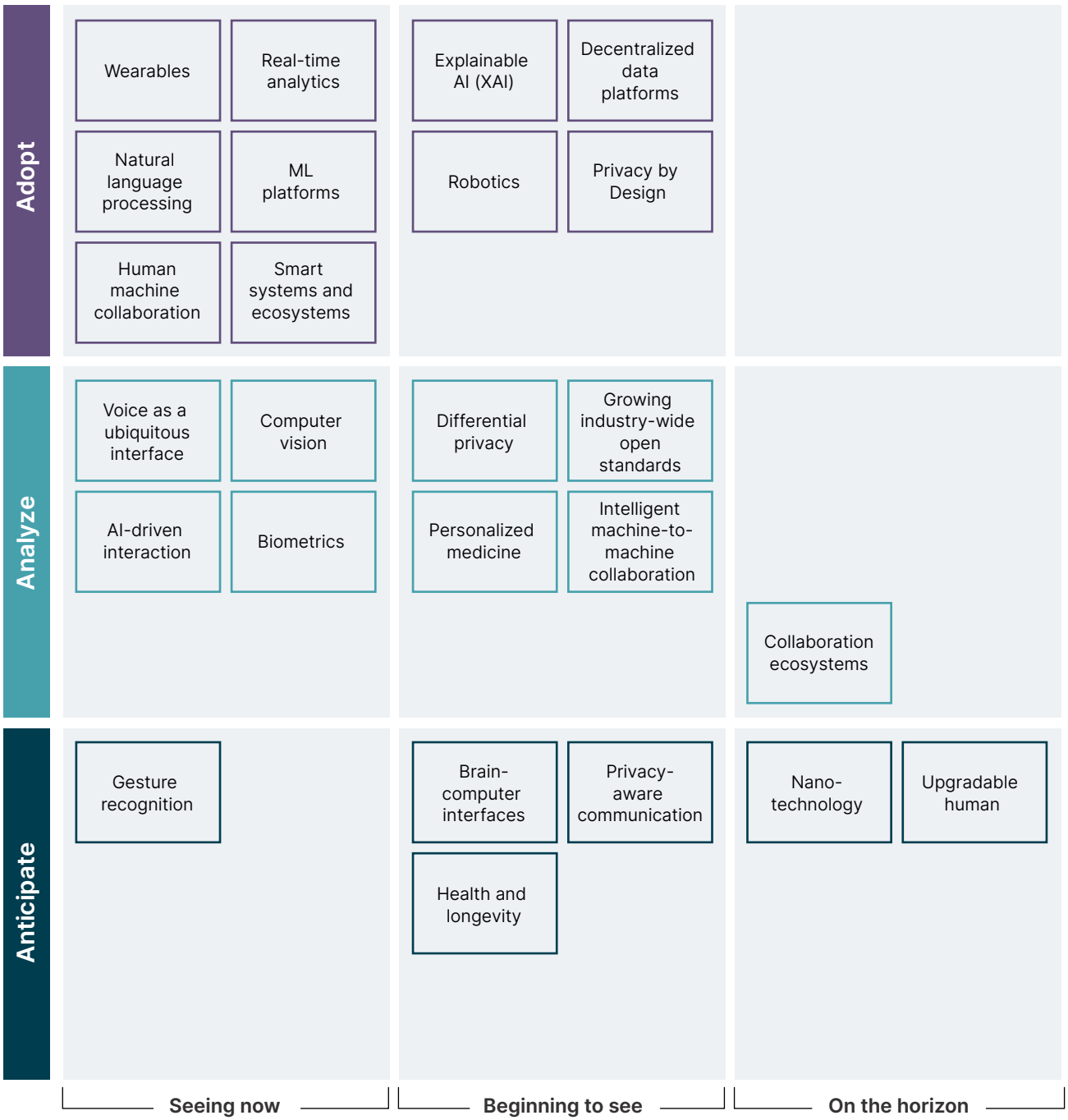
The opportunity at a glance

- Automated security, privacy by design, and differential privacy can all help healthcare organizations guard against increasingly sophisticated cyber-attacks and protect patient and operational data.
- Security and privacy must be a top priority, and be built into all digital plans from the beginning to prevent patient data loss and safeguard against system failure and disruption of patient care.
- To enable the promise of personalized healthcare, awareness of potential bias creeping into ML models needs to be considered. We recommend considering explainability as a key concern when relying on ML models, especially to build trust and drive usage of tools built using the model.

The future of healthcare in focus

Each of the trends explored within our six key lenses has the power to transform multiple aspects of healthcare management, support, or delivery. But, when applied together, they can be used to drive wider changes, and accelerate shifts in how care is delivered that have been years in the making.

In the chart below, we've included the emerging and maturing technology trends most likely to impact healthcare, mentioned throughout the report.



The trends in the top left of the diagram should be the initial focus to consider for adoption. As you move outwards from that point, we introduce trends to watch and analyze as they develop. These might not be things you can dive into today, but they should be on your radar over the coming years.

We've identified three major shifts that can take shape when organizations in the healthcare industry apply the right combination of technologies from across our transformation lenses.

Trend #1: Putting patients in control of their health

With the right combination of technology and process changes, patients can gain far greater control over their health and how they engage with healthcare providers. When they interact with digital healthcare services, they can choose how their data is used, which data is shared, which practitioners they want to engage with, and when and how they engage with those services. In short, they're in control of their healthcare.

This is both a huge opportunity and a major challenge for organizations in the healthcare industry. Putting patients in control of their healthcare and empowering them with greater choice can help improve satisfaction and keep them with you for longer. But, when patients are in charge of things like choosing how their data is used, organizations can quickly find themselves restricted and unable to accurately predict demand, or deliver the kinds of data-driven service they want to.

The potential for change

Patient control and choice will both be incredibly important in tomorrow's highly connected digital healthcare landscape. As patient data grows in value, it's essential that patients are given control over how their data is gathered and used by practitioners and providers.

Patients must clearly understand how sharing data with a provider can improve healthcare outcomes. Putting data ownership in patients' hands and giving them choice in how that data is used can help providers safely gather the information they need to deliver highly-connected digital healthcare experiences while navigating growing data governance, ownership, and sharing concerns.

The result — when managed and executed well — is a healthcare ecosystem driven by patient choice. They choose the data they want to share, based on the outcomes they want. They choose how and when they engage with you. And they take greater responsibility for their own health through always-on digital services that they can access anytime, anywhere.

Nearly 90% of people think it is important that organizations use personal data ethically

Source: https://theodi.org/article/nearly-9-in-10-people-think-its-important-that-organisations-use-personal-data-ethically/

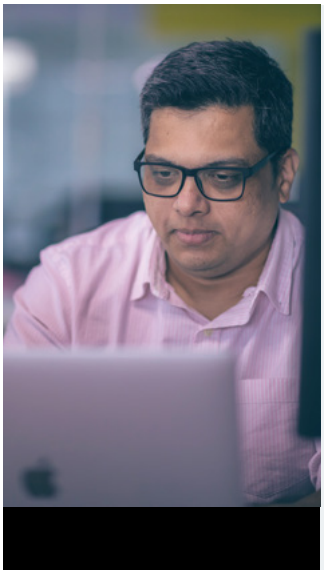
Key challenges

Giving patients greater power and choice in their healthcare journeys carries significant challenges, including:

- **Managing data ownership and storage:** Patients need to own and control their own data, but you need it to deliver strong personalized digital services. Decentralized data platforms can play a powerful role here, giving patients ownership of their data while still enabling you to access it.
- **Improving interoperability between digital healthcare services and providers:** A big part of enabling patient choice is delivering consistent digital experiences and services that they can freely move between. If data and services are owned by different organizations, then patients can't move freely between them and their choices become limited.
- **Meeting stringent data protection regulations:** When it comes to the use and storage of data, patient choice can't be misleading. If healthcare organizations fall into the trap of offering digital services in exchange for data and providing only the illusion of control over how data is used, they may face fines or further punitive action.

The technology behind the change

- **Privacy-aware communication:** Privacy must be built into every digital patient interaction, and patients' privacy options must be clear to them at every touchpoint. By embedding privacy wherever communication happens, organizations can put patients in control, while still enabling clear information sharing for the purposes of care delivery.
- **Digital healthcare platforms:** Digital healthcare platforms enable patients to engage with healthcare services in similar ways to consumer digital services. Digital platforms help healthcare providers offer choice to patients — both in the services they access, and when and how they access them.
- **Decentralized data platforms:** Decentralized data platforms help solve many of the data ownership challenges associated with delivering patient-controlled care. They ensure that patients retain ownership of their data and that they can choose exactly how you use it.



What we've seen

Improving interoperability and making it easier for patients to access and share their data can't come at the expense of security.

Building privacy into every aspect of technology design and lifecycle management is essential. But with healthcare data breaches and ransomware attacks hitting the headlines with alarming regularity, providers must also double down on their efforts to **safeguard patient data**.

Trend #2: Empowering healthcare providers to work more effectively

By improving how patient data is gathered, analyzed, and shared, healthcare providers can make huge improvements to how care is delivered. Healthcare professionals can provide better service and prepare for appointments more effectively. Specialists can give patients their opinions immediately without requiring face-to-face appointments. And personalized, proactive healthcare delivery can become the norm for millions of patients worldwide.

For healthcare providers, these technologies and trends bring opportunities to improve the efficiency of care delivery and help practitioners work effectively to provide a higher quality of care.

The potential for change

Historically, the healthcare industry has been burdened by slow processes. From long wait times for appointments, to inevitable delays as patients are moved between specialists, many of these hindrances can be traced back to a single issue: all information about a patient needs to be verified by a professional before any action can be taken.

By using wearables, cameras, and digital platforms to enable patients to submit and manage data about their health, providers can cut the number of appointments needed through pre-screening, reduce the average number of touchpoints required for a patient to get the care they need, and move towards proactive healthcare delivery.

Clinicians can identify issues faster, healthcare professionals can monitor personalized health metrics and reach out when an intervention may be needed. Lastly, healthcare professionals can gain a more complete view of patient health that enables them to do their jobs faster, and with greater accuracy, while delivering highly personalized experiences.

Key challenges

Enabling connected healthcare journeys and experiences that improve efficiency brings challenges, including:

- **Ensuring interoperability between digital tools and platforms:** As patients move between digital services and care providers, they want everything to be available through a single digital ecosystem. That model can only work when there's complete interoperability between the digital tools and platforms used across a patient's healthcare journey — from their wearables to the digital health services they use.
- **Data sharing and protection:** Having patients submit and manage their own healthcare data, and sharing and acting on that data within your organization, creates new data sharing and protection challenges. If you want to use this data to enable patient-driven journeys, you need a robust data protection strategy that keeps patients in control.

> **"Assume your services will operate in a hostile environment, where you don't have control over where demand is coming from and build in truly elastic scalability."**
>
> **Ben Davison,** NHS Digital

The technology behind the change

- **Wearables+:** Wearable tech is bringing always-on healthcare monitoring to a broader audience than ever before. The next generation of smart medical devices will create further opportunities for healthcare providers to track, monitor, and proactively improve the health of patients of all ages and needs.
- **AI:** Fueled by the data generated by wearables, and other data submitted directly by patients, AI is helping accelerate diagnosis and identify trends and patterns in patient health. By doing much of the diagnostic work required to establish what a patient needs, AI is freeing up vital time for professionals while also accelerating service delivery.
- **Smart systems and ecosystems:** To have the right impact on practitioner workloads, digital healthcare services must be delivered through consistent systems and ecosystems. If services can't share data and speak to one another effectively, they'll have little impact on the efficiency and speed of a patient's healthcare journey.

What we've seen

The ultimate goal of government healthcare programs is to stop people from needing treatment by shifting behaviors to minimize the risk of preventable illnesses.

We recently worked with a government health organization to build a new digital ecosystem, including a platform and apps for its nationwide preventative health program — all aimed at helping people make healthier lifestyle choices. And in the first week after launch, 260,000 people had already signed up.

Trend #3: Improving lives and empowering patients

Emerging technologies are creating countless opportunities to improve the accessibility of healthcare services and transform the lives of patients in exciting new ways. From helping patients with limited mobility easily access care, to using new interfaces and tools to help people with different communication needs interact, digital healthcare provides the opportunity to level the healthcare playing field and deliver inclusive and empowering experiences for all.

That includes everything from improving access to basic healthcare services for those in remote locations, to meeting the needs of an aging population and delivering better in-home care for those with limited mobility.

The potential for change

For millions of patients, making healthcare services more accessible can change their lives. Simply making digital platforms easier and more intuitive to engage with can have an enormously positive impact on wellbeing and bring basic healthcare services into reach for the people that need them most.

"Making health *extremely convenient* is the best approach to encouraging health and wellness."

Recent user studies have shown personalization based on machine learning, data analytics and well-placed self-assessments help in delivering a uniquely tailored experience that is targeted to the specific user cohort and is able to keep the population engaged by serving relevant content. Quality content cultivates adoption.

But, it's not just about improving accessibility — many of the technologies identified through our lenses can be applied as part of patient care to improve outcomes and augment lives. For patients with more significant or specific needs, emerging and evolving technology can fundamentally transform how they live, helping them move, communicate, and interact in new ways.

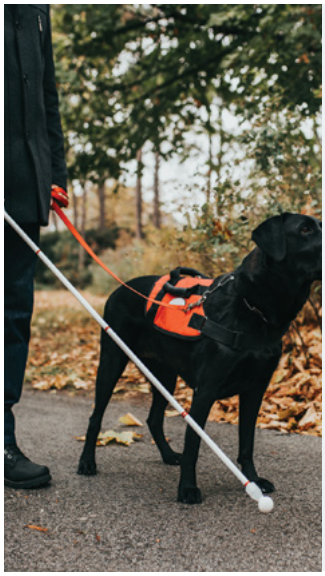
Key challenges

To effectively improve the lives of patients through the use of emerging technology, healthcare organizations must overcome several key challenges, including:

- **Meeting needs equally:** When talking about empowering patients and improving the accessibility of care, there are many different needs to consider. Some will be easier to meet than others, and with limited budgets for transformation, organizations will have to prioritize their efforts intelligently if they want to meet needs equally and improve outcomes for as many patients as possible. We're still a long way from healthcare of these levels being universally accessible, but the decisions made by providers can drive meaningful progress towards that goal.
- **Prioritizing new engagement methods:** From voice interfaces to gesture and facial recognition, there are a lot of different engagement options and technologies for healthcare organizations to explore. Each may require significant investment to apply, so prioritization is vital.
- **Building inclusive platforms and solutions by design:** As new digital services, platforms, and ecosystems are designed, organizations must change their mindsets and make equality and accessibility key considerations from the very beginning of the design process. This may require embracing new design and delivery processes that can support this input and incorporate patient and user feedback. NIHR research suggests users need to be partners in design for assistive tech, so involving users from the earliest stages of the process can significantly improve patient outcomes.

The technology behind the change

- **Brain-computer interfaces:** Brain-computer interfaces can enable patients with limited mobility to interact directly with technology without physical movement, opening up digital experiences and communication methods to patient groups with the greatest mobility and accessibility needs.
- **Intelligent assistants:** Intelligent assistants can transform the lives of patients with ongoing care needs. Playing a vital role in the delivery of always-on healthcare, digital assistants can support the ongoing monitoring of patient health and enable a greater number of patients to self-manage their healthcare.
- **Gesture recognition:** Advanced gesture recognition tools can capture and interpret even the smallest physical gestures. By applying those capabilities in digital healthcare, providers can make their services accessible to patients with diverse accessibility needs.



What we've seen

At Guide Dogs Victoria (GDV), inclusive experiences start — quite literally — on the ground. The Thoughtworks IoT team worked with GDV to help people with low vision or blindness when crossing roads. Together, we created an infrared sensor in a cane, which detects the safe crossing zone and sends feedback to a vibration module on users' wrists.

It's just one example of how applying the right technology in the right ways can improve people's lives.

Conclusion

As we've established, emerging and maturing technologies promise to transform the way healthcare is delivered, managed, and accessed. For organizations in the healthcare industry, the biggest challenge at hand is prioritization. For individuals, the biggest challenge remains accessible personalized healthcare that puts them in control of their wellbeing.

At Thoughtworks, we work closely with organizations across all industries to carefully analyze their needs and work backwards to determine which technologies and capabilities are best suited to deliver the results they want to achieve.

As you look to the future and consider what you want your services to look like over the coming years, we're here to help you understand your options, prioritize your budgets and efforts, and bring your vision of smarter, more efficient, and more accessible healthcare services to life.

To find out more, and learn how our team can help you, talk to us today.

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About Thoughtworks

Thoughtworks is a global technology consultancy that integrates strategy, design and engineering to drive digital innovation. Thoughtworks is 9,000+ people strong across 48 offices in 17 countries. Over the last 25+ years, we've delivered extraordinary impact together with our clients by helping them solve complex business problems with technology as the differentiator.

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