

Look Out 2020+
Industry Trends
Healthcare

Pioneering the way to precision medicine

Thought
Leadership

Atos

Megatrends in Healthcare: Toward predictive and personalized care



“Value-based care is already reshaping ecosystems today; but the next frontier will be even more disruptive with precision medicine, predictive and personalized care, at last, on the horizon.”

Ruud van der Loo
Vice President, Global Healthcare, Atos

The healthcare ecosystem is in the turmoil of disruptive changes. Never has the prospect of innovation been so bright, with new technologies such as immunotherapy and genomics promising to bring revolutionary advances in medicine and life-extending therapies. At the same time, never have exploding MedTech costs and demographics trends put the sustainability of healthcare systems at such risk.

Facing digital shockwaves

In the West, aging populations and the prevalence of chronic diseases threaten traditional insurance systems, while healthcare costs already represent almost 20% of GDP and follow a constant growth trend. In emerging countries, continued demographic vitality and a natural will to improve health standards are exponentially growing global care needs, at the same time as urbanization and globalization are increasing risks of diseases and epidemics.

A new universe of smart services

As a result, continuing to accelerate innovation in health while bending the cost curve is a vital challenge for the years to come. Up to now, diverse and siloed care ecosystems have been slow to catch up with digital opportunities.

New technologies are changing the game today. They may not just promise to set up patient-data centric ecosystems and value-based care that will allow the move from reactive to proactive care supporting patients all along their lives. But Predictive, Preventive, Personalized and Participatory (P4) care is, at last, on the horizon along with population health and precision medicine. This not only creates multiple opportunities but also means all stakeholders need to fundamentally rethink the way they interact with patients, conduct their operations, structure their business models and guarantee medical safety and compliance.

Today's mutations bring major opportunities for all healthcare players to place themselves at the heart of tomorrow's predictive and patient-centric care ecosystems.



cost savings could be generated by digital health
\$ = USD



more chronic diseases are observed each year



of OECD GDP may be dedicated to Healthcare in 2020



health apps are available on app stores, growing by 20% per year



healthcare facilities will be accessible by mobile in 2019



should be added to life expectancy in the next 10 years



the cost of individual genome analysis has been divided by 1,000 in 10 years



specialty drug costs will quadruple by 2020



people will be added to the world population by 2050

Four transformation challenges and opportunities for the future of Healthcare

1



Rethink patient experience

The rise of mobile and wearables has not just created new markets around healthy living and quantified self; it has also changed patient expectations for more holistic care approaches with a lifelong, personalized experience 'beyond the pill'.

For healthcare providers, this makes **improving the patient experience at the hospital and within ambulatory and home care** with telemedicine, telehealth and teleconsultation critical.

It makes it essential for them to **move from reactive to proactive care**, leveraging connected health devices able to constantly track health functions (such as sleep, pulse rate, glucose level, ...), analyze patterns, manage preventive care and react immediately if there is an issue (heart attack, ...).

> **What's ultimately at stake: deliver more personalized treatments, thanks to the conjunction of extensive condition monitoring and individual patient analysis (DNA, ...).**

2



Dramatically reduce healthcare costs

Faced with the need to care more and better for less, it is essential that players develop more effective clinical pathways.

This requires both the reduction of clinical and administrative redundancies and a shift to lower-cost standardized clinical processes, such as a better use of generics, shared service centers, etc.

To succeed, healthcare players can **improve treatment coordination by developing electronic health records (EHR)** and interoperable repositories for health information, including lab results, prescription information, allergy reports, etc. They can **assist caregivers in diagnostic, monitoring and process management tasks**. And they may **increase collaborative productivity and faster communication** between medical teams, administrative staff, patient and all stakeholders: insurers, payers, regulation authorities,...

> **The impact is vital: as the world population ages, augmenting care productivity will not only be a financial necessity; it will be essential for facing the boom of chronic diseases.**

3



Develop value-based healthcare

For decades, healthcare business models have revolved around reactive and curative care process.

Healthcare innovation brings a revolutionary promise today: a move to prescriptive care. This will require profound changes in the healthcare value chains and ecosystems, blurring the frontier between caregivers, pharma and insurers.

Challenges do not just include the **rollout of value-based care models** tied to patient outcomes, to favor economies of scale and broader service reach; they also include the development of **new risk-sharing and outcome-based payment models**, enabling care organizations to be rewarded with proactive support for their patients' health, with reimagined economic incentives.

> **What's at stake: a shift from 'curative' models (with episodic and transaction-based treatments) to ones focused on prescriptive prevention.** This will pave the way to population health, and to precision medicine.

4



Guarantee total trust & compliance

New technologies bring multiple opportunities. They also multiply dangers, especially in Healthcare's life-sensitive environments, which are subject to a complex and perpetually changing set of global, regional, country and industry-specific laws and regulations.

What if malicious people could deliver counterfeit drugs, hack the smart wearables that monitor treatment or take control of connected pacemakers?

With the rise of new technologies, players must not just ensure **the absolute safety of people**; they must also provide protection **from fraudsters, hackers, mafias or hostile organizations and states who may threaten the availability and integrity of health systems**. And they must **guarantee the privacy of patient data**.

> **Data breaches may not only badly damage reputation and create a huge risk of fines, notably with new GDPR regulations; they could also put patients' lives at risk. In a life-sensitive domain such as Healthcare, absolute trust is a vital and ethical issue.**

Building next-generation platforms to succeed in next-generation healthcare ecosystems



“With complex healthcare stakeholder ecosystems and billions of patients and connected healthcare devices overall, Healthcare will be a very data-intensive field. More than in any other vertical, data management, Cloud services, Artificial Intelligence and the IoT will be the core technologies needed to succeed.”

Santiago Ristol Jorba

Director of the Mobile Competence Center, Worldline and member of the Atos Scientific Community

As one of the most vital domains for human living, Healthcare has always received great attention from research and pioneered advanced technologies such as DNA recombination, medical robots, transplants and artificial organs.

Bringing legacy tech into the digital era

At the same time, the very complex nature of living things, the multiplicity of specialties needed to handle all kinds of pathology and the scarcity of resources has led to a very siloed approach, per affliction type or place of treatment. This complexity has been increased by the breadth of healthcare value chains themselves, including life science corporations, research institutes, health providers, payers and regulations authorities.

Preparing for a paradigm shift

By fully interconnecting people, business and things anytime anywhere, the latest digital technologies can now not only help healthcare institutions better manage their operations; they can now enable all MedTech players to provide, at last, a holistic care experience. To fully leverage this opportunity, Healthcare must be ready to make a quantum leap:

- Become **wholly patient-centric**, federating all players across a 360° personalized patient journey, from healthy living and prevention up to diagnosis, treatment, recovery and home care.
- Provide **intelligent data-driven orchestration** so all stakeholders can collaborate around value-based care and precision medicine.
- Adopt **open platform foundations and real-time process automation** to provide the best care services at the lowest cost.

The road ahead

To thrive, healthcare players will need to create the right partnerships and convene the largest ecosystems. Modernizing legacy and fully embracing the latest Cloud, automation, Big Data, API platforms and IoT technologies is only the start of the journey.

Next-generation architecture for future-ready healthcare players

CITIZEN CENTRICITY



360°, LIFE-LONG PATIENT EXPERIENCE

360° patient care and healthcare personnel engagement



COGNITIVE ANALYTICS

Smart care orchestrator for P4 medicine



BUSINESS ACCELERATORS

Real-time care services: EHR, Clinical Systems, ERP,...



HYBRID CLOUD

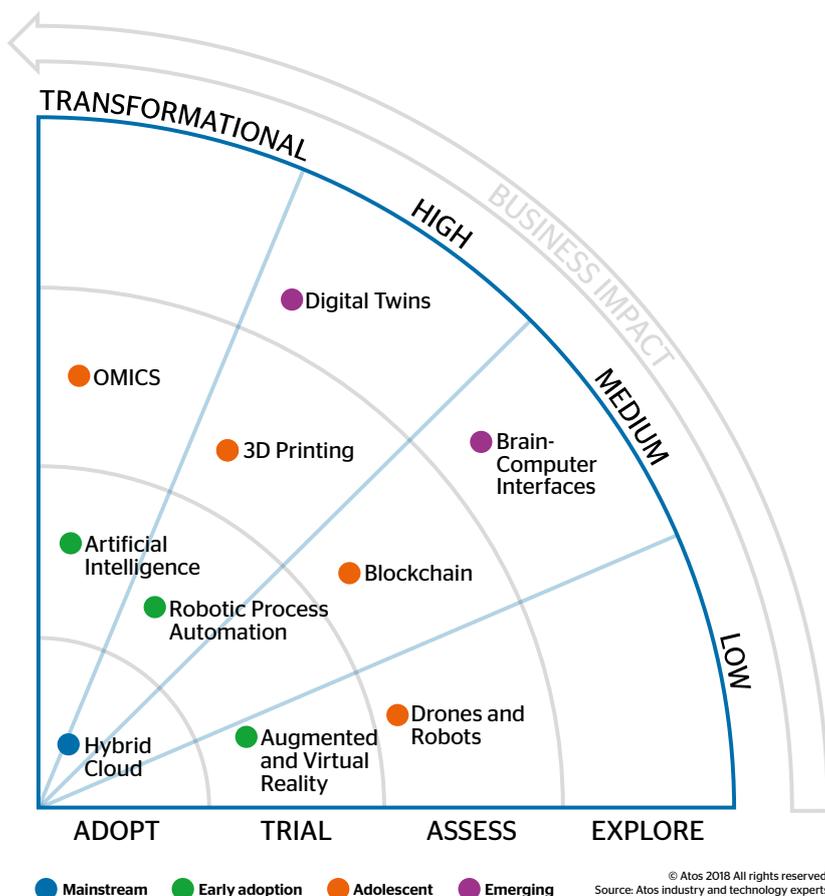
Software-defined infrastructures, microservices and DevOps

INTELLIGENT DATA-DRIVEN ORCHESTRATION

OPEN PLATFORM FOUNDATIONS

More disruptive technologies will emerge. While some may only appear as dots on the horizon today, they will turn out to be transformational in the years to come.

10 disruptive technologies that will shape the future of Healthcare



Healthcare Look Out 2020+ Radar: 10 key technologies set to impact healthcare players over the next 5 years.



Want to know more? Examine the Look Out 2020+ Global Technology Radar to get deeper insights into these 10 strategic technologies and many more: atos.net/lookout

Hybrid Cloud is reviving Cloud initiatives by enabling seamless integration of private and public Cloud platforms. With this model, organizations can exploit the benefits of public Cloud: pay-per-use, 'infinite' bursting resources, agility and innovation. Healthcare players must adapt their IT processes.

Artificial Intelligence promises to second human cognitive capabilities with virtual assistants and advisors, smart healthcare devices and robots. It may dramatically improve patient experience and support physicians from healthy living to diagnosis, treatment, recovery and home care. Healthcare players must prepare for the care, business, human and legal impacts.

Robotic Process Automation will bring virtual workforces for managing repetitive tasks, reducing the cost of administrative and regulatory processes by at least 50% while improving quality and speed. Healthcare organizations need to standardize processes to facilitate automation and engage in ambitious change management programs.

Augmented and Virtual Reality are blurring real and virtual worlds, allowing patients, physicians and healthcare personnel to engage with digital services within the context of their current environment. Healthcare players should explore use cases in patient guidance and physician care activities (consultation, medical data analysis, surgery, ...).

OMICS technologies leverage High-Performance Computing to accelerate genetic sequencing analysis and identify at-risk populations or target therapies to patients who are likely to respond. It is a major pathway to precision medicine. Healthcare organizations should begin to assess how they can begin to leverage OMICS today.

3D Printing already enables the production of patient-tailored prosthetics. Much more: personalized 3D-printed 'polypills' are being tested to simplify the delivery of complex medication regimes, and organoid bioprinting and tissue engineering may ultimately do away with the need for some transplants. Healthcare organizations should begin to get ready for these revolutionary breakthrough.

Blockchain is a potential game-changer for conducting exchanges with parties without prior trust relationships. In Healthcare, hyperledger technologies can help implement decentralized patient data management, leveraging automated contracting and the microservice economy. Healthcare player ecosystems should explore applications today.

Drones and Robots are promising to revolutionize healthcare environments, with potential applications such as express drug delivery, robo-surgeons or autonomous robo-ambulances. While some technologies are just adolescent, healthcare players must assess potential applications now.

Digital Twins are virtual models of a process, device or service, or even a patient. This pairing of the virtual and physical worlds allows for better design and solutions management, and could also be applied to simulate, monitor and optimize patients' treatments. Organizations should explore the tremendous potential of these technologies in Healthcare now.

Brain-Computer Interfaces, or neuro-interfaces, promise to leverage neural sciences to establish a direct communication pathway between humans and digital devices or machines. While yet prospective, these technologies could have disruptive applications in health. Healthcare organizations should start exploring them.

A glimpse into the future of Healthcare: Expert views on best practice for digital transformation



Ruud van der Loo
Vice President, Global Healthcare, Atos



Dave Bryan
Vice President, Head of Healthcare in North America, Atos

What could Healthcare look like in five years?

Current approaches that appear pioneer today will likely become commonplace in Healthcare over the next five to ten years, particularly in three areas:

- **New care delivery options will appear or generalize**, such as mobile care, remote monitoring, acute care clinics, ... This will require a greater reliance on patient decisions for procuring services and will make granting patients greater access to their data a necessity.
- **Clinical teams will revamp to increase patients' role in the team**, with a shift to prevention and wellness.
- **Data analytics and value-based payment models will develop significantly**, for example, payments for meeting goals, population health management,... Payers will place greater focus on 'compliance to care plans' as a means of changing patient (smoking, BMI, preventative care, annual screenings, for example) as well as provider behaviors.

Most of the innovations will have less to do with medical advances and more to do with improving how healthcare is accessed, provided and paid for worldwide. While medical science has advanced at rapid speed over the last 60 to 70 years, the cost of healthcare has spun out of control, the level of quality is inconsistent and the patient experience is in need of repair. In other words, **it's the way we deliver care that really needs a mammoth dose of innovation.**

Which driving forces will help them succeed?

Organizations must take into account the main factors motivating innovation in Healthcare:

- **Address dissatisfied patients:** 81% of consumers in the US are dissatisfied with their healthcare experience. You can hail an Uber from your smartphone, but the patient experience hasn't caught up. In major US cities, the average waiting time for an appointment is 18.5 days!
- **Lower-cost sharing:** Over just the past five years, out-of-pocket medical expenses have doubled for employees. In turn, the number of consumers declining medical care has risen to 40%.
- **Reduce skyrocketing prescription drug costs**, which ultimately has a domino effect. If patients can't afford the drugs, pharmaceutical companies are limiting how much they spend on R&D.
- **Decrease healthcare complexity.** Between medical facilities, doctors, insurers and pharmaceutical companies, healthcare treatments and billing quickly gets overly complicated.

All that will require a patient-centric, data-driven approach across the whole ecosystem.



The move to patient-centric care will drive a vertical and horizontal consolidation of stakeholders to gain market share as well as a 'data share' of the patient behavior. ”

What should healthcare players do today?

The big learning curve over the next five to 15 years is around **moving from just making the medical model more efficient to implementing the new health model.**

This encompasses three new competencies: **keeping the healthy out of trouble** by managing risk factors and chronic conditions; **managing the sickest 5% to 10% of patients better**, so they don't need frequent hospitalizations; and **avoiding consuming excessive resources.** This offers plenty of scope for innovation.

To achieve that, our conviction is that there are three major steps along the road:

- **Optimize and streamline existing systems**, notably through real-time clinical delivery and Electronic Health Records.
- **Interconnect and orchestrate synergies between all ecosystem players**, notably through collaboration and telehealth, and optimize treatments with new analytic technologies for population health.
- **Leverage the latest advances in genomic analysis** and High-Performance Computing (including Quantum-based) to enable precision medicine. It's the future. And we are among the pioneers in this field with our OMICS offering that powers multiple research initiatives.

For all of these, we are among the leading integration and managed services partners in the US and Europe with our Digital Transformation Factory, our deep healthcare security expertise and our partnership with Google.

The objective is to support the **move from systems of reactive care – often siloed and just articulated around emergency care – to a system for proactive care**, supporting patients throughout their lives.

This is happening all over the world. In the US, for example, the Affordable Care Act of 2010 marked a turning point by **opening the floodgates to a whole host of new technology companies.** Since 2010, health technology start-ups have raised \$7.65 billion from VC firms. While these new entrants are driving many healthcare companies to rethink and retool their businesses, **no one should wait for the threat of disruption to start innovating.**

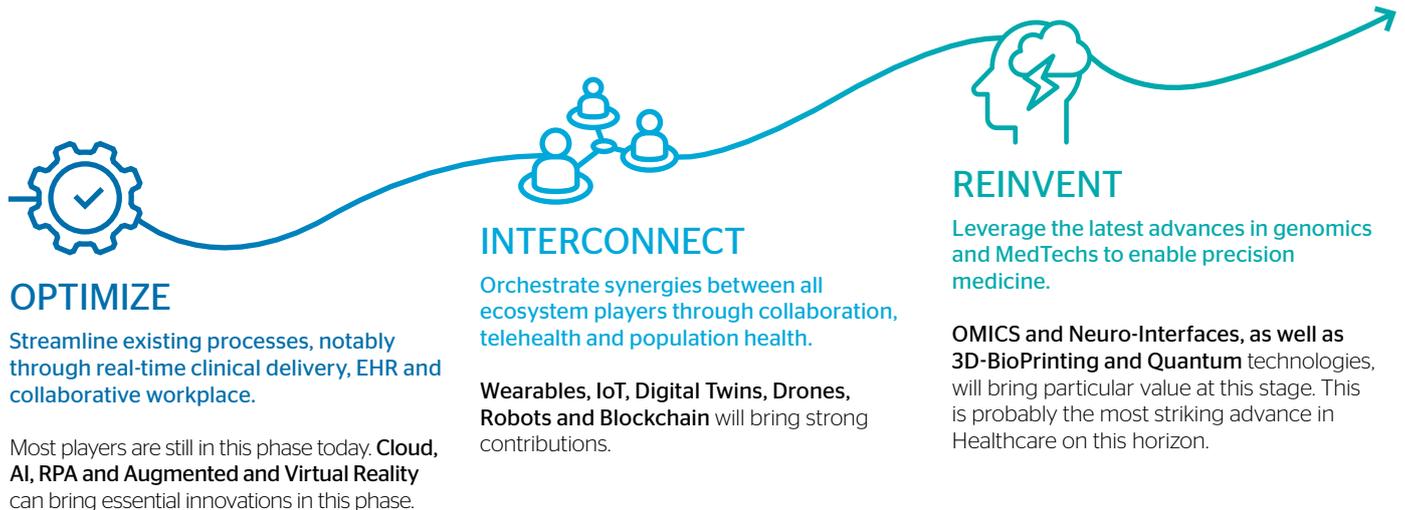
Creating your own Healthcare transformation journey

With all these changes converging at once, you must drive your healthcare organization forward. Faced with a rapidly changing model, the questions you will be asking is not 'Why change?' but 'Which direction?' and 'How?'

The first step is **figuring out your position in today's fragmented ecosystem and establish your strategy for collaboration.** You must understand how your operations, culture and business model will change as a result of being digitally competitive.

You must also analyze where leveraged and managed services can bring higher value while allowing you to invest in core healthcare products and services rather than IT.

Having made that strategic choice, you must next **embark on a journey of progressive and continuous transformation,** combining people, organizational and technology streams. Your journey requires a roadmap. We have drawn up a three-step approach, with steps that can be undertaken simultaneously.



Throughout these phases, an open approach to innovation, such as the **Digital Business Continuum** approach developed by Atos, will be paramount to success. In an ecosystem world where start-ups appear and spread at internet speed, openness is the best way to capture collective intelligence. As healthcare organizations strive to transform, **open innovation labs**, such as the joint Atos and Google Labs, will provide an ideal environment for bringing new ideas and new concepts to life - and creating the healthcare services of tomorrow.

Where should you begin?

As the Trusted Partner for your Digital Journey, Atos can help. Meet our experts and stay one step ahead by getting hands-on experience of new disruptive technologies.



ENGAGE in a co-innovation workshop at one of our **Business Technology & Innovation Centers.**

Get off to a quick start with a personalized workshop. Ask for a meeting:
> atos.net/btic



EXPLORE how the latest technologies can boost your own practice.

Leverage our experts and labs to build POCs tailored to your own business:
> atos.net/healthcare



STAY TUNED with the latest trends and best practices in digital transformation.

Keep yourself informed. Follow the latest insights from the field on:
> atos.net/blog

This is an extract from the full Atos Look Out 2020+ report, which provides an in-depth analysis of the emerging megatrends, business transformation opportunities and technologies that will drive innovation in the years ahead. Explore the full report on atos.net/lookout.



About Atos

Atos is a global leader in digital transformation with approximately 100,000 employees in 73 countries and annual revenue of around € 12 billion. European number one in Big Data, Cybersecurity, High Performance Computing and Digital Workplace, the Group provides Cloud services, Infrastructure & Data Management, Business & Platform solutions, as well as transactional services through Worldline, the European leader in the payment industry. With its cutting-edge technologies, digital expertise and industry knowledge, Atos supports the digital transformation of its clients across various business sectors: Defense, Financial Services, Health, Manufacturing, Media, Energy & Utilities, Public sector, Retail, Telecommunications and Transportation. The Group is the Worldwide Information Technology Partner for the Olympic & Paralympic Games and operates under the brands Atos, Atos Consulting, Atos Worldgrid, Bull, Canopy, Unify and Worldline. Atos SE (Societas Europaea) is listed on the CAC40 Paris stock index.

Find out more about us

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Let's start a discussion together

