

A photograph of a person's legs from the knees down, standing on a digital scale. The person is wearing a white towel with a red heart pattern. The background shows white medical cabinets. The text is overlaid on the right side of the image.

A Future in Digital Health Transforming Healthcare for Patients, Professionals, and Providers



Run Simple

A NEW VISION FOR HEALTHCARE



Today's healthcare consumer is informed and proactive, and above all connected. We envision a healthcare network that uses the latest digital solutions to bring patients and the healthcare industry closer together – high tech for more personalized care.

Martin Kopp
Global General Manager for
Healthcare
SAP SE

Dear Customers and Partners,

Ten billion people – that's the global population projected by 2050, and with many enjoying longer lives, the services required by healthcare systems will have to adapt and grow. No one can be certain how the industry will evolve, but with new challenges come exciting solutions. What we can be certain of is that future trends will be driven by unprecedented access to Big Data and a greater involvement by the patient or healthcare consumer in shaping and benefiting from services.

A new era of true digital connection is giving people greater access to health information and resources via the Internet, not only driving revolutionary advancements in medical research and technology, but creating the promise of a new, individualized approach toward "personalized" medicine. Digital innovation is already helping the healthcare industry anticipate real-time demand and supply for services, streamline prevention and treatment, and give patients greater control over their health.

Such progress requires quick and ongoing adaptations by healthcare providers, insurers, and life sciences organizations. What is emerging is a healthcare ecosystem, moving beyond traditional hierarchies, in which all healthcare shareholders participate and benefit. Leaders will be inspired to reevaluate services, customer experience, and business networks and create:

- **Business models** that will support a patient-centric value chain and leverage a provider's key strengths
- **Business processes** that will promote patient engagement and optimize clinical outcomes, resource planning, and care collaboration
- **Workforce structures** that will support changing roles for physicians, nurses, and care teams

SAP's expertise as a power enabler in data management aims to help healthcare stakeholders provide the best value to their customers at an affordable cost. We create the foundation and gateways to connect the digital healthcare network to core solutions for patient engagement, care delivery, care collaboration, clinical analytics, and personalized medicine.

This document explores the many opportunities in the healthcare industry that await us and how SAP will support the industry's digital transformation. I look forward to our journey together.

A stylized, handwritten signature in black ink, appearing to be 'MK' or similar initials, enclosed within a circular loop.

Global General Manager for Healthcare
SAP SE

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THE BIG PICTURE – HEALTHCARE GOES DIGITAL

Five technology trends changing how healthcare works now

We are witnessing an unmatched era of digitally driven innovation. Breakthrough technologies have matured and hit scale together, which will change how we provide healthcare. A digital network solution is arising that blurs the lines between patient, professional, and provider for more responsive, patient-centric care. Five defining technology trends have already emerged which are powering this digital healthcare network:

HYPERCONNECTIVITY

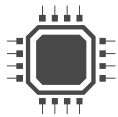
1



Every patient, healthcare organization, and machine is connected – changing all the established rules for healthcare channels. Connectivity drives the collaboration of patients, providers, and supporting businesses and assets in the digital healthcare network.

SUPER COMPUTING

2



Networking and in-memory computing allow for the creation of an infinite number of new business opportunities for the healthcare industry. For example, genome sequencing costs decrease even faster than Moore's law.

CLOUD COMPUTING

3



Technology adoption and business innovation now move at lightning speed. Technology infrastructure can be rented to eliminate barriers to entry, and transactions among healthcare players are moving to new cloud-based collaboration platforms that can connect millions of users.

SMARTER WORLD

4



“Smart” devices, wearables, sensors, robotics, 3D printing, and artificial intelligence are the new normal. This technology can turn Big Data in healthcare into smart data, resulting in insights for clinical decisions relevant to each patient's specific situation.

CYBERSECURITY

5



The digital healthcare network is a prime target for digital attacks and sabotage. Because trust remains the ultimate business currency, healthcare organizations must make cybersecurity a top priority in designing and operating a digital business network.

THE BIG PICTURE – HEALTHCARE GOES DIGITAL

Transitioning to digital healthcare

The digital healthcare network

The digital healthcare network is the foundation for a new, consumer-centric healthcare system. It consists of next-generation digital solutions and an open platform for communication and integration that enables shared, connected, and fluid data among all network stakeholders, including those beyond traditional healthcare boundaries.

What's driving the switch to digital?

The traditional value chain for healthcare providers is evolving, driven by:

- **Cost pressures**, demographics, and the rise of chronic diseases
- **A digital, “connected” patient**, empowered and also sharing valuable data with the wider community
- **The emergence of digital technology** and advanced medical devices, sensors, and wearables for extended monitoring and prevention
- **Artificial intelligence – turning** Big Data into smart data to make clinical decisions more fact-based

What does digital healthcare look like?

The transformation of healthcare offers many opportunities for both established organizations and new players. All future healthcare services will reflect:

- **Value-based care**, adapting structures to focus on patient outcomes at the lowest possible cost
- **Patient engagement**, encouraging the digital patient to take a more responsible role in disease management and prevention
- **Personalized medicine**: Groundbreaking insights into the human body at unprecedented, highly granular levels
- **Participatory research and clinical trials**, including more stakeholders and a higher number of participants
- **Balanced demand and supply** with real-time insight and predictive analysis to optimize service offerings and eliminate waste

The changing face of healthcare

- **Genomics**
DNA sequencing costs a hundred thousandth of what it did a decade ago –an even faster decrease in cost than the cost of computing per Moore's law¹
- **Aging population**
The number of people aged 60 years and older will rise from 900 million to 2 billion between 2015 and 2050 (moving from 12% to 22% of the total global population)²
- **Increase of chronic diseases**
73% of all deaths will result from chronic diseases by 2020³
- **Shortage of skilled workforce**
By 2035, the world will fall short of the number of needed healthcare workers by 12.9 million; today, that figure stands at 7.2 million⁴
- **Medical errors**
In the United States alone, medical errors kill more than 1,000 people each day – this costs the nation \$1 trillion each year⁵

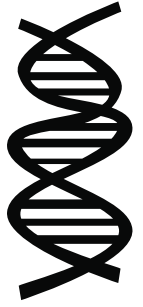
DIGITAL HEALTHCARE NETWORK



The digital healthcare network provides a gateway to all healthcare stakeholders, both traditional and up-and-coming, to partake in a wider healthcare ecosystem in which communities act more and more out of mutual, shared challenges.

THE BIG PICTURE – HEALTHCARE GOES DIGITAL

Being a part of the future of healthcare



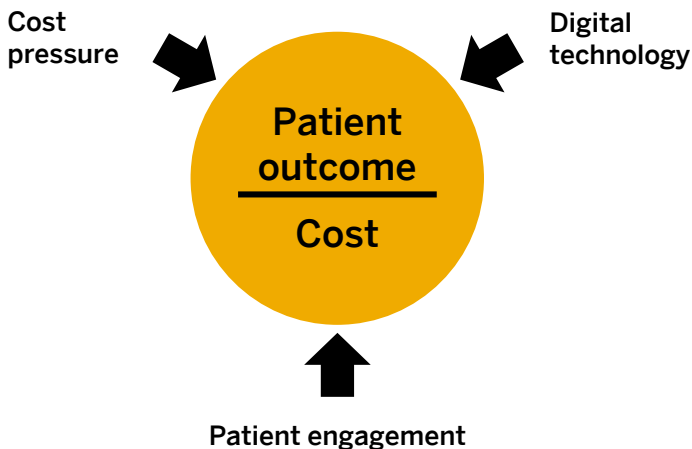
Digital healthcare – take a step into the future

Executives are aware of the need for and impact of digital transformation but are unsure how to make it happen. They understand that current models are not sustainable and are starting to ask questions like:

- How can we meet the expectations of the new healthcare consumers?
- How do we provide patient care with optimized outcomes at reduced costs?
- How can we leverage personalized medicine and other advancements in digital technology to provide highly personalized care?
- How can we restructure and empower our workforces?
- How can we connect our organization to the new digital healthcare network?
- Which segments within healthcare organizations allow market leadership and competitive differentiation?

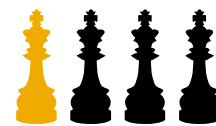
To help you reimagine your organization, you can think along three core areas: **business models, business processes, and work methods**. To reimagine these three core areas, SAP offers Design Thinking to help develop your business case. It uses a designer's sensibility and methods to match business needs with what is technologically feasible and economically viable. Our goal at SAP is to drive a profitable transition to digital while providing a rich environment for innovation. Therefore, we recommend evaluating these design thinking results using the concept of value-based care by asking two basic questions:

- Are we improving patient outcomes?
- Are we reducing costs?



Forerunners in digital healthcare

- **The American Society of Clinical Oncology (ASCO)** launches "CancerLinQ", a platform that will harness Big Data to deliver high-quality care to cancer patients and survivors
- **Terveystalo** provides data for employers to help reduce sick time
- **Schön-Klinik** supports accurate, time-driven, and activity-based costing for various treatments in multiple fields
- **Cleveland Clinic** facilitates video consultations for second opinions and other online services for patients
- **Kaiser Permanente** emphasizes a paperless and vertically integrated care system



One out of four

As of today, only 25% of healthcare providers have a comprehensive strategy for meeting the challenges of digital transformation in healthcare⁶



REIMAGINE

CREATING A DIGITAL
NETWORK FOR A NEW
HEALTHCARE ECOSYSTEM

REIMAGINE HEALTHCARE

The backbone of a new digital healthcare ecosystem

Changing populations are demanding new models for patient-centric care. Listening to customers' real desires can lead to inventing new value-added services. Unprecedented access to Big Data empowers healthcare professionals across all sectors. Altogether, a wider healthcare ecosystem arises in which everyone collaborates and grows. Moving your healthcare services into the digital age starts with reimagining.



REIMAGINE BUSINESS MODELS

Now proactive and flexible, healthcare business models can respond swiftly to changing patient needs or demographic shifts. Digitized business models can:

- **Integrate:** Merge wellness, prevention, monitoring, etc. for patient-centric healthcare beyond acute care
- **Specialize:** Scale an organization's strengths while eliminating activities with less value
- **Participate:** Share in clinical research for a new level of insight to offer personalized therapy
- **Create:** React to emerging segments like corporate health, medical tourism, and retail healthcare
- **Broker:** Balance supply and demand; synchronize and provide for a patient's need for services



REIMAGINE BUSINESS PROCESSES

Once linear and one-dimensional, processes under new models now expand care, bringing patient and expert closer. Modern processes can:

- **Optimize prevention strategies**, empowering healthcare consumers
- **Improve clinical decisions and diagnostics** with access to smart data
- **Boost monitoring and reaction** with digital and interactive technologies, facilitating early detection and prediction
- **Engage patients and foster collaboration** between all care givers for holistic care
- **Real-time care and communication** to eliminate transmission errors, create real-time transparency, and improve value-added care
- **Streamline resource planning** to enhance efficiency within and across organizations



REIMAGINE WORK

New models and processes create an ecosystem where all benefit, changing the way professionals work and grow in their jobs. For example:

- **Physicians as can now coordinate** for a more informed and empowered patient, replacing the traditional hierarchy and "spot consulting" attitude
- **Nurses as personal care givers** assume more responsibilities for **greater impact** in the care process
- **Clinical decisions are easier with superior access** to information anywhere, anytime, and to more artificial intelligence embedded into the workflow
- **A new care team** is characterized by flat hierarchies, more cross-functions, and **better collaboration**
- **A new environment for clinical researchers** enables **translational** research that fosters **creativity**

CUT ANTIBIOTIC OVERPRESCRIBING

Seoul National University Bundang Hospital built a clinical data warehouse on the SAP HANA platform. The organization can now **track 320 clinical indicators** with the help of only six nurses, which has, for example, lead to a **reduction of antibiotic cycles for preoperative patients from six days to one day**.⁷

ACCELERATE AND SIMPLIFY CANCER SCREENING

Heidelberg University Hospital has initiated a project to **improve prevention and treatment of cervical cancer** in Kenya, where the disease is the number one cause of death in women. Using the **SAP HANA Cloud Platform** for timely collection, exchange, and access of screening data, nurses are **better able to save women's lives**, even in very remote areas.⁸

UNLOCK INSIGHTS FOR CANCER RESEARCH AND CARE

ASCO, one of the world's largest organizations of professionals dedicated to the study and care of cancer patients, is leading the development of its **Big Data solution "CancerLinQ" on the SAP HANA platform**. CancerLinQ will allow clinicians and researchers to move beyond the 3% of patients represented in oncology clinical trials today and also **learn from the 97% of cancer patient data previously locked away in unconnected files and servers**.⁹



REIMAGINE BUSINESS MODELS

Healthcare by and for the community

The healthcare business model is rapidly moving from the optimization of single providers to building a community of specialists that collaborates in a wider ecosystem. By harnessing the flexibility of cloud-based and digital solutions, the healthcare industry can find new ways to help professionals and consumers jointly create more comprehensive, patient-centric, and cost-effective healthcare. New healthcare models envision the following:

Integration

Opportunity exists to transform the data existing with one-dimensional, single step care providers to communities of care, ensuring targeted and personalized responses across the spectrum of service providers.

- Help patients navigate the healthcare system with digital services
- Offer holistic and patient-engaged solutions to empower patients
- Foster prevention and manage chronic diseases
- Use real-time analytics for insights into the population and trends
- Go beyond traditional borders

Specialization

Healthcare providers can specialize themselves rather than offering a wide selection of services. To adopt this business model, organizations need to know their key strengths (such as patient outcome), and identify non-core services to shed. This could include:

- Investing in clinical research
- Attracting new patients seeking specialized, high-quality care
- Leveraging the economics of scale through a higher volume
- Exchanging specialized knowledge within the ecosystem

Participatory clinical research

Harnessing digital technologies and electronic medical records from various sources, clinics can unveil new insights from large populations beyond traditional clinical trials.

- Optimize and personalize clinical treatment
- Increase transparency of clinical outcomes

Create new markets or segments

By addressing the needs of the new healthcare consumer, providers offer innovative healthcare services and leverage new channels.

- Corporate health – help companies keep the workforce healthy and productive
- Medical tourism – offer high-quality, specialized services at attractive prices to patients willing to get healthcare abroad
- Retail healthcare – offer standard services at convenient locations and office hours

Broker within healthcare networks

By creating opportunities with real-time digital platforms that help eliminate inefficiencies in healthcare delivery, stakeholders connect to create a balanced healthcare demand and supply beyond traditional channels. Better match supply and demand using the digital age to close the gap.

- Second opinions
- Specialist appointments
- Medical equipment, transport



FORWARD-LOOKING MEDICINE

Sequencing genomes could cost less than \$0.10 as early as 2020, promoting a shift from reactive to proactive medicine¹⁰



VALUE-BASED REIMBURSEMENT

Accountable care organizations (ACO) are expected to double or triple the number of patients in the next four years¹¹



REIMAGINE BUSINESS PROCESSES

Optimizing the lifecycle of health

With new business models opening the doors to increased collaboration across the digital healthcare network, processes are arising which provide solutions at every stage of healthcare – preventative, curative, and educational.

Prevention strategies

Create effective preventive healthcare by empowering and motivating patients to take responsibility for their health. Digital technologies such as sensors and mobile devices help the patient and the care team to continuously monitor conditions and behavior and react faster and more effectively.

Collaborative clinical decisions and diagnostics

With digitized solutions, healthcare professionals can gain new insights into our physiology, biology, and anatomy. By sharing health information over the digital health network and combining it with relevant clinical research, we can rely less on experienced-based medicine and find the root causes of diseases. This includes:

- Outsourcing of highly specialized diagnostics
- Aligning and accessing relevant clinical research
- Eliminating duplicate testing
- Making patients a trusted source of valuable health information

Boost monitoring and reaction

Through delivery of telemedicine services with digital and interactive technologies, organizations can virtualize care venues, continuously track relevant biological signals, and facilitate early detection and prediction of health issues – extending their impact beyond the traditional borders.

Engage patients and foster collaboration

Medication and treatment can be tailored to each patient, for example by matching doses and active ingredients to individual genetic profiles rather than the general population. Leveraging the digital healthcare network, patients and providers will jointly define actionable health plans, agree on individual health goals, and use technology to monitor progress and react to deviations in real time.

Streamline resource planning

When actual data from all critical resource categories become available in the digital healthcare network, physical assets, care teams, and the patient can be planned simultaneously, even across organizational borders. Data capture can be automated through machine-to-machine communication and connected medical devices in real time. Advanced resource planning combines actual status with simulations and “what if” scenarios.

Real-time care and communication

Organizations enjoy full transparency and real-time insights into all care activities and across all care team roles and care venues. The new technology makes it possible to eliminate repetitive shift hand-over tasks and error-prone manual transmission of information. Lightweight, enterprise-grade communication tools provide professionals the same level of convenience as they experience in their private lives.



40% faster checking of medical records during preparation and post-processing of ward rounds with enterprise mobility¹²



In-memory technology can transform clinical analytics, saving months or years of scientific work¹³



REIMAGINE WORK

Greater value for patients and professionals

People working in healthcare do so because they feel it is their calling, even a dream job. Yet the burgeoning healthcare infrastructure prohibits them from giving hands-on, effective care. With digital technology, they find new opportunities to do their job better and grow in their profession. They are also able to actively contribute to the solutions of the future, creating the next cycle of proactive care.

Physicians facilitating overall care

In the new digital healthcare network, a physician's responsibilities go beyond one-off diagnostics to include advising and coordinating along the continuum of care. Access to relevant clinical and research information combined with advanced clinical decision support systems help physicians evolve into a new role of trusted facilitator.

Nurses return to hands-on attention

Supporting technology such as sensors, speech recognition, and automated documentation releases nurses from traditional, routine tasks, freeing up more time for patients. They can focus on value-adding activities such as interaction, providing advice, and planning recovery.

A new level of clinical decision support

Whether rule-based or through insights from smart data, the digital health network will provide a new level of clinical decision support to healthcare stakeholders.

Human interaction will continue to be key in healthcare. Digitization intends to enrich this interaction for better patient outcomes and free scarce human resources by shifting standard work items from people to technology.

Collaborating care teams

Employers create work environments that foster open communication across specialties. Mutual knowledge sharing based on proven patient outcomes creates a new generation that questions hierarchies and assumes shared responsibility. Cross-functional teams then create clear and patient-centric KPIs.

Ground-breaking clinical research

Researchers use real-time analysis of clinical and genomic data from large patient cohorts down to the individual, anonymized patient. This capability allows researchers to instantly validate hypotheses and ask the best, next research question based on the results. Breakthrough research results can be generated in hours rather than years.



Physician assistants in America can do about 85% of the work of a general practitioner¹⁴



48% of hospital managers expect training related to digitization to be mandatory to their employees in the future¹⁵

SAP HANA: TURNING IMAGINATION INTO ACTION

At the heart of the digital business transformation is a very simple idea: bringing together transactions and analytics on the same platform. Uniting structured data (e.g., finance) and unstructured data (text, video, voice) will change the way healthcare businesses plan, scale, and innovate.

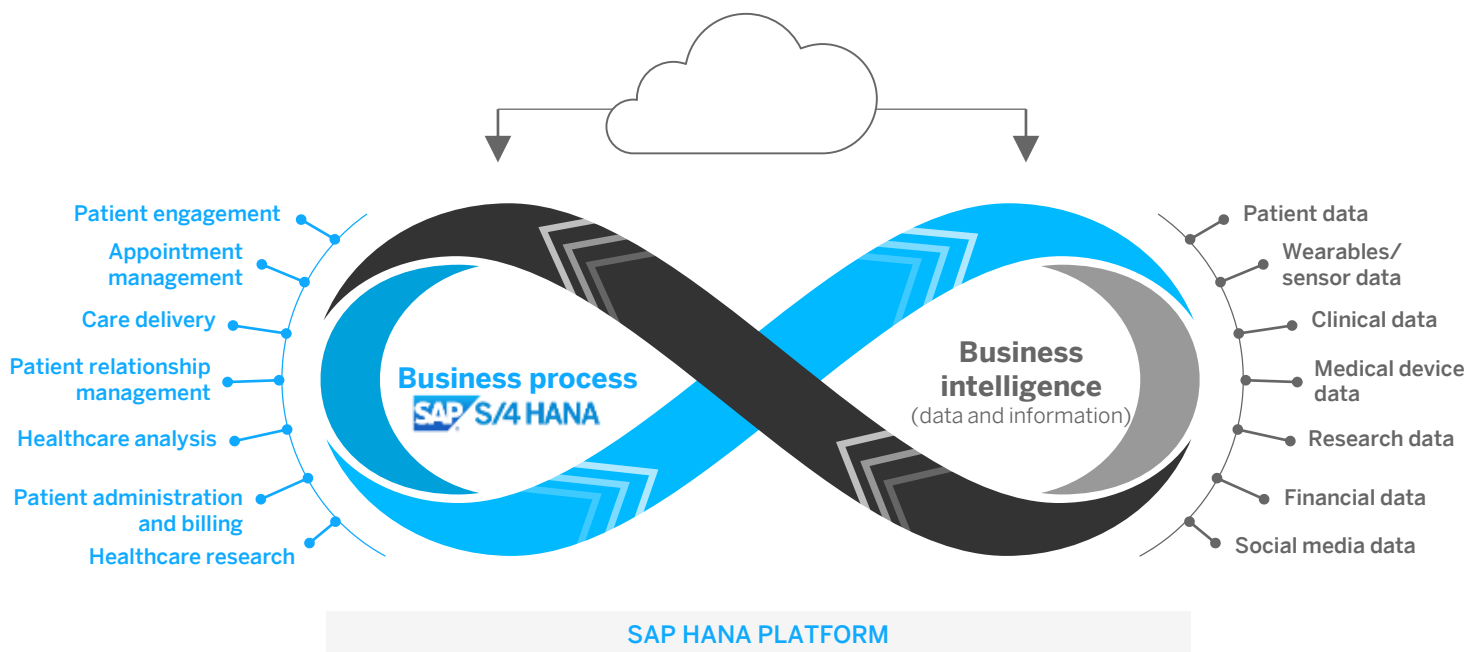
In order to not only reimagine healthcare in a digital world but also carry out innovative changes, agility and flexibility are required to adjust course at any time. In-memory computing is a concept brought to life by the breakthrough SAP HANA platform. SAP HANA's rapid adoption across multiple industries validates its massive potential for digital healthcare. Its success revolves around two key concepts: **simplification** and **innovation**.

These cloud-based capabilities open infinite new ways to optimize business, simplify work loads, reduce cost, and provide value-based care in a rapidly changing world.

With in-memory computing, we can now finally:

- **Leverage and act on Big Data** from wearables, sensors, medical devices, social media, and research sources
- **Extend business processes** to interoperate with business partners in near real time via advanced cloud-based business networks
- **Run business processes** from patient engagement to activity-based costing in real time, with no data replication and no batch programs

SMARTER DECISIONS + SMARTER TRANSACTIONS = SMARTER BUSINESS





TRANSFORMING YOUR HEALTHCARE SOLUTIONS

FIVE PILLARS FOR CREATING
NEW VALUE IN HEALTHCARE IN
A DIGITAL AGE

A DIGITAL FRAMEWORK FOR HEALTHCARE

Every healthcare organization needs to think about five pillars of a digital strategy

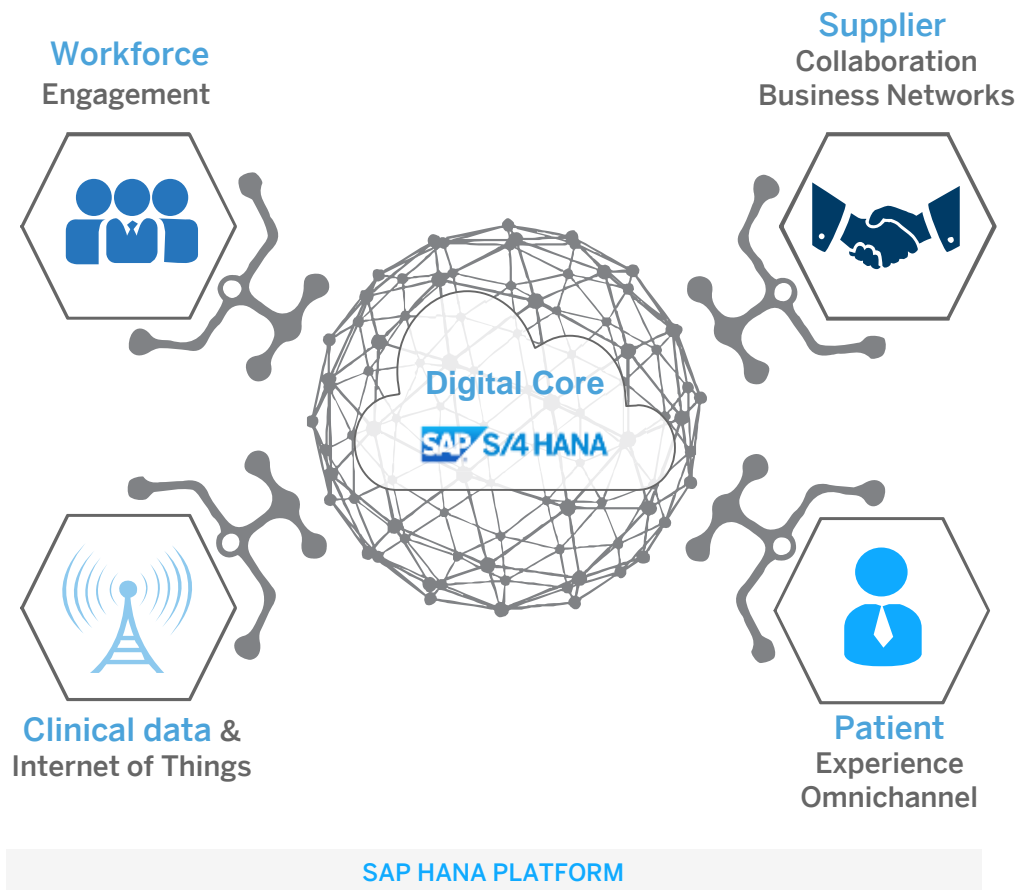
Leading healthcare organizations investing in digital capabilities require a framework designed for change – one that supports new business strategies and ensures agility while delivering value-added patient services.

At SAP, we have created a framework of five pillars to help you develop and execute your digital business strategy. With this framework, the entire value chain will be digitized, including the core, which serves as the platform for innovation and business process optimization.

The key lies not in any one of the five pillars, but rather in how they interconnect to achieve the best business outcomes.

1. **Digital core:** Re-platform core business processes and bring together transactions and analytics in real time to be smarter, faster, and simpler
2. **Patient:** Improve interactions to enable personalized medicine, value-added services, and outcome-based therapies
3. **Workforce:** Empower and engage across all employees and contingent staff
4. **Supplier:** Collaborate to improve efficiency and provide seamless patient service
5. **Clinical data and the Internet of Things (IoT):** Harness new data and the Internet of Things to drive real-time insights and new business models

The digital value network **interconnects** all aspects of the ecosystem in real time to drive healthcare outcomes



Re-platform **core business processes** and bring together transactions and analytics in real time to be smarter, faster, and simpler



THE DIGITAL CORE FOR THE DIGITAL HEALTHCARE NETWORK

A new generation of ERP solutions, running in real time, integrating predictive, Big Data, and mobile, will change how healthcare organizations work, how the business is run, and how information is used.

With advanced in-memory computing, you can finally free yourself from running the business in batch mode and building complex procedures to get around technology limitations. You can run simply and unleash the full power of the digital healthcare network.

Real time

Real-time optimization of business-based changes will have a massive implication for how we work, how we do business, and how we organize.

Power of prediction and simulation

Every employee can leverage real business insights with the help of simulation and predictive tools to drive perfect decisions, improve productivity, and increase profitability significantly.

Agility

The ability to rapidly enter new markets or segments, improve or extend business processes, or reflect an organizational change in one-tenth of the time it takes with today's systems is now possible and will enable the agility required in the digital economy.

Deployment choice and lower TCO

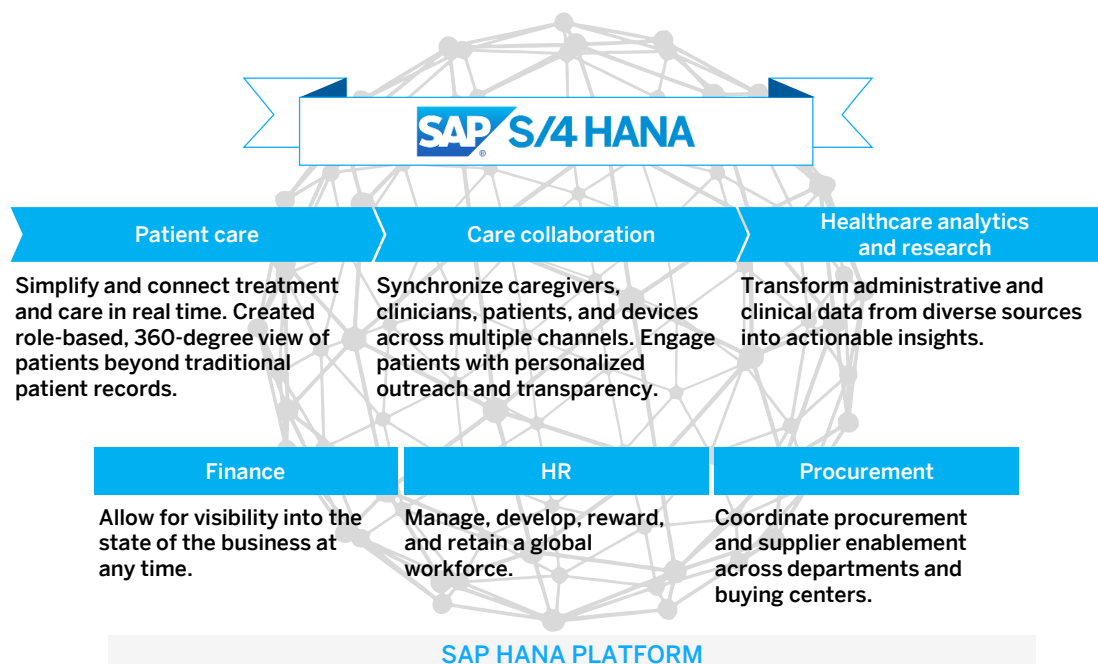
The consuming solution to run the core has to be simple. Companies now have the choice to deploy in-house or in the cloud. In-memory computing will also have a significant impact on TCO, and it will free up more budget for innovation.

Consumer-grade user experience

User experience is key to success. It drives adoption, user engagement, and, ultimately, productivity.

Simplify with SAP

SAP S/4HANA is the only comprehensive solution that covers all business processes and runs in-memory. It helps healthcare providers analyze and interpret both structured and unstructured, high-volume data for better decision support across the health network. It also helps run the organization in real time for fundamentally better performance and insight.





PATIENT EXPERIENCE

Digital technology is changing the traditional role of patients, enabling better-informed choices regarding health and well-being. Patients can more readily access health information and diagnose their own conditions or easily obtain test results and even receive better treatment.

Key trends reshaping the patient experience:

Outcomes and value-based healthcare:

Today's patients need to see value from the insight into options they have for their specific health issues, based on key performance indicators and assessments of other patients facing similar circumstances. Pure statistics are not meaningful. The demonstrated outcomes must be specifically relevant to the individual patient and his or her particular context.

Engaged and informed healthcare consumers:

Healthcare consumers engage with healthcare in many ways: they seek relief when sick and increasingly want to be actively involved in prevention and self-supported care. They value easy access to reliable and personalized information, proven outcomes for their particular situation, and continuity of support. Engaging this multifaceted customer requires new interaction channels, delivery models, and services.

New opportunities in wearables, apps, and the Internet of Things:

The proliferation of customer-owned medical devices connected to the Internet fuels the availability of Big Data, helping healthcare providers identify and respond to patients' needs in real time and set the next engagement points. This is opening up new opportunities for prevention, monitoring, and treatment – and increasing patient engagement.

6 million

people will travel across international borders for less expensive (though comparable) care to save money or avoid long waits for treatment¹⁶

More than 75%

of all patients expect to use digital services in the future¹⁷

> 80%

of consumers said an important benefit of wearable technology is its potential to make healthcare more convenient¹⁸

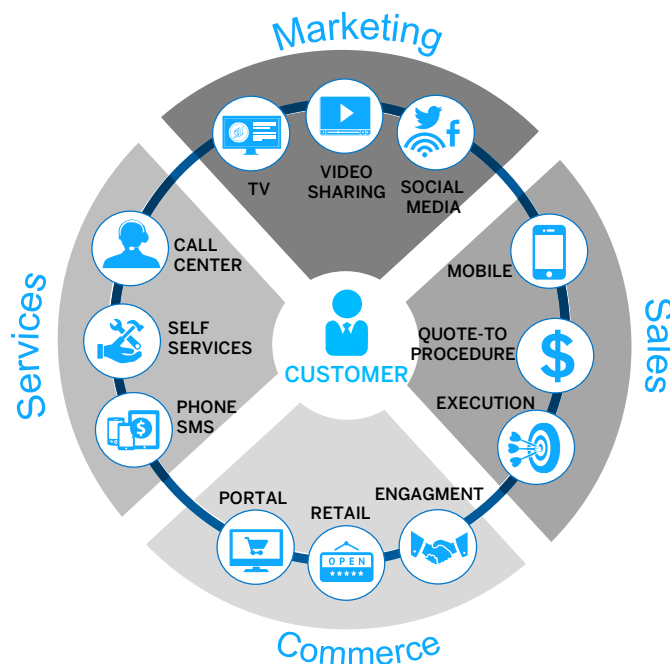
190 million

visits on WebMD every month – more than visit regular doctors in the United States¹⁹

Digitize your end-to-end patient experience with SAP

SAP software provides a single platform that brings together healthcare marketing, services, and engagement to ensure the seamless digitization of the entire patient experience – fully integrated with your core transactional system.

- **Enhanced marketing initiatives** through patient segmentation, predictive analysis, and personalized healthcare campaigns
- **Robust service support** for your call center, patient self-service activities, and essential phone, text messaging, e-mail, and social media functions
- **Integration with your core processes in care delivery** provide a unique healthcare-specific platform for omnichannel patient engagement and service



SAP HANA PLATFORM



WORKFORCE ENGAGEMENT

New digital tools enable the workforce to reevaluate how they work and get the most out of their professional training, freeing them from paperwork to focus on patient care.

Complexity is the enemy of workforce engagement. It can drive up costs and slow down progress. People are working harder than ever but could accomplish even more with access to smart, consumer-grade technology that helps them work faster, better, and more efficiently to address the following trends:

Changing of the guard

Over 50% of the workforce will be from the millennial generation by 2020.²⁰ Healthcare organizations must devise a workforce strategy to make the industry attractive for the digital generation.

Contingent labor is on the rise

Healthcare providers are increasingly turning to contractors and service providers to drive agility and lower fixed costs. But while providers can outsource work, they are still responsible for safe and compliant operations. The contingent workforce must be digitally integrated in all business processes.

Constant reorganization

Adjusting to new realities is now a constant, but it shouldn't disrupt efficient operations. Healthcare providers must keep track of the necessary qualifications for today's workforce and help their employees meet those qualifications. Hiring and keeping talent is another major issue that requires the industry's attention.

41%

increase in contingent workforce spending in the past five years²¹

30%

of executives say their companies give special attention to the particular wants and needs of millennials²²

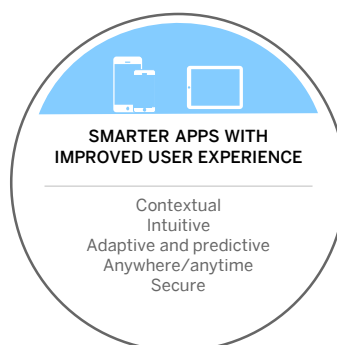
18%

more employees retained and 12% increase in employee performance for **Sport & Spine Rehab** after implementing SAP SuccessFactors solutions. A shift in core competencies and performance management resulted in an engaged, informed, and energized company²³

Improve your total workforce productivity: Simplify with SAP

Digitize your workforce with SAP: SAP S/4HANA + SAP SuccessFactors solutions + SAP Fieldglass solutions + SAP Fiori provide the tools for total workforce engagement and advanced analytics.

- Attracting the best people: Recruit and onboard the best workforce, simplify their work, and ensure that regulatory and compliance requirements are met
- Manage the total workforce lifecycle: From recruiting to onboarding, performance, compensation, and learning – all in one place
- Smarter apps with greater user experience: Enable the workforce to easily access the right information across any device and through a dramatically simplified user experience





BUSINESS NETWORKS AND SUPPLIER COLLABORATION

Trillions of dollars of commerce moving in silos + millions of companies attempting to innovate on their own = lost opportunity to improve the lives of billions of end users.

Healthcare providers have to reimagine business processes to remain competitive and best serve customers in the digital economy. From sharing data securely and in real time, to providing personalized and contextual insights, to changing how companies exchange and offer products and services, collaboration across entire vertical markets is key to value creation. Several trends are redefining the game:

Consumer buying experience

Business applications must be effortless to learn and use, just like consumer applications such as iTunes, Amazon, or Google. Solution complexity leads to low adoption, increased costs, and lost opportunities.

Network of networks

An open network serving a single market (example: travel, suppliers, labor) is valuable to its ecosystem. But a vertical network that connects to other vertical networks in real time is revolutionary and can only be accomplished through a shared set of cloud-based services built on top of the SAP HANA Cloud Platform.

Business connectivity at scale

The greatest challenge and opportunity in connecting vast ecosystems is the exponential data growth generated and consumed by the network. Connecting millions of partners and processing petabytes of data in real time are the core requirements to becoming the de facto standard. Only SAP offers the platform to meet this challenge.

80%

spend managed with automated processes to drive contract spending and compliance²⁴

50%

Highly networked enterprises are 50% more likely to experience market share gains and higher profit margins than their un-networked peers²⁵

50–75%

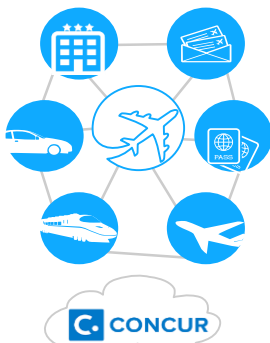
faster transaction cycles are being achieved with the Ariba Network²⁶

Connect your business to the world and the world to your business

SAP S/4HANA gives you incredible capabilities to digitize business processes across your business – and the connectivity to the business network allows you to extend those processes beyond the four walls of your business.

- **Solution already at scale** to cover all spend categories (direct and indirect material, labor and services, travel and expenses)
- **Business networks operate on a global basis**, meet data security standards, and operate with near zero downtime
- **Extensive offering by leveraging services** from many partners such as supply chain, financing, payment, supplier certification, etc.

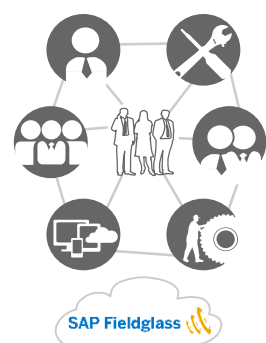
Manage expenses



Direct and indirect material



Labor and services





CLINICAL DATA AND THE INTERNET OF THINGS

The most **dramatic change** in the digital economy will be driven by hyperconnectivity and Big Data science. These will **transform nearly every business model in healthcare**.

The ability to monitor patients, collect health data, and react early to, or even predict medical conditions, independent from physical constraints, will massively change the healthcare value chain and the way healthcare professionals deliver care to their patients. A user-centric design will help ensure acceptance and transform therapies. Plus, using IoT will improve healthcare access to the underserved. Other advantages are:

Improving wellness, monitoring illness

The adoption of fitness trackers will continue and create a multi-billion-dollar business. Data from these devices help people to track their exercises and change unhealthy lifestyles. Devices that track illness can contribute to a large extent to improving quality of life, extending healthy lifespans, and driving down treatment cost. Through further technology advancement, wearables are expected to broaden both in scope and impact.

Remote monitoring for better outcomes

Adherence, early detection of complications, and real-time treatment management are the biggest value drivers according to the McKinsey Value Institute.²⁷

By 2025:

1.3 billion people will have fitness trackers; adoption rates of 10-56% depends on region²⁷

Up to \$470 billion

of treatment cost savings per year in 2025 by using IoT technologies in human health applications²⁷

Connect, transform, and reimagine with SAP

With the SAP Foundation for Health, organizations can now take embedded device data, analyze this data into insights in real time, and apply this information across the value chain to drive business insights and create new business models.

From sensors that help patients remain in their homes instead of a hospital bed, to mobile solutions that monitor health and provide alerts to physicians, the SAP Foundation for Health provides the relevant medical information for a 360-degree patient view. The data is stored and processed in the platform, which provides basic functions like data services, predictive analytics, and others.

Applications are developed by SAP, partners, and customers and enable use cases like:

- Medication reminders
- Tracking your own health and that of family and friends
- Home monitoring
- Emergency detection (e.g., eCall project in the EU)
- Preventing and controlling infections (e.g., online monitoring of hand washing)
- Medical device utilization (e.g., remote diagnostics, prediction of failures before they occur)

SAP FOUNDATION FOR HEALTH

The engine behind better patient outcomes and affordable personalized medicine

Groundbreaking clinical research and clinical decision support enabled by SAP Foundation for Health

The SAP Foundation for Health provides a flexible and extensible clinical data warehouse model, industry-focused data integration management, and real-time analytics on large-scale structured and unstructured data, enabling healthcare providers to deliver personalized medicine, cross-boundary care, and true innovation in clinical research and care delivery.

Breakthrough applications

Application platform for our next-generation apps for better clinical decision support, clinical research and patient engagement. Open architecture allowing development of new applications and extensions by anyone and allowing the use of the entire platform content.

Clinical data management

Data services and combined data model for clinical and genomics data, allowing the integration of data from any source into the clinical data warehouse. Text mining enabling the ingestion of unstructured data.

Integrating the continuum of care

Providing a unique patient view across the continuum of care as the backbone for patient-centered data and process integration in a heterogeneous system environment.

Genomics

Enable large-scale genome analysis and intuitive visualizations of genomic data. By seamlessly integrating clinical and annotation data, researchers can easily perform population-level and individual level analyses to obtain new insights on patient data.³⁰

ASCO

"The SAP HANA platform with its data architecture and data mining tools is the reason why SAP is the leader in so many industries. SAP HANA platform is the health platform that underlies CancerLinQ."²⁸

Kardinal Schwarzenberg Hospital

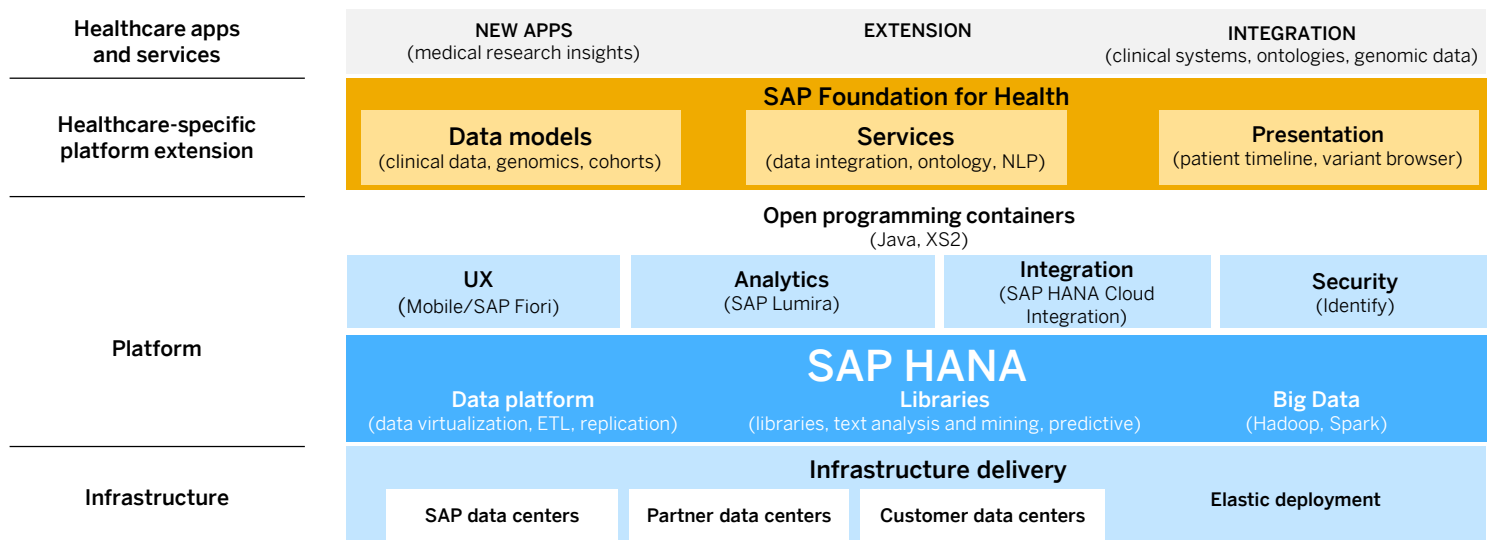
"By unifying our software landscape on SAP HANA, we not only achieved a lower TCO but have also paved the way for future innovation. For instance, we can now further enhance patient care in the most critical situations by making mass patient data immediately available to medical staff in the intensive care unit."²⁹

NCT

Through SAP Medical Research Insights powered by SAP HANA, analysis that would have taken weeks to complete in the past is now finished in just minutes at NCT.³⁰

The SAP Foundation for Health is...

Real-time, in-memory platform • 10x data footprint reduction for ERP • Extended storage, including Hadoop • Open architecture • Developer-friendly • Embeds mobile and analytics • Secure • Cloud-ready



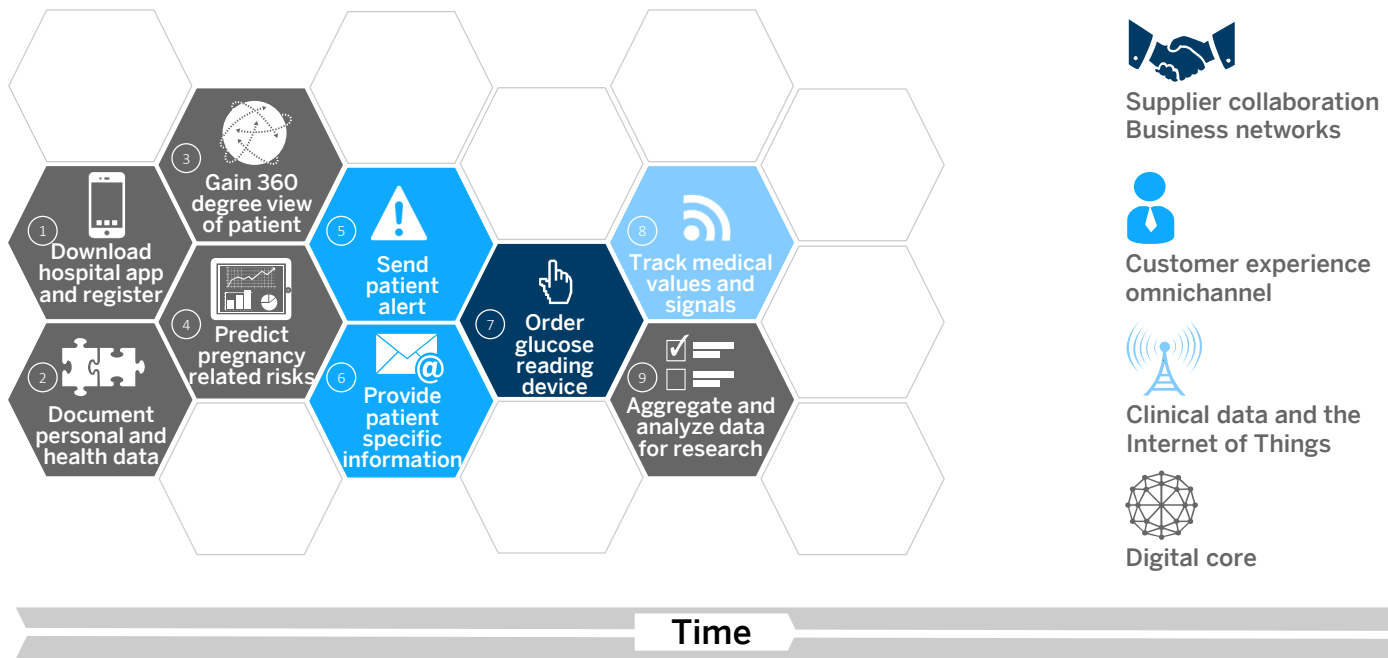


DIGITAL HEALTHCARE IN ACTION

REAL, LIFE-CHANGING
EXAMPLES

DIGITIZED HEALTHCARE IN REAL LIFE: PATIENT ENGAGEMENT

Foster well-being and prevention during pregnancy



A woman finds out she is pregnant and schedules an initial appointment with her gynecologist. Her health insurance company offers a smart phone app that lets women monitor their health during pregnancy. She downloads the app, self-registers, and creates a profile. She can now document personal and health data as guided by the app.

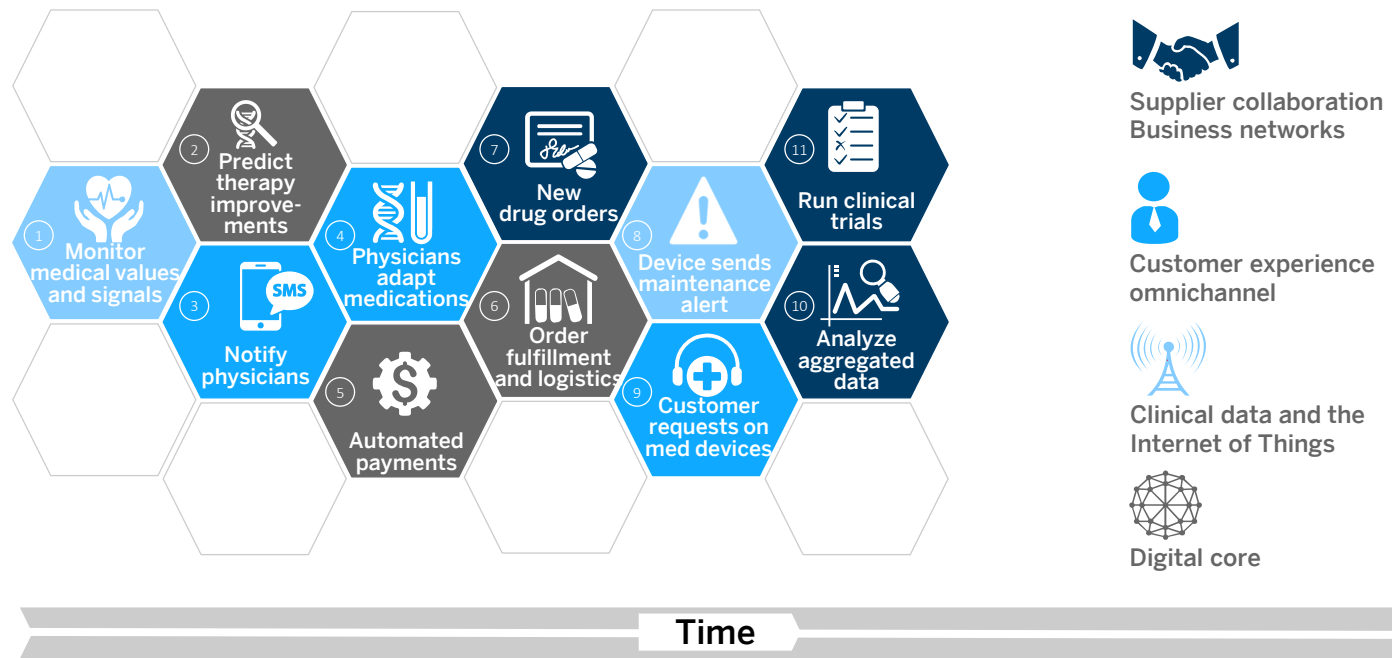
Using the cloud-based patient engagement platform, the woman's gynecologist gains a 360-degree view of her combined health data from her EMR and her self-documented information. This complete picture helps the gynecologist predict certain pregnancy-related risks such as diabetes or depression, and identifies her as a patient at risk for developing diabetes.

The woman gets a notification recommending a follow-up visit to her gynecologist. Based on her profile and personal data, she also receives regular messages with pregnancy-related information tailored to her specific needs.

Following the initial measurement of her glucose levels, the woman's doctor orders a glucose-reading device to measure the levels going forward. The doctor can retrieve the results, monitor trends, and intervene remotely as needed. Aggregated data from the cloud-based patient engagement platform can also be used to conduct clinical research.

DIGITIZED HEALTHCARE IN REAL LIFE: CONNECTED HEALTH

Managing chronic conditions



A woman with diabetes enrolls in a disease management program that her GP can offer thanks to the collaboration with a diagnostics company and her health insurance. The program includes a diabetes app that connects her weight scale, fitness tracker, and glucose meter, automatically capturing measurements. Based on her individual profile and preferences, the GP can predict outcomes and discuss alternative scenarios with her. Together they set up an individual care plan and agree upon specific activities and health goals.

The system automatically triggers alerts so that the woman's GP can react much faster to changing conditions and adopt the treatment plan and her personal health plans accordingly. The app also supports the medication process, such as reminders to take her medicine, order refills, and drug interaction checks. Intake is automatically recorded.

In our example, the GP recognizes that the patient is not following the prescription plan. He therefore sends out an invite for a follow-up video consultation to check the reasons for non-adherence.

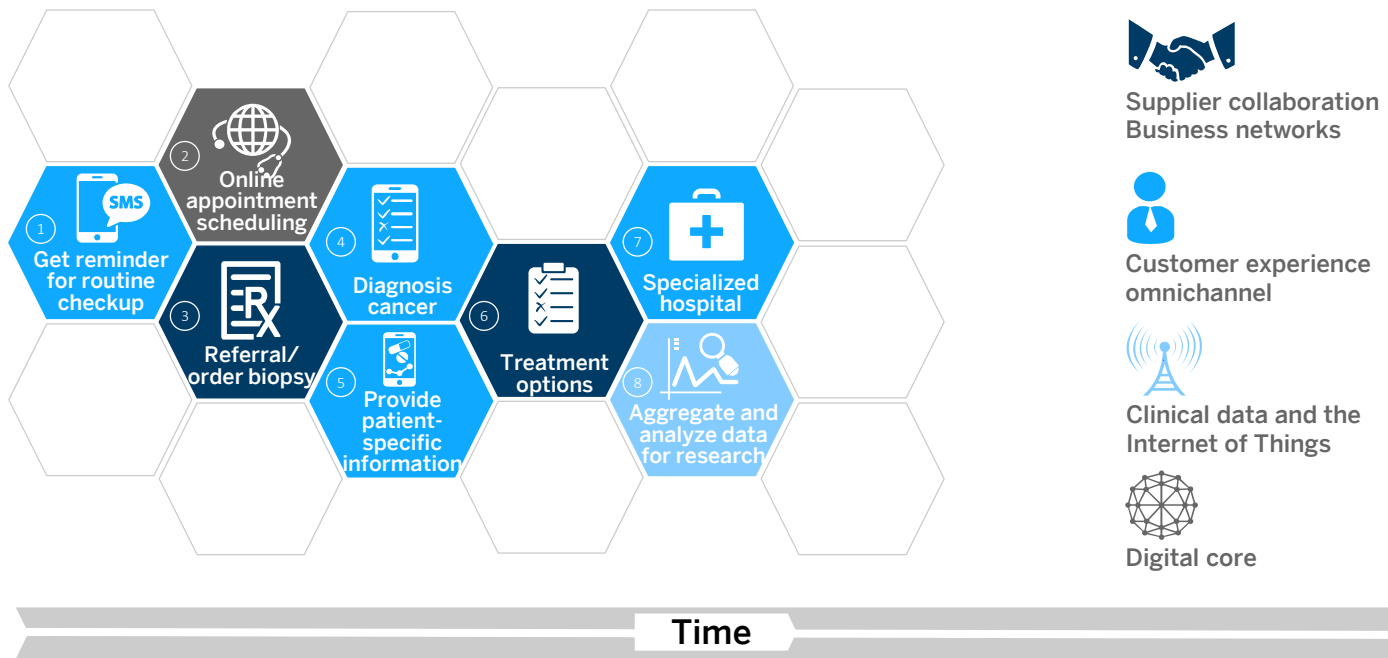
Based on the findings the GP changes the prescriptions and the new drug order is processed automatically in the background. The drugs are shipped to the patient's home address while reimbursement is handled with the insurance plan without any further manual interaction needed.

Meanwhile, at the patient's home, the glucose meter sends a silent alarm to the medical device company as usage is approaching a critical limit and maintenance is required. Before she even notices the issue, the patient receives a replacement device.

All relevant data are made available in anonymous format for secondary scientific usage and clinic trials in the digital health networks. This ensures continuous learning from each individual case.

DIGITIZED HEALTHCARE IN REAL LIFE: PERSONALIZED MEDICINE

Cancer research, diagnostics, and individualized therapy



Patients can receive a very personalized experience in cancer diagnosis and therapy based on the latest clinical research and an ultra-personalized genome profile.

A well-informed and highly empowered healthcare consumer manages his well-being using digital technology that includes a personalized health app. He gets a reminder for a recommended routine checkup due to his personal health plan and age. His physician offers online appointment scheduling that the patient initiates right through the app.

During the checkup, the physician finds that a biopsy is needed, orders the procedure for the patient, and the assistant schedules the appointment with the hospital together with the patient. The patient receives detailed instructions and further information on the planned procedure.

Learning that the biopsy is positive for cancer, the patient researches various sources and finds out that personalized offerings exist for his cancer type. He also finds out that his employer pays for such programs. The diagnostic service provider recommends optimal treatment options and clinical studies based on the patient's genetic profile and the latest findings in clinical research. The patient starts treatment at a hospital that specializes in his type of cancer.

All relevant data are made available in anonymous format for secondary scientific usage and clinic trials in the digital health networks. This ensures continuous learning from each individual case.



LET'S GET STARTED

BRINGING THE DIGITAL AGE TO
YOUR HEALTHCARE BUSINESS

GETTING STARTED

Bringing the digital age to your healthcare business



There's nothing that can make a difference in the world more than improving the outcomes of health in society. And, therefore, we are totally dedicated to it.

Bill McDermott
CEO, SAP SE



Dear Customers and Partners,

As in healthcare, simplification and business innovation matter more than ever in the digital economy. SAP has a broad range of services to cover your end-to-end digital transformation journey, from advising on a digital innovation road map and plan, to implementing with proven best practices, to the ability to run across all deployment models, and ultimately delivering innovation through your digital journey. SAP provides both choice and value within our services, allowing you to tailor the best approach based on your needs.

Our comprehensive ecosystem includes:

- Integration into a wide range of healthcare services and industries such as life sciences, insurance, higher education, defense, and more
- Open architecture: Choice of hardware and software for IoT use cases, medical devices, wearables, etc.
- Complementary and innovative third-party solutions, e.g., for healthcare analytics
- Reach: Partners to serve your business of any size, anywhere in the world

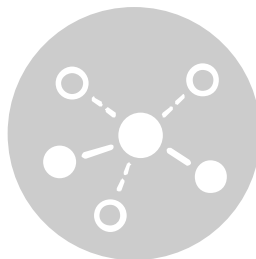
No matter what size or place your company has in the healthcare system, we can help you answer the question, "What role will I play in the healthcare value chain?" and we will direct you in reimagining your business processes and operational model.

Let's step into the digital healthcare age today.



Experience

it yourself at the next SAP event near you, or check out [SAP global events](#) or browse [solutions for the healthcare industry](#)



Connect

We look forward to your input and taking this journey together

Martin Kopp
Global General Manager,
Healthcare
martin.kopp@sap.com



Discover

opportunities for digital transformation in Design Thinking workshops

ADDITIONAL RESOURCES

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Note: All sources cited as "SAP" or "SAP benchmarking" are based on our research with customers through our benchmarking program and/or other direct interactions with customers

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