Hype Cycle for Healthcare Providers, 2023

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Initiatives: Healthcare and Life Science Digital Optimization and Modernization; Healthcare and Life Science Digital Transformation and Innovation

This Hype Cycle tracks the benefits and maturity levels of digital innovations, market solutions and approaches for healthcare providers. It helps CIOs communicate with stakeholders on the future direction of IT and supports decision making to identify, understand and prioritize investments.

More on This Topic

This is part of an in-depth collection of research. See the collection:

- 2023 Hype Cycles: Deglobalization, AI at the Cusp and Operational Sustainability

Analysis

What You Need to Know

This Hype Cycle identifies and analyzes technologies significantly benefiting healthcare providers. In 2023, we see greater interest and focus on patient engagement technology. The aim is to manage consumer relationships through multichannel communications, personalization, social networking and campaign management. We also see a continued interest in virtual care to mitigate workforce shortages, increased consumer demand and the need for convenient access

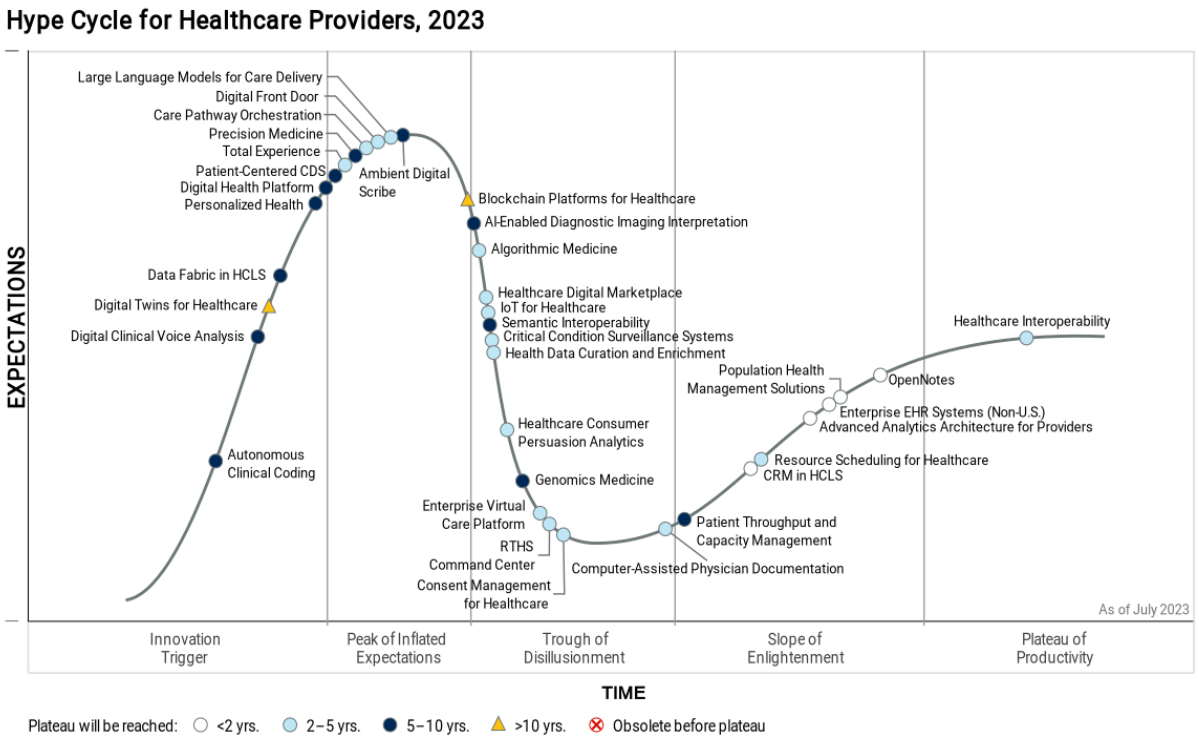
CIO investment priorities focus on data and analytics as providers seek to harness the data held across their IT estate for planning and monetization purposes. Creating longitudinal views of patient data has long been challenging, but interoperability standards, legislation and modern application architectures such as the digital health platform are beginning to make an impact.

The Hype Cycle

Several key themes emerge across this Hype Cycle:

- **Generative AI has arrived** — Generative AI has transformational implications for how care is provided as it can change healthcare faster than any innovation that has come before. Generative AI is used in ambient digital scribes. Large language models (LLMs) are used for care delivery and autonomous coding.
- **Digital health platform touches the Peak of Inflated Expectations** — Large investments by the tech giants in industry cloud solutions offer CIOs the potential to modernize the application portfolio at the pace of business change. This has put the digital health platform in the spotlight. Digital health platforms address a major strategic issue for providers, providing a solution where monolithic application architectures centered around the electronic health record (EHR) do not have the flexibility to innovate at the pace of required change.
- **Enterprise virtual care increases provider capacity** — Healthcare is on a journey to transform how clinical care is delivered. After years of small-scale pilots and proofs of concept, providers are now changing their operating models to encompass virtual care. This will improve access and equity, address capacity demands and mitigate clinician shortages.
- **Providers grow more aware of total experience (TX)** — Provider organizations recognize that they must invest more in customer, employee and user experience initiatives when introducing new digital capabilities. This is the best way to improve engagement and compete for scarce talent. TX considers the interdependencies between patient, clinician, administrator and user experience by balancing employees' and customers' digital and nondigital needs.

Figure 1: Hype Cycle for Healthcare Providers, 2023



The Priority Matrix

The Priority Matrix is a companion to the Hype Cycle and maps a technology's benefit to its time to maturity. The Priority Matrix summarizes two key Hype Cycle takeaways:

- How much value will there be from a particular technology?
- When will the technology be mature enough to deliver that value at a manageable level of risk?

Investments with the potential for transformational impact include the digital health platform, which will provide significant value by creating packaged business capabilities and new user experiences. It will also be the main delivery mechanism for generative AI services. The ability of LLMs to generate humanlike interactions can potentially improve patient education, engagement and adherence to treatment plans. Other evolving use cases include clinical decision support and clinician education and training.

The ecosystem and marketplace providing these capabilities will mature quickly as opportunities are realized, and further investments are made.

Table 1: Priority Matrix for Healthcare Providers, 2023

(Enlarged table in Appendix)

Benefit	Years to Mainstream Adoption			
↓	Less Than 2 Years ↓	2 - 5 Years ↓	5 - 10 Years ↓	More Than 10 Years ↓
Transformational		Algorithmic Medicine Digital Front Door IoT for Healthcare Large Language Models for Care Delivery Total Experience	Data Fabric in HCLS Digital Health Platform Genomics Medicine Personalized Health Precision Medicine	Blockchain Platforms for Healthcare Digital Twins for Healthcare
High	Advanced Analytics Architecture for Providers CRM in HCLS Enterprise EHR Systems (Non-U.S.) Population Health Management Solutions	Care Pathway Orchestration Critical Condition Surveillance Systems Healthcare Consumer Persuasion Analytics Healthcare Digital Marketplace Healthcare Interoperability Health Data Curation and Enrichment Resource Scheduling for Healthcare RTHS Command Center	AI-Enabled Diagnostic Imaging Interpretation Ambient Digital Scribe Autonomous Clinical Coding Digital Clinical Voice Analysis Patient-Centered CDS Patient Throughput and Capacity Management Semantic Interoperability	
Moderate	OpenNotes	Computer-Assisted Physician Documentation Consent Management for Healthcare Enterprise Virtual Care Platform		
Low				

Source: Gartner (July 2023)

Off the Hype Cycle

We have introduced, removed or renamed several technologies this year:

- **Autonomous clinical coding:** This innovation, new to the 2023 Hype Cycle, automatically assigns diagnostic and procedural codes to patient charts without human input.
- **Large language models (LLMs) for care delivery:** This technology is new to the provider Hype Cycle and appears due to extensive media coverage around generative AI applications such as ChatGPT.

- **Semantic Interoperability:** This innovation has been introduced to the provider hype cycle due to the importance of exchanging information between provider systems.
- **Patient self-scheduling:** This has now been removed and absorbed into **resource scheduling,** which covers several scheduling areas.
- **Real-time physician documentation improvement:** This technology has been renamed as **computer-assisted physician documentation.**
- **Automated patient decision aids:** Renamed as **patient-centered CDS.**
- **Healthcare application marketplace:** Renamed as **healthcare digital marketplace.**
- **Precision health:** Renamed as **personalized health.**
- **Computer-assisted coding**: These applications have reached mainstream adoption and matured off the Hype Cycle.

On the Rise

Autonomous Clinical Coding

Analysis By: Sharon Hakkennes

Benefit Rating: High

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Definition:

Autonomous clinical coding is a process of automatically assigning diagnostic and procedural codes to patient charts without human input. Solutions leverage natural language processing (NLP) with machine learning (ML) to extract and analyze the relevant clinical information from a patient's health record required for code assignment. Solutions provide a full audit trail for assigned codes, and those that do not meet the specified level of confidence are flagged for manual coding review.

Why This Is Important

Assigning standardized clinical codes to medical diagnoses, procedures and treatments is an essential process supporting healthcare billing and reimbursement, prior authorization processes, quality reporting, and data analysis and research. Autonomous clinical coding solutions deliver timely, accurate and consistent coding. The majority of solutions available in the market today focus on the ambulatory setting, with the most mature solutions in radiology, emergency medicine and urgent care.

Business Impact

Autonomous coding solutions can:

- Reduce the cost of clinical coding service delivery.
- Increase the speed, consistency and accuracy of clinical coding, resulting in reduced accounts receivable days, reduced claim denial rates and increased revenue.
- Mitigate risks associated with clinical coding staff shortages.

Drivers

- A global shortage of skilled clinical coders is resulting in delayed clinical coding and reduced accuracy and quality of coded data. Autonomous clinical coding solutions free up clinical coders' time, allowing them to focus on more complex records such as those with clinical documentation quality and completeness issues.
- Many healthcare providers are facing significant financial strain. As a result, they are actively investing in solutions to improve revenue cycle management (RCM) processes. Autonomous clinical coding reduces coding times and coding backlogs that delay billing and, ultimately, hospital revenue.
- Increasing complexity of coding rules coupled with the growing volume of patient data affect the quality of coding output. Through improved accuracy and consistency, autonomous coding can address issues of undercoding that result in lost revenue, and overcoding, which is a compliance risk.

Obstacles

- The majority of commercially available solutions support only a narrow range of clinical specialties in the ambulatory setting. It will be some time before autonomous coding solutions can achieve the required accuracy across the entire spectrum of healthcare settings and specialties.
- Accuracy is limited by the quality of the documentation. Issues such as conflicting information, ambiguous information and missing information can lead to inaccurate coding. Inaccurate coding can have significant negative effects on downstream hospital operations such as prior authorization, billing, quality reporting and research.
- Resistance to change is a key barrier to implementation. Clinical coders fear job replacement and lack trust in the accuracy of autonomous clinical coding solution outputs.

User Recommendations

- Identify the most appropriate solution by evaluating the accuracy, coding standards supported, audit trail capabilities, workflows and user experience, analytics and reporting dashboards, support for clinical documentation improvement, and electronic health record and RCM integration. Future-proof investments by reviewing vendor development roadmaps, ensuring alignment to your clinical specialities and care settings.

- Deliver the required business outcomes by incorporating a proof of value into the implementation plan prior to committing to full solution implementation. Establish a framework to monitor the ongoing performance of the solution, including measures of accuracy, efficiency and financial outcomes.
- Ensure successful deployment by focusing messaging on improving efficiency rather than job replacement. Engage the coding team early in the procurement phase to inform requirements, deliver optimal coding workflows and experience, and facilitate change management efforts.

Sample Vendors

Aidéo Technologies; Artificial Medical Intelligence; BUDDI.AI; CodaMetrix; CorroHealth; Fathom; Nym; Synapse Medical

Gartner Recommended Reading

The Healthcare Delivery Organization CIOs' Guide to Computer-Assisted Coding

Digital Clinical Voice Analysis

Analysis By: Sharon Hakkennes

Benefit Rating: High

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Definition:

Digital clinical voice analysis evaluates an individual's linguistic variables and vocal cues, such as pitch, tone, pauses, word choices, speech rate and volume. These solutions use artificial intelligence and machine learning to analyze voice patterns and codify voice biomarkers in order to noninvasively detect clinical abnormalities for clinical diagnosis and monitoring.

Why This Is Important

The characteristics of our voice and speech can be evaluated to screen for and monitor a growing list of clinical conditions. This includes behavioral health issues (including depression, psychosis, dementia and post-traumatic stress disorder [PTSD]), Parkinson's disease, cardiovascular disease and lung disease. Startup companies and researchers are leveraging technologies to detect abnormalities sooner and less invasively than traditional clinical assessments.

Business Impact

Applications include predicting the onset, diagnosing and monitoring the progression of disease; measuring the severity of symptoms; and monitoring response to treatment. Outcomes include earlier detection of disease, more frequent monitoring and reduced reliance on care by highly specialized clinicians. These solutions are noninvasive, affordable and portable, and thus highly scalable and well-suited for virtual care.

Drivers

- As a result of advances in technologies such as smartphones and home voice assistants, the enabling technology for accurate recording and real-time interpretation of vocal data is now infinitely more available than ever before.
- While there are no commercially available solutions available on the market with the required, geography-specific, regulatory approval for use as a medical device, several vendors are making progress in this area. For example, Aural Analytics' Speech Vitals – ALS solution (which collects and analyzes speech recordings to assist neurologists in the monitoring of amyotrophic lateral sclerosis) was recently granted designation as a Breakthrough Device by the U.S. Food and Drug Administration.
- Efforts are now underway to build and share large datasets of high-quality voice data for training and validation of algorithms. For example, the Colive Voice study aims to advance the use of voice for diagnosis, risk prediction and remote monitoring of multiple conditions through the collection and analysis of voice recordings of 50,000 individuals from across the globe.
- New multimodal solutions are entering the market that are combining voice biomarker analysis with additional biomarkers obtained through computer vision and other data sources (such as the electronic health record [EHR]) for clinical diagnosis and monitoring.
- Over time, we predict that technologies to enable digital clinical voice analysis will become embedded as a core capability of healthcare chatbots, virtual health assistants, ambient digital scribes and call center technology. This evolution, combined with the continued extension and scaling of healthcare provider virtual care services, will be the catalyst for accelerated adoption of this technology in the future.

Obstacles

- Despite the obvious potential of these solutions, increasing adoption is being hindered by the paucity of evidence of clinical effectiveness and the limited availability of commercial solutions.
- Training, testing and validating solutions are hampered by the lack of large, high-quality, characterized libraries of voice data from both well and disease-impacted individuals. In particular, algorithms require validation on large diverse population datasets for integration into mainstream clinical practice.
- Uncertainty regarding reimbursement models for services leveraging digital clinical voice analysis solutions limits adoption.
- No solution will be 100% accurate; thus the clinical and legal ramifications of both false positive and false negative results must be accounted for. A false negative may result in a patient not seeking required medical care, and a false positive may result in unnecessary clinical testing and patient anxiety.

User Recommendations

- Identify potential use cases by working with clinical leaders, CDOs, CNIOs and CMIOs to evaluate alignment of the current vendor landscape with clinical strategic priorities.
- Demonstrate both efficacy and practicality of identified use cases through small pilot projects in discrete clinical areas.
- Use your AI governance model to minimize risks associated with deployment of these solutions. Ensure early involvement of key stakeholders to address ethical, medical, legal, privacy and consent issues — even in a pilot phase.

Sample Vendors

Aural Analytics; Canary Speech; Clarigent Health; Cordio Medical; Deliberate Solutions; Kintsugi Mindful Wellness; Sonde Health; Telling.ai; Winterlight Labs

Gartner Recommended Reading

Applying AI — Governance and Risk Management

Digital Twins for Healthcare

Analysis By: Gregg Pessin

Benefit Rating: Transformational

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Definition:

A digital twin is a technology-enabled proxy that mirrors the state of a thing. A "thing" may be a physical or virtual asset, process, person, organization, or collection. The real-time health system (RTHS) is an example of a digital twin for a health system. The RTHS digital twin models the characteristics and behavior of a healthcare provider enterprise that is situationally aware, collaborative, and smart.

Why This Is Important

Situational awareness is at the heart of digital twins in healthcare delivery organizations (HDOs). Digital twins manifest information gathered from IoT and other sources to create a digital model of a real-world healthcare organization. They allow healthcare leaders to create an enterprise abstraction that exhibits the RTHS characteristics and behavior, and can be used to monitor, analyze, and predict how the enterprise will respond to changes in conditions and circumstances.

Business Impact

Digital twins positively impact these organizational areas:

- **Care delivery:** Clinical communication and collaboration, nurse call, alarms and notifications, and crisis/emergency management.
- **Patient engagement:** Experiential wayfinding, integrated patient room, interactive patient care, facilities and operations, patient throughput and capacity management, real-time operational dashboards, and supply chain.
- **Management and administration:** Real-time costing, healthcare information exchange, healthcare interoperability, and revenue cycle management.

Drivers

- Accelerating problem-solving and decision making, and enabling more efficient and effective care delivery and administration operations.
- Enabling easy testing of various scenarios that can lead to organizational improvement, by studying the effects of changing various inputs and operating conditions used by the digital twin.
- Allowing change impact to be understood, without disrupting services or the risk of impacting patient safety or quality.
- Enabling process simulations that are detailed and dynamic across the enterprise, and supporting many hospital operations and care delivery components.
- Getting the right information to the right people, at the right time and place, to enable highly informed decision making across the healthcare organization.
- Accelerating digital transformation by creating accurate real-time situational awareness for every aspect of the healthcare organization.

Obstacles

- The primary obstacle is poor data quality or low data point counts used to create the twins. Sound decisions cannot be made based on twins built from unreliable or incomplete data.
- Cultural obstacles exist based on a reluctance to trust a digital twin representation of a real-world healthcare entity. A quality boundary or threshold must be reached before that trust level can be achieved.
- Institutional barriers exist that can slow or prevent investment in these technologies, based on a misunderstanding of the potential value delivery offered by digital twins.

User Recommendations

- Include a concise digital twin vision within the HDO's digital transformation strategy. The CIO must establish and communicate the direct correlation between expected transformation outcomes, and the purpose and value of digital twins.
- Educate business and clinical units to inform them about the benefits of digital twins, and how they fit in with departmental and organizational goals. Start by identifying the right data to create highly effective digital twins and establish a collaborative environment for the initiative among stakeholders.
- Create a pilot program targeting simple models of patients, a department, or other entity tied to a specific desired business or clinical outcome to understand digital twin challenges. Begin by analyzing the underlying source data required to compose the digital twins, understanding that the twins' usability is directly correlated to their data quality.

Sample Vendors

GE HealthCare; Philips; PTC; Siemens; ThoughtWire

Gartner Recommended Reading

Innovation Insight: Healthcare Provider Digital Twins Transform Decision Making

Use RTHS Principles to Guide Digital Transformation

Data Fabric in HCLS

Analysis By: Gregg Pessin

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

A data fabric is a design framework for attaining flexible, reusable and automated data integration pipelines, services and semantics. It supports a broad spectrum of operational and analytics use cases on various platforms. Data fabric design provides the necessary data access capabilities for the composable healthcare enterprise.

Why This Is Important

Due to uncertainty and constantly changing market conditions, healthcare organizations need to be able to create and recompose business and clinical capabilities more quickly. Composable architecture is the solution to this requirement, and data fabric is the foundation of that architecture. Data fabrics will significantly reduce or eliminate manual data integration tasks and augment (in some cases, completely automate) data integration design and delivery.

Business Impact

Data fabric solves the healthcare industry's data problem. The sector has disparate data sources across care delivery, payer and life science enterprises. These isolated data sources hinder the timely, full-value delivery of enterprise-level information insights. Data fabric improves data access velocity, improving decision making. It offers an opportunity to eliminate manual data integration tasks significantly and automate data integration design and delivery.

Drivers

- The healthcare industry is in the midst of a digital transformation, which at its core requires composable enterprise architectures for success. Data fabric is a crucial enabler of composability. Adoption is low currently, but the hype is creating more interest as the healthcare industry begins to apply composable concepts to their application solution sets.
- Most organizations will find that they already have some of the base components of a data fabric, creating a solid foundation to begin the journey.
- Data science as a practice is maturing in healthcare, motivated by the need to expose more value from data. At the same time, new independent data sources with higher complexity drive the need for better data access solutions.
- Data fabric offers an alternative approach to traditional interoperability requirements. The data integration, interfacing and interoperability issues that plague the industry have another solution option with data fabric.
- New technologies that support the data fabric solution set are becoming generally available, including knowledge graphs, active metadata management and semantics management.

Obstacles

- Healthcare industry organizations lack enough high-quality data to train the machine learning (ML) required to activate metadata and enable a fabric.
- Lack of metadata in the early stages of data management initiatives — especially for on-premises deployments — will put initial pilots at risk of failure.
- Healthcare data returned from data fabric stacks must consider the privacy of the data-owning patient. In gathering the healthcare information, the data fabric technology layers must each comply with local regulations such as Health Insurance Portability and Accountability Act (HIPAA) and General Data Protection Regulation (GDPR).
- In addition to privacy, patient/member/consumer/citizen consent for access to their healthcare data is gaining momentum and shifting in complexity as granular consent gains traction. Data fabric capabilities must include honoring individual consent approvals to the data element level.

User Recommendations

- Assemble a fusion team of D&A practitioners, IT engineers and business users completing significant, manual data preparation for their projects. The CIO will find the right automation opportunities and gather the right team by finding personnel that experience the mundane task involved in delivering value from data.
- Task this newly formed team to identify where the data resources do not meet business or clinical requirements. The team should look for key technology solutions where users find accessing and using the associated data difficult.
- Develop KPIs that align with business outcomes, and capture performance before and after the pilot. Examples include correlating patient length of stay, delays due to an EHR availability outage, payer overpayment due to 30+ days, delay in access to paid claims data, or delayed clinical trial progress due to IT system inefficiencies.

Sample Vendors

Cambridge Semantics; Cinchy; CluedIn; Denodo; IBM; Informatica; Semantic Web Company; Stardog; Talend

Gartner Recommended Reading

Quick Answer: What Is Data Fabric Design?

Personalized Health

Analysis By: Amanda Dall'Occhio

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Emerging

Definition:

Personalized health improves an individual's health by predicting the likelihood of future illness and recommending actions or interventions to promote health and disease prevention. It analyzes a wide range of data, including clinical, genetics, lifestyle, behaviors, biometrics, genomics and social determinants of health. Personalized health employs technological advances in "omics" medicine and consumer data capture to identify individuals' optimal health pathways.

Why This Is Important

Early research has demonstrated personalized health's potential for revolutionizing the health industry by identifying patient-specific health risks early on, leading to disease prevention. The strategic end goal of personalized health is to create a healthcare system for wellness care — instead of sick care — by enabling early detection of illness or disease and preventing its progression using personalized treatment options.

Business Impact

Personalized health breakthroughs will eventually operationally and technologically disrupt the healthcare ecosystem and organizations' business models. The shift from curative to preventive care with personalized health interventions will become the new gold standard in medicine. It will aim to prevent illnesses before they happen through wellness and prevention efforts, and ultimately increase lifespans, decrease the incidence of lifestyle diseases and reduce chronic illness.

Drivers

- Personalized health implies that the business model of today's healthcare organization, which relies on repair care episodes, needs to alleviate the skyrocketing care cost and revenue risk of relying on ill patients. Advancement in personalized health promises to shift care delivery from curative to preventive by monitoring individuals' health, identifying risks and performing wellness and preventive interventions, radically changing primary and secondary care as we know it today.
- As healthcare shifts from fee-for-service to value-based care models, personalized health can support providers in identifying as many (some otherwise hidden) opportunities as possible to hone course of care and, ultimately, improve health outcomes.
- With advancements in machine learning and artificial intelligence (AI) capabilities, personalized health can assemble and provide an aggregated view of patients' health, including all relevant clinical and social determinants of health data points.
- With an influx of new regulations on interoperability globally, healthcare organizations can integrate, analyze and act on multiple datasets. These will enable direct connections to physicians, care workers, genetic counselors and other professionals and patients.

Obstacles

- Although evidence is mounting, it will take years to develop the technologies required to capture personalized health data elements, standardize their recording and analysis, and create evidence-based health pathways at scale. It will take even longer to develop AI-enabled insights from all the data required for each person.
- While advances in interoperability enable more collaborative approaches, current innovation networks are siloed with too much competition and insufficient collaboration for personalized medicine to succeed. It will take time to create public policy and develop reimbursement models that link the value of preventive interventions to successfully eliminate a condition that may develop over 50 years later.
- Personalized health depends on patient behavioral changes that can be difficult to achieve.
- Personalized health will continue to rise on the Innovation Trigger slope. However, we project it to be at least five to 10 years from reaching the Plateau of Productivity.

User Recommendations

- Track the leading adoption indicators for personalized health. These include decreases in the cost of sequencing and companion testing, reductions in the cost of treatment, and increasing rates of reimbursement for treatment.
- Find opportunities to leverage developing organizational competence in responding to genomic and biomarker analysis as well as consumer engagement to amass the data and analytics capabilities required for personalized health initiatives.
- Keep personalized health concepts on your growth strategy and roadmap as they establish population health management and invest in precision medicine platforms. Take the long view in capturing more data than less, positioning the organization for its use in research or AI-driven initiatives to see personalized health business opportunities.

Sample Vendors

2bPrecise; DNAnexus; Molecular You; Orion Health; Philips; Precision Digital Health; Syapse

Gartner Recommended Reading

Population Health Management Framework for Healthcare Provider CIOs

Innovation Insight for Digital Health Platform

At the Peak

Digital Health Platform

Analysis By: Andrew Meyer

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

The digital health platform (DHP) is an architectural approach that enables healthcare providers to respond rapidly to strategic imperatives and external uncertainties using modern cloud platforms and services. This approach combines a healthcare data fabric, a library of prebuilt digital business capabilities and composition tools to create the digital experiences.

Why This Is Important

The DHP approach enables CIOs to adjust the application portfolio at the pace of business change. It leads the organization to faster value realization when responding to strategic imperatives and external uncertainties. DHP also addresses a major strategic issue for providers, where existing monolithic EHR-centric application architecture cannot meet changing patient, consumer and clinical workforce demands.

Business Impact

The impact of a DHP includes:

- Addressing business capability gaps, more efficient use of IT and increasing value from current IT investments by repurposing data or application functionality
- A means for rapid innovation and reducing reliance on vendors that lock in buyers by seeking to commercialize access to underlying data
- Better business decisions through powerful data and analytics capabilities at patient, pathway and population health levels
- Improved resilience, adaptability and flexibility for organizational imperatives

Drivers

- Disruptions to the healthcare industry have required rapid innovation using new digital solutions, which are not immediately available from EHR vendors or other systems of record in the IT application estate. These disruptions include the need for on-demand virtual care, Internet of Things for home-based patient monitoring, clinical collaboration tools and multiexperience patient engagement tools.
- CIOs have an increased appetite for modern cloud and platform architectures and require highly compliant application environments.
- The market for healthcare-specific solutions that support the DHP approach is accelerating, and industry clouds are a strategic technology trend. They will drive generative AI building blocks offered to the healthcare industry.
- Organizations need to harness data from many operational systems to support care planning, coordination and data and analytics.
- CIOs need to continuously improve the clinician experience to reduce the burden of IT and data collection.
- Adoption of industry standards, such as FHIR, among healthcare IT vendors is increasing as application reuse, unmetered data access and improvements in interoperability are becoming essential requirements for connected care.
- IT talent shortages and underuse of nontechnical teams slow healthcare innovation.
- The position of this profile has moved close to the Peak of Inflated Expectations; it reflects rapidly advancing maturity and new market penetration by DHP vendors with industry experience and significant investment and market share across regions (see Market Guide for Digital Health Platforms). These platforms will also be the route by which industry cloud platform vendors bring generative AI to industry markets.
- Due to vendor investment and market interest, we expect the DHP to rise swiftly up and over the peak as drivers combine with the availability of regionally compliant, highly secure and available cloud SaaS and PaaS solutions.

Obstacles

- Regional legislation requires cloud vendors to adapt solution offerings for compliance. This may slow the availability of solutions and require complex precontract evaluation.
- The need to increase IT funding streams to support SaaS and PaaS pricing models in an industry that has historically used the capital for new investment.

- Low API maturity and delays by incumbent vendors to participate in open data ecosystems.
- Limited range of packaged business capabilities offered by DHP providers or third-party vendors.
- Lack of robust healthcare-specific standards and tools to design and operate a real-time data fabric.
- Shortage of IT talent in healthcare teams to apply this approach.
- Mindset among CIOs and executive sponsorship that retains focus on an EHR-first model for new investment.
- Commercial limitations of existing EHR contracts that prevent CIOs from requiring EHR vendors to shift toward a composable approach and improve the availability of open APIs.

User Recommendations

- Build DHP technical foundations by adopting an application strategy that is modular, composable and resilient.
- Change mindsets and adopt composable thinking by socializing the DHP approach with key stakeholders.
- Evaluate where poor digital experience is a priority and needs to change across existing business capabilities.
- Conduct a review of the current application portfolio to determine where gaps in capability exist or if there is a negative burden on clinical workflow.
- Form fusion teams with SMEs from the highest-priority business units, setting common objectives throughout the team.
- Evaluate DHP vendors based on cost, capability and fit with your existing licensing models for integration in terms of open APIs and across core I&O.
- Apply the Gartner Composability Business Index to assess the composability of current applications.

Sample Vendors

Amazon Web Services (AWS); Better; Google; Innovaccer; InterSystems; Microsoft; NTT DATA; Philips; Salesforce

Gartner Recommended Reading

Tool: Healthcare Provider CIO Executive Presentation for a Composable Digital Health Initiative

Establish Interoperable Application Ecosystems Early in Your Composable Healthcare Provider Roadmap

Tool: Healthcare and Life Science CIOs Executive Presentation for Composable Data and Analytics

Market Guide for Digital Health Platforms

Case Study: Intermountain Healthcare Creates a Digital Health Platform for Growth and Agility

Patient-Centered CDS

Analysis By: Veronica Walk

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Emerging

Definition:

Patient-centered (PC) clinical decision support (CDS) directly engages with the patient or caregiver to deliver evidence-based CDS, focusing on meaningful and achievable personal health goals and outcomes for the individual patient. These solutions empower the patient to actively participate as a member of their care team, enable shared decision making between the patient and provider, and equip the patient to achieve their highest level of health.

Why This Is Important

PC CDS is an important, yet largely missing component of CDS. Most CDS technologies are focused on supporting clinician decision making at the point of care. Clinicians can recommend and prescribe the best evidence-based treatments, but ultimately, the patient must accept and adhere to these recommendations to achieve their highest level of health. PC CDS can advance the goals of value-based care and health equity by engaging patients as active members of their care team.

Business Impact

Healthcare providers and payers can use PC CDS to:

- Increase patient and caregiver knowledge about their conditions and choices, and provide personalized, actionable guidance.
- Increase patient satisfaction and loyalty by incorporating patients' values and preferences in their healthcare decisions.
- Advance value-based care by facilitating shared decision making, increasing the likelihood of adherence to treatment plans and enabling providers to intervene or adjust plans as needed.

Drivers

- As healthcare continues to shift toward value-based care, it is essential to engage the patient in their clinical decision making and care planning tailored to their personal goals, abilities and preferences.
- Advancing health equity will require an increased focus on individual patient's preferences, values and other key considerations, such as social determinants of health (SDOH), when making clinical decisions and recommendations. PC CDS can help ensure these patient-centric factors are considered alongside evidence-based medicine.
- Shared decision making in healthcare has been shown to improve patient satisfaction and outcomes, and remains a key objective of patient-centered care initiatives. PC CDS can facilitate shared decision making by providing patients and caregivers with personalized guidance and recommendations to understand their conditions and choices.
- The proliferation and adoption of consumer health devices and tools, such as smartwatches and self-triage tools, drive increased patient engagement and ownership of their health data and decisions, facilitating progress toward patient-directed care and openness to PC CDS.
- Government-led initiatives and regulations drive patient access and ownership of their health data, which is critical to improve patient-directed and shared decision making.
- This year, we have updated this technology profile to replace and encompass the former profile, automated patient decision aids (APDAs). PC CDS follows a similar trajectory with a higher benefit rating.

Obstacles

- Paternalistic culture in medicine remains a barrier to empowering patients as decision makers in their care.
- Patients and providers are skeptical of PC CDS, especially solutions leveraging advanced capabilities such as artificial intelligence and machine learning.
- As with clinician-facing CDS, PC CDS faces challenges with keeping current with evidence, and perhaps, with less oversight for direct-to-consumer solutions.
- Lack of integration with electronic health records (EHRs), patient engagement, care management and other clinical systems will impede adoption and perpetuate data silos.
- Healthcare providers are in the early stages of integrating patient-generated health data (PGHD) into their EHR and clinical workflows. PGHD will be an important component of PC CDS. Concerns over the quantity and quality of PGHD will slow adoption.
- Lack of data standards for PGHD, or adherence to existing data standards, will perpetuate data quality and interoperability challenges and impede scalability.

User Recommendations

- Work with clinical colleagues to identify potential pilot use cases for PC CDS, for example, chronic pain management, maternal medicine or perioperative care. Ensure PC CDS solutions fit into your overall patient engagement strategies and platforms, such as your digital front door.
- Ensure PC CDS meets the intent of patient centricity by involving patients in designing and deploying tools, and measuring success based on improved health outcomes and patient and clinician satisfaction.
- Increase clinician engagement and support for these solutions by integrating them within clinical workflows, such as the EHR.

Sample Vendors

Abridge; EBSCO Information Services; Epic; Medical Brain; Wolters Kluwer

Gartner Recommended Reading

Market Guide for Clinical Decision Support Solutions

Cleveland Clinic Abu Dhabi Improves Consumer Engagement Through a Digital Front Door

Innovation Insight for Consumer Experiences in Healthcare and Life Sciences

Precision Medicine

Analysis By: Veronica Walk

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Precision medicine improves health outcomes by precisely diagnosing and treating medical conditions. It leverages individual factors of the disease, such as physiology and genomic indicators, and patient factors, such as social determinants of health and lifestyle. Precision medicine technology orients this data in context for clinical diagnosis and treatment protocols — thus integrating electronic health records (EHR), genomics, labs, images, treatment protocols and other digital data sources.

Why This Is Important

Precision medicine has significant potential to transform medicine and improve health outcomes. As the underlying technologies mature, use cases for precision medicine continue to emerge in clinical practice and complex disease treatment (for example, targeted treatment plans for cancer patients). To remain competitive, healthcare providers must adopt these technologies to bring precision insights to clinical diagnosis and treatment and bridge clinical decisions into care delivery.

Business Impact

Precision medicine can transform clinical decision-making and enable mass personalization of healthcare consumer engagement. It will likely drive the majority of healthcare delivery and targeted clinical decision support in the next five-to-10 years. Healthcare providers presently report significant reductions in medical diagnosis errors and improved treatment efficacy and patient outcomes. These results ultimately lead to higher quality and lower total cost of care.

Drivers

- Advancements in genomics plus the inclusion of genomic data with clinical data are helping to curate the expanded knowledge base required for precision medicine. This has led to more commercialization of precision medicine technology in the last two years.
- EHR vendors have begun incorporating discrete genomic data into the patient record, enabling precision medicine via point-of-care pharmacogenomic clinical decision support (CDS).
- New techniques yield insights into disease origins, for example, which therapies are effective given an individual patient's profile, and how various diseases respond to treatments.
- Large federated learning models and cross-industry collaboration are making precision medicine algorithms more precise, flattening out biases, and thus increasing trust in the ability to use the results to augment clinical diagnosis and treatment.
- Life sciences and pharmaceutical companies are advancing precision medicine through new products better tailored toward more specific patient cohorts — even specific genotypes.
- For these reasons, we have advanced precision medicine closer to the peak of the Hype Cycle.

Obstacles

- Precision medicine at scale is accelerating unevenly. Many early use cases are in oncology, but clinical specialists in other areas of medicine are closely following the development of additional approved diagnostic and therapeutic use cases in their respective fields.
- Regulatory requirements and government agency approvals slow adoption in heavily regulated markets.
- Clinicians cannot always act upon precision knowledge since many are not well-trained to incorporate genomic data and other insight from precision medicine within their workflows.
- Additional challenges include the cost and reimbursement of genomic sequencing, EHR integration, and managing the volume of data required to deliver precision medicine fully.

User Recommendations

- Assess the preparedness of your organization's data and analytics strategy and capabilities to support precision medicine. Precision medicine requires robust, efficient and actionable patient data collection and the analysis and assessment of that data to arrive at a precise diagnosis and treatment.
- Evolve toward a data fabric architecture to collect, curate and leverage diverse patient information sourced from genomics, mobile apps and devices, wearables, patient-generated health data, and social determinants of health.
- Organize a fusion team including clinicians, data scientists, clinical informaticists, and other domain experts to explore opportunities to pilot precision medicine use cases. Evaluate potential vendors based on their ability to interoperate within the data fabric architecture and enable point-of-care precision medicine based on real-world evidence.

Sample Vendors

2bPrecise; BC Platforms; Orion Health; Philips; Syapse; Tempus; Verily

Gartner Recommended Reading

Market Guide for Clinical Decision Support Solutions

Healthcare and Life Science Business Driver: Medical Technology Innovation

Total Experience

Analysis By: Michelle DeClue, Jason Wong

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

Total experience (TX) is a strategy that creates superior shared experiences by intertwining four disciplines: customer experience (CX), employee experience (EX), multiexperience (MX) and user experience (UX). The goal is to drive greater customer and employee confidence, satisfaction, loyalty and advocacy using digital and nondigital techniques.

Why This Is Important

The march toward mobile, virtual and distributed customer and employee interactions has accelerated, making a compelling case for TX adoption. TX is about using technology and interactions to enhance, empower and embolden both customers and employees. Executive leaders must evaluate the intersections between these experiences and increase both customer and employee confidence and lifetime value. It's about how these experiences make the customer and employee *feel about themselves and the decisions they have to make*.

Business Impact

TX is designed to retain and cultivate greater **customer and employee lifetime value,** a calculation based on the longevity of the relationship and the value they bring to the organization. Losing profitable customers can harm the financial position of an organization. Employee lifetime value also has financial repercussions:

- Loss of institutional knowledge and productivity when an employee leaves.
- Impact to existing team members in terms of morale and load management.
- Cost of recruiting, onboarding and training new talent with no guarantee of productivity.

Drivers

- Technology advancements allow greater opportunities to connect across multiple platforms with multiple ways of engagement (voice, gestures, immersion, etc.).
- Edge devices with cloud-based applications have proliferated across multiple organizations and in consumer electronics and vehicles, providing more opportunity to connect and understand employees, customers and the technology data points at a higher level.
- Employees can facilitate better CX through digital solutions, such as giving a discount or promo code, adding additional time to due dates and deadlines, unlocking exclusive content, or providing next best actions.
- Initial investments can be scaled to add external ecosystem partners to increase the long-term value.
- AI can be applied to see how other similar customer issues were resolved and offer the solution to rectify a customer's issue. Machine learning can recognize where gaps are and either refine the process or notify a developer to address the issue. Recurring patterns or orders can be used to identify how to improve products and services, such as with personalized products or most-requested additional services for a venue.

Obstacles

- **Concept:** The TX concept in the early stages of permeating into organizational roadmaps for joining CX and EX initiatives. Some organizations may feel like they've already been doing some aspects of TX. While they may have focused on each of the four disciplines of TX separately, many have not interlinked or aggregated them from a holistic perspective of the multiparty experiences to have seamless and frictionless UX.
- **Ownership:** Ownership over digital employee experience is also unclear in many organizations. Expanding the aperture to the more expansive TX can have knock on improvement effects to EX, which then yields a better CX — not only digitally, but within employee-to-customer interactions.
- **Inertia:** Organizations making it through the disruptions of the last couple of years without drastic changes to the CX may be inclined not to adopt a new TX strategy.
- **Technology:** Even as organizations transform digitally, they still struggle to modernize digital experiences. This prevents them from achieving richer MX customer and employee journeys across multiple devices with multiple touchpoints and modalities.

User Recommendations

- Form a TX fusion team that crosses activity silos by engaging with CX, EX, UX and MX leaders or centers of excellence across your organization. Use intersecting performance plans (such as OKRs), to incentivize interteam cooperation.
- Start small by applying total experience to a single customer or employee journey, to be built upon further in the future. Engage with business stakeholders and product managers by conducting workshops to determine how TX strategy can transform their roles and make the organization more agile.
- Identify critical gaps in customer and employee interactions by encouraging project teams to also consider how to leverage MX and UX initiatives to improve those experience gaps.
- Use TX strategy to determine future-state business capabilities, which, in turn, will drive targeted business outcomes. This should include customer and employee journey mapping.
- Apply TX to close the strategy to execution gap by finding important business opportunities that have been held back by their siloed CX, EX, UX or MX efforts.

Sample Vendors

Deloitte; Qualtrics; Salesforce; ServiceNow; TechSee; Valtech; Zoom

Gartner Recommended Reading

Achieve Best-in-Class CX Wins Through Total Experience

Quick Answer: How Do I Get Started With Total Experience?

Tool: Total Experience Scoping Guide

Case Study: Connect Customer and Employee Journeys to Deliver Superior Experiences (the LEGO Group)

Care Pathway Orchestration

Analysis By: Sharon Hakkennes

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Care pathways provide a standardized, evidence-based clinical plan for the appropriate sequence of care delivery activities, such as investigations, treatment and education, for a defined patient cohort. Care pathway orchestration employs digital technologies to coordinate care delivery, deliver decision support and automate specific processes across a care journey. They enable healthcare providers to deliver personalized, proactive and coordinated care.

Why This Is Important

Patient-centered care actively engages patients, coordinates services across the continuum and is a core objective for healthcare providers. Information silos and service fragmentation prevent many healthcare providers from realizing this goal. Care pathway orchestration solutions address these challenges by delivering digitally enabled, personalized and coordinated care experiences, thus creating efficiencies through automation and supporting clinicians to practice at the top of their license.

Business Impact

Care pathway orchestration impacts the care journey as:

- Automation of administrative and routine clinical tasks lowers costs and improves staff productivity.
- Delivery of care aligned to standardized clinical pathways eliminates unnecessary variation, improving the quality and consistency of care.
- Proactive and personalized outreach to patients increases adherence to clinical pathways, leading to improved health outcomes and patient experience.

Drivers

- The shift to value-based care requires healthcare providers to build new capabilities to engage with patients longitudinally across their care journey.
- Increasing competition and rising patient expectations are driving a strategic focus on improving the patient experience for many healthcare providers. Care pathway orchestration solutions support improved experiences by addressing issues of fragmentation across the care journey.
- In the face of ongoing financial pressures and significant administrative and clinical staff shortages, healthcare providers are adopting digital solutions to deliver efficiencies in care delivery without compromising clinical outcomes.
- Advances in interoperability and rising interest in composable architectural approaches are accelerating adoption of solutions, such as care pathway orchestration, to address issues related to siloed data caused by monolithic applications.

Obstacles

- For organizations operating on fee for service reimbursement arrangements, the inability to adequately charge for services delivered through these solutions and quantify ROI is a significant barrier.
- Interoperability remains a challenge for most healthcare organizations, preventing them from achieving the required integration into core clinical systems.
- Bidirectional exchange of information between care pathway orchestration solutions and core clinical systems is essential to ensure information flows across the care journey and to optimize both the patient and clinician experience.
- Lack of staff and clinician engagement lead to resistance to adopt solutions and change clinical workflows, as does a lack of trust in underlying algorithms including those that inform care pathways and activities.
- The increasing digitization of touchpoints with health services has the potential to exacerbate health inequities for certain populations that are unable to access or use the digital tools.

User Recommendations

- Implement care pathway orchestration technologies as a component of your organizations' broader patient engagement and total experience strategies.
- Include measures of patient and clinician experience and satisfaction, along with quality and efficacy, in evaluation frameworks.
- Start with well-defined clinical pathways, such as elective surgery, to prove outcomes and use take-aways from these early implementations to expand into increasingly complex pathways.
- Evaluate vendors on their preconfigured pathway capabilities and their ability to configure pathways unique to your organization across a broad range of use cases.
- Ensure your chosen solution enables personalization of patient engagement across a variety of channels (e.g., SMS, interactive voice response [IVR], mobile app).
- Develop systems and processes to aggregate data collected through the platform, such as adherence to pathway requirements and patient outcomes, to deliver insights and drive continuous improvements in care pathway design.

Sample Vendors

Amwell (Conversa Health); Health Catalyst (Twistle); Lumeon; Medical Brain; Memora Health; Personify Care; SeamlessMD; UpHill

Gartner Recommended Reading

Healthcare and Life Science Business Driver: Total Experience Transformation

Digital Front Door

Analysis By: Sharon Hakkennes

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

A digital front door (DFD) acts as the primary point of digital engagement and digital interaction with consumers. It consists of a multiexperience communications platform (including web portals, mobile applications, SMS and voice) used to provide multiple stakeholder groups (including consumers, family members or ecosystem partners) centralized access to healthcare providers' digital and analog products and services.

Why This Is Important

For many healthcare providers, the rush to deploy digital capabilities to meet the increasing demand for digitally enabled healthcare services is resulting in independent digital interactions that do not support a cohesive patient journey. The DFD solves this issue by spanning a wide range of digital touchpoints to link these interactions and orchestrate comprehensive health journeys for patients across diagnosis, treatment and care management services.

Business Impact

Through the deployment of a DFD, healthcare providers can:

- Streamline the end-to-end patient journey, improving patient activation, engagement and satisfaction.
- Personalize patient journeys across touchpoints, providing an avenue to address gaps in healthcare.

- Enhance digital presence and experience to drive increased revenue through new patient acquisition, and increased patient retention and loyalty.

Drivers

- As healthcare providers continue to scale and expand virtual care offerings, capabilities to digitally engage patients must mature to ensure equitable access to services, optimize patient activation and engagement, and maximize clinical outcomes.
- The DFD enables healthcare providers to differentiate from competitors on the basis of consumer experience. This is becoming increasingly important as traditional healthcare providers expand virtual care services and new market entrants (such as big-box retailers, digital giants and startups) continue to advance into healthcare delivery with a diverse range of digital offerings.
- Increasing consumer and patient expectations for highly personalized digital healthcare interactions across multiple touchpoints and channels are driving the ongoing evolution of healthcare providers' patient engagement strategies and DFD adoption.
- Traditional electronic health record (EHR) tethered portals do not provide the flexibility in digital channels and experiences or the breadth of capabilities necessary to support all requirements of a healthcare provider's DFD.
- The DFD is a critical capability for healthcare providers to maximize patient engagement across their health and wellness journey. This is of particular importance in supporting the shift from episodic to longitudinal care delivery associated with increasing uptake of value-based care.

Obstacles

- Integration remains a significant barrier to DFD deployment. The DFD is not delivered through a single solution; data must flow freely across solutions and touchpoints to optimize the patient experience.
- For healthcare providers that have made significant long-term investments into EHR solutions and their associated patient portals, justifying the time and cost required to transition to a DFD can be a barrier to adoption.
- Overinvestment in digital solutions in the absence of addressing nondigital needs that should be orchestrated by the DFD has the potential to exacerbate health inequities for certain populations unable to access or use digital tools.

User Recommendations

- Gain organizational endorsement for your DFD strategy and roadmap by identifying the cost, revenue, clinical and experience gains that will be realized through the enablement of comprehensive, personalized digital patient journeys.
- Identify strategic vendor partners by evaluating not only their capabilities but also their ability to align with your development and implementation roadmaps and timelines.
- Reduce time to deployment and value realization by adopting a composable architectural approach that enables the composition of existing applications (such as EHR) and custom-built capabilities.
- Maximize consumer, patient and employee adoption by taking a total experience approach to address digital and nondigital needs across their respective journeys — especially the components that intersect. Invest in multiexperience technologies to improve user experiences across channels, devices, touchpoints and interaction modalities.

Sample Vendors

Appian; b.well Connected Health; Gozio Health; Kyruus; League; Loyal Health; Pager; Pegasystems; Salesforce

Gartner Recommended Reading

Cleveland Clinic Abu Dhabi Improves Consumer Engagement Through a Digital Front Door

Innovation Insight for Digital Health Platform

Ambient Digital Scribe

Analysis By: Sharon Hakkennes

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

Ambient digital scribes are intelligent documentation support systems that leverage speech recognition, natural language processing (NLP), AI and machine learning (ML) to automate documentation of the spoken aspects of a clinical encounter. These solutions use ambient listening and speech recognition technology to convert captured audio to text. Relevant information from the clinical encounter is extracted and summarized before being uploaded to the electronic health record (EHR).

Why This Is Important

EHRs have increased the burden of documentation and are associated with negative impacts on work-life balance and clinician burnout. These issues are especially acute in the U.S., where physicians routinely spend a significant proportion of their day as well as time outside of office hours completing documentation. Ambient digital scribes address these issues by replacing clinicians with technology to automate the clinical documentation process.

Business Impact

Ambient digital scribes promise a number of benefits including:

- Reducing time spent on clinical documentation and increasing the timeliness, completeness and accuracy of notes
- Addressing issues of clinician burnout associated with documentation and increasing the time available for clinicians to spend with patients, thereby improving engagement

- Supporting the move to value-based care models, which rely heavily on clinical documentation to identify gaps in care and inform shared savings payments

Drivers

- Healthcare providers are in crisis due to workforce burnout and staffing shortages. Ambient digital scribes help alleviate the documentation burden associated with the EHR, and deployment of these solutions is being used as a tool to support attraction and retention of physicians.
- Many healthcare providers have employed human scribes to chart patient encounters in real time, either in person or off-site (i.e., virtual scribes). Scribes require considerable training and are costly — ambient digital scribes are emerging as a viable and scalable alternative.
- Maturation and evolution of the technology, including the use of large language models, are improving the accuracy of solutions and reducing the need for quality checking of notes by a human prior to surfacing to the clinician. This, combined with an increasing number of solutions in the market, will drive down solution licensing costs.
- New market entrants are expanding the availability of solutions beyond the U.S., such as in Canada and France.
- Maturing speech recognition and NLP capabilities of cloud service providers and their healthcare vertical offerings are enabling healthcare providers to develop solutions to address specific problems at their organizations. For example, Houston Methodist Hospital is leveraging Amazon Web Services (AWS) capabilities, including Amazon Lex and Amazon Transcribe Medical, to deliver voice assistant and ambient digital scribe capabilities in operating theaters and ambulatory clinics.

Obstacles

- Underlying models must be trained by specialty, specific to the language spoken and global variations in healthcare delivery models.
- Commercially available solutions are currently limited to ambulatory settings. Solution vendors are just beginning to pilot capabilities in the inpatient setting with a focus on nursing documentation.
- Ambient digital scribes capture the entire clinical encounter, raising privacy, ethical and legal concerns, which must be addressed prior to implementation.

User Recommendations

- Identify potential use cases for ambient digital scribes across your organization by actively engaging with the chief medical informatics officer/chief nursing information officer (CMIO/CNIO) and clinical leaders. Start with targeted specialty areas to run proofs of concept, using lessons from early trials to scale over time.
- Look beyond the hype when evaluating different solutions by carefully evaluating the approaches taken to develop the underlying models to ensure accuracy and minimize bias. Prioritize solutions that demonstrate explainability and traceability of the output.
- Future-proof your vendor selection by evaluating their product development roadmap for their ability to capitalize on rapidly evolving generative AI capabilities and alignment with your organizations' pain points and priorities.
- Address privacy, ethical and legal concerns by enabling robust discussion and debate with legal, clinical and operational leaders. Develop policies and processes that deal with issues of consent, data ownership, retention and secondary use.

Sample Vendors

3M (M*Modal); Abridge; Ambience Healthcare; Augmedix; DeepScribe; Microsoft (Nuance); Suki

Gartner Recommended Reading

Innovation Insight: Ambient Digital Scribes Reduce Clinical Documentation Burden

Quick Answer: What Healthcare Provider CIOs Need to Know About LLM Applications Such as ChatGPT

Large Language Models for Care Delivery

Analysis By: Sharon Hakkennes, Jeff Cribbs

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Definition:

Large language models (LLMs) are generative AI algorithms trained on large volumes of unlabeled textual data. Applications can use LLMs to accomplish a broad range of tasks, such as content generation, content summarization, search, language translation and augmenting conversational assistants for care delivery.

Why This Is Important

The hype created by the release of ChatGPT, an application that leverages the GPT LLM, saw LLMs rapidly accelerate to the Peak of Inflated Expectations — creating both excitement and apprehension regarding its potential. Clinicians, hospital administrators and technology vendors immediately saw the value proposition of this technology in addressing some of the biggest challenges being faced by healthcare services today, such as clinician burnout and staff shortages.

Business Impact

Early applications have been focused on administrative tasks — such as clinical documentation, information summarization and data interpretation — that help improve operational efficiency, reduce cost and free time for clinicians to spend with patients. The ability of LLMs to generate humanlike interactions has the potential to improve patient education, engagement and adherence to treatment plans. Other evolving use cases include clinical decision support and clinician education and training.

Drivers

- Healthcare systems across the globe are facing numerous challenges, such as staff shortages, clinician burnout, rising costs and unsustainable demand for service, that are threatening their ability to deliver on healthcare's quadruple aim. LLMs have the potential to drive operational efficiencies and augment clinicians in the provision of high-quality clinical care. For example, ambient digital scribe solutions are leveraging LLMs to automate documentation of a clinical encounter.
- The public release of ChatGPT is enabling broad-scale experimentation and research on the potential applications of LLMs for healthcare providers with promising early results. For example, researchers from University of California San Diego used a sample of 195 publicly available patient questions and physician responses, comparing ChatGPT's response to the question with that of the physician. Evaluators preferred the chatbot's response in almost 80% of cases, and the proportion of responses rated as empathetic or very empathetic was significantly higher for the chatbot than for physicians.
- There is a steady cadence of mature and startup healthcare technology vendors leveraging LLMs either through integrations or as a core component of their technology. For example, Epic has partnered with Microsoft to integrate the Microsoft Azure OpenAI Service with Epic's electronic health record (EHR). Early use cases include drafting clinician responses to patient (In Basket) messages and enabling natural language queries and interactive data analysis in Epic's self-service data reporting tool, SlicerDicer. And Abridge's ambient digital scribe solution has been built using the BERT LLM.
- Large technology companies with healthcare industry cloud platforms (such as Microsoft and Google) are making enormous investments in developing new LLMs, demonstrating and broadcasting their achievements in a race to achieve a strong position in the LLM space.

Obstacles

- There is widespread misunderstanding of the technology. This can result in unproductive strategic discussions and reflexive governance decisions to prohibit use of LLM tools.
- Use cases that will transform healthcare delivery require higher degrees of proven accuracy and safety than the 80% to 90% general performance LLMs demonstrate today.
- LLM outputs are not currently explainable — at least not in the sense we are accustomed to in healthcare when we validate rule-based software, clinical protocols or efficacy studies. LLM use-case adoption will be constrained by the need for transparency about decision making.
- There is significant uncertainty about the future regulatory environment for LLMs. Issues include intellectual property in LLM training datasets, privacy and confidentiality of enterprise data, and legal liability for content generated by the LLM.
- Many LLMs are cloud-based, so the data may have to leave the control of the healthcare organization — creating a risk of exposing protected health and other confidential information.

User Recommendations

- Accelerate clear, effective internal communications by ensuring business, clinical and technology leadership teams have a common set of definitions for key terms in generative AI. Build a foundational understanding of how LLMs — such as GPT — work, along with associated risks.
- Develop an understanding of the different types of LLMs and where they are applied. Similarly, become familiar with techniques for working with these models, including prompt engineering, fine-tuning and the role of vector databases.
- Engage your patient populations directly by convening sessions with patient advisory groups to understand current utilization of LLMs and LLM-enabled applications like ChatGPT, ascertain perceptions of the technology, observe first usage where possible and trial messaging for safe patient usage.
- Ensure your vendor partnerships are positioning their products and services to maximize the value and manage the risk presented by LLMs by making generative AI a regular point of discussion.

Sample Vendors

Amazon Web Services; Google; John Snow Labs; Microsoft; OpenAI

Gartner Recommended Reading

Quick Answer: What Healthcare Provider CIOs Need to Know About LLM Applications Such as ChatGPT

GPT-4 Impacts and Actions in Healthcare and Life Science

Blockchain Platforms for Healthcare

Analysis By: Gregg Pessin

Benefit Rating: Transformational

Market Penetration: Less than 1% of target audience

Maturity: Adolescent

Definition:

Blockchain platforms provide the foundation to create and run blockchain solutions and decentralized networks. This includes support for distributed ledgers, decentralized consensus, tokenization and smart contracts. They enable the creation of blockchain solutions that provide immutability, transparency, decentralized contract execution and tokenization of physical or digital assets. In healthcare, blockchain can facilitate the secure exchange of health information.

Why This Is Important

Blockchain platforms are the foundation on which blockchain applications are built and managed. The key aspects of blockchain — distributed ledger, immutability, transparency, tokenization and support for smart contracts — are implemented through blockchain platforms. The potential of this technology to transform economic interactions could impact the health value chain, regulators, suppliers and consumers.

Business Impact

Blockchain can enable efficiency when reaching new customers, extending relationships with supply chain partners, and offering better quality and more complete linkages between events and data. Blockchain has the potential to expand the boundaries of healthcare by connecting industry systems of record directly to end users, without the burden of centralized control.

Drivers

- Leading enterprises are starting to realize that blockchain can address multiple problems that other technologies cannot. This includes the ability to audit and provide oversight of public fund distribution, delivery and use of healthcare incentives to change public action, and decentralized identity management for contact tracing.
- Development continues to progress in design, testing and piloting across the industries. Furthermore, it has gained more traction with the digital acceleration fostered by addressing the challenges brought about by COVID-19, including digital identity validation.
- Today, breakthroughs are few, with enterprise pilots concentrated on blockchain-inspired or distributed ledger technology (DLT) solutions.
- For the most part, market adoption has halted recently, as the industry continues to explore how blockchain can support business process efficiency improvements. Interest in metaverse implications for healthcare has sparked some new interest.
- As digital acceleration pervades all industries and the public sector, more attention is being paid to specific use cases that blockchain platforms can support, such as credentialing, document management and supply chain.

Obstacles

- Many CIOs realize that standard distributed database-style projects do little to sufficiently boost returns.
- The transformative nature of blockchain at a process, operating and business model level (decentralization and tokenization) implies the need to break and remold decades-old healthcare industry processes, relationships, systems, and structures.
- Most projects require cooperation among different entities, but achieving governance and cooperation across multiple enterprises is difficult.
- Adopting blockchain features and capabilities to provide business value requires enterprise process adjustments, which are disruptive to today's business processes. Adoption in healthcare continues to be very slow.
- The full scope of decentralization demands that the platform solve competing demands regarding cost, performance, compliance and security, while trying to match or better traditional features of enterprise software, including ease of use, developer support, reporting, and interoperability.

User Recommendations

- Track blockchain's market readiness in healthcare, and factor these trajectories into your strategic plans and investment timing. The most transformative and impactful applications will be oriented to ecosystem services with multiple organizations involved, and they will take longer to evolve.
- Differentiate the kinds of blockchain technology providers and disruptors by establishing a map of solution providers in your healthcare industry sector.
- Use Gartner's guidance (see Guidance for Blockchain Assessments) for identifying opportunities and apply the decision framework to determine the blockchain technology approach.
- Experiment with innovative trials using blockchain and be ready for setbacks, as additional use cases emerge and the technology continues to evolve.

Sample Vendors

Enterprise Ethereum Alliance; Hyperledger Foundation; R3

Gartner Recommended Reading

Guidance for Blockchain Assessments

Quick Answer: What Is Blockchain?

Top Five Reasons CIOs Should Care About Blockchain

Sliding into the Trough

AI-Enabled Diagnostic Imaging Interpretation

Analysis By: Jeff Cribbs, Laura Craft

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

AI-enabled diagnostic imaging interpretation uses deep learning techniques, machine learning (ML) and classification technology on large sets of labeled medical images to create algorithms that enable faster and more accurate findings from an imaging study. AI-enabled interpretation can be applied to radiological and pathological images such as X-ray studies, MRI, CT scans and pathology.

Why This Is Important

Radiology and pathology images contain critical insights about patient health. As the number of studies and images increases, there is rising concern about shortages of imaging specialists to meet the demand. AI-enabled solutions can augment imaging specialists for prescreening large numbers of images, helping clinicians prioritize their workloads and focus on the most urgent images. In poorer less developed health systems, it can deliver imaging expertise where it was not previously feasible.

Business Impact

AI-enabled diagnostic imaging interpretation promises a range of benefits:

- Reduce burnout and time spent on prioritizing caseloads while directing imaging specialists to high-risk findings requiring immediate attention.
- Reducing the likelihood of a missed diagnosis, as the AI algorithms flag abnormalities that the reader's eye may miss at times.
- Additionally, the technology can enable increased and timely access to radiological and pathological services for remotely located patients.

Drivers

- Regulatory bodies worldwide are actively working on developing and regulating frameworks for approving AI-powered solutions that can augment clinicians' decision making when reading diagnostic images.
- While X-ray, CT and MRI have been the primary modalities, use cases are emerging in other areas such as mammography (including 3D tomosynthesis), whole slide imaging in pathology, fundus imaging (of the eye), ultrasound and echocardiography.
- Recent foundational research in pathology has illuminated another potential driver of AI diagnostics: The ability to identify novel features for disease prognostication and treatment. In this learning from deep learning model, elements of the image that were not previously known to clinicians to be significant are identified as such by the AI.
- Globally, we see researchers and government agencies implementing policies to improve technology adoption, by bringing reimbursement aid for hospitals using the solutions. The Centers for Medicare & Medicaid Services (CMS) in the U.S. has granted New Technology Add-On Payment (NTAP) to various vendor solutions offering AI/ML solutions for diagnostic image interpretation. The NHS has announced its intent to fund certain high-value AI-based software medical devices in 2023 (see MedTech Funding Mandate Policy 2022/23). Health Insurance Review and Assessment Service (HIRA) agency in Korea is working actively to introduce guidelines to enable hospitals to receive extra reimbursement for AI in radiology (see Radiology Technologies Using AI Can Get Reimbursement, Korea Biomedical Review). A Springer Nature's article suggests a novel payment design intended to be more equitable and sustainable in the long term.
- Major picture archiving and communications system (PACS) vendors continue expanding their capabilities by bringing AI-algorithm marketplaces that offer a range of AI algorithms designed for specific clinical use cases (such as cardiology, bone health and oncology). This approach leads to a simplified integration process with native PACS systems and often helps reduce the total cost of ownership to the healthcare provider.

Obstacles

- Despite the new ideas for reimbursement cited above, for providers planning to invest long-term in implementing technology, there remains uncertainty regarding the financial implications when imaging specialists are aided or even replaced by computer systems.

- Ongoing skepticism among some providers with apprehension regarding the disruption to existing reporting workflows that many radiologists view as already efficient.
- Concerns around health equity in the representation of populations in training datasets, the algorithmic bias introduced or reinforced by current practices, and the potential for algorithmic drift as equipment and medical practice change over time.

User Recommendations

- Prepare for the adoption of AI for diagnostic imaging interpretation by establishing a strong AI governance strategy. The strategy should address the benefits, risks and regional regulatory requirements and establish metrics to measure the value and adoption by the clinical workforce.
- Build the business case for investment into AI-enabled diagnostic imaging interpretation by collaborating with clinical imaging leaders and understanding how the technology offers the potential to improve medical accuracy and departmental efficiency, and reduce clinical burnout.
- Assess the vendor products by establishing a vendor evaluation framework that evaluates the solution's ability to integrate and clinically transform existing medical imaging workflows and performance at scale, and meet compliance and regulatory approval requirements.

Sample Vendors

Aidoc; DiA Imaging Analysis; GE HealthCare; MaxQ AI; NANO-X IMAGING; PathAI; Philips; Proscia; Viz.ai

Gartner Recommended Reading

Innovation Insight for AI-Enabled Diagnostic Imaging Interpretation

Case Study: AI-Enabled Diagnostic Imaging Interpretation (Bolton NHS Foundation Trust)

Algorithmic Medicine

Analysis By: Veronica Walk

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Algorithmic medicine enables advanced clinical decision support using insights and rules built from clinical guidelines, evidence-based best practices, and other clinical data repositories to accurately draw “expert level” diagnosis and treatment decisions. These solutions rely on artificial intelligence (AI), machine learning (ML), natural language processing and rule-based algorithms to augment clinical judgment by suggesting diagnoses and specific treatment protocols.

Why This Is Important

Algorithmic medicine solutions can augment certain clinical activities, up to and including diagnosis and treatment, enabling increased diagnostic accuracy and earlier interventions, and freeing clinicians to focus on clinical situations that require human interaction. This is supported by increasing real-world evidence of ML models outperforming clinician accuracy.

Business Impact

Algorithmic medicine can augment clinical decision making and speed up time to diagnosis and treatment, improving outcomes and reducing the cost of care. It is increasingly accepted and used to predict high-priority clinical conditions and outcomes, such as hospital readmissions, opioid use disorder and suicide risk. There is growing evidence for use cases such as cancer detection and treatment, diagnostic image interpretation, and speech analysis for disease detection.

Drivers

- Global healthcare workforce shortages are driving increased interest in technology solutions that can supplement or increase clinical workforce capacity. There is also significant potential to address health disparities in low-income and low-resource regions, where algorithmic medicine might be used to increase access to diagnosis and treatment options that might not be available otherwise.
- Much of the algorithmic medicine model development is being carried out by healthcare organizations themselves or in partnership with vendors for specific clinical use cases. This increases the chances of success by addressing the necessary levels of real-world testing, specificity, localization and work to overcome sociotechnical barriers to adoption.
- Regulatory oversight is critical to ensuring the safe, effective and unbiased application of these technologies. International health agencies and regulators, such as the International Medical Device Regulators Forum and World Health Organization, are actively developing and encouraging industry participation in regulatory frameworks for AI- and ML-enabled software as a medical device (SaMD).
- The emergence of synthetic data will help improve testing and overcome challenges related to algorithmic bias.
- Over the past year, we have observed significant advancements in underlying technologies, such as AI and ML, that make the possibilities for algorithmic medicine more exciting and seemingly attainable than ever. Past the Peak of Inflated Expectations, the industry remains cautiously optimistic, but we expect a proliferation of solutions and adoption in the next two to five years.

Obstacles

- Regulatory and medicolegal issues (for example, who will be held responsible when an algorithm is “wrong” or when it will be considered malpractice not to use an algorithm) remain largely unknown and untested.
- Evidence of algorithmic bias has emerged due to incomplete or inherently biased datasets or models. These biases became evident in some deployments of algorithmic medicine during the pandemic and are highly concerning for their potential to exacerbate socioeconomic health disparities.
- Lack of industry standards and oversight for the development and validation of models has contributed to skepticism and mistrust, and in part, has created the environment for biases to emerge and persist.
- The most advanced algorithms are often the least explainable — often referred to as “black-box algorithms” — leading to doubt and distrust among patients and providers.

User Recommendations

- Maximize investments in algorithmic medicine by partnering with clinical and business leaders to identify high-priority use cases and drive adoption. Leverage shared risk agreements with vendors to ensure the solution delivers on the value proposition.
- Establish strong governance to vet and oversee algorithmic medicine by engaging with leaders throughout the organization, including clinical leadership, compliance, data sciences, legal and risk management. Carefully monitor for algorithmic bias and unintended consequences.
- Work with risk management and legal to monitor and understand evolving regulations and eventually mitigate any ramifications of using or failing to use algorithmic medicine.
- Earn clinicians’ and patients’ trust by starting with explainable algorithms. Commit to transparency in reporting outcomes and addressing any signs of bias or unintended consequences.

Sample Vendors

Epic Systems; Google; Lightbeam Health Solutions; MEDITECH; Oracle Cerner; VigiLanz

Gartner Recommended Reading

Market Guide for Clinical Decision Support Solutions

Case Study: Make AI Models Credible, Not Explainable (Unity Health Toronto)

Quick Answer: What Healthcare Provider CIOs Need to Know About LLM Applications Such as ChatGPT

Healthcare Digital Marketplace

Analysis By: ck Andrade, Sharon Hakkennes

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Adolescent

Definition:

A healthcare digital marketplace is a systematically organized online catalog that enables healthcare organizations to efficiently find, test, procure, share, implement and integrate technology and clinical products and services. Within organizations, digital marketplaces support the internal sharing of technology, such as algorithms and services. Across the ecosystem, they provide distribution channels serving vendors, technical and nontechnical developers, healthcare providers and consumers.

Why This Is Important

Digital marketplaces help CIOs quickly compose, deploy and scale new capabilities to meet business needs, fill gaps in core systems and innovate without developing all capabilities in-house. They democratize technology by providing a trusted place for technical and nontechnical users to find and use easy-to-consume technology with composable architectures compatible with existing infrastructure or systems. And they support the distribution of clinical services to clinicians and consumers.

Business Impact

Digital marketplaces enable scaling care delivery and operational excellence by providing consumers and employees with a range of clinical services and secure, digitally-enabled business and clinical capabilities, such as patient engagement and virtual care apps. In addition, by providing access to a secure and compliant library of validated novel capabilities and algorithms, they extend the value of core system investments, enable digital innovation and improve patient and employee experience.

Drivers

- The rise of healthcare digital marketplaces reflects a change in buying behavior in which technical and nontechnical technology buyers seek a convenient, trusted place to discover, try and buy products related to a particular application, platform or industry. Buyers do this to gain easy access to capabilities that address the gaps in core clinical systems or drive digitalization.
- Digital marketplaces built around specific solutions (e.g., analytics, no-code/low-code platforms, cloud infrastructure, automation and workforce management) offer composability as the technology providers in these marketplaces are prevalidated to ensure easy integration.
- Vendors are pivoting their business model to sell through digital marketplaces leveraging a strong ecosystem of partners, an easier selling process and a cohesive customer segment to grow their customer base, revenue and healthcare-specific capabilities.
- The breadth of digital marketplaces offered by vendors has increased exponentially to include technology and services from cloud hyperscalers, cross-industry vendors, healthcare-focused vendors and systems integrators.
- As healthcare providers increasingly adopt healthcare industry cloud platforms, they leverage their associated marketplaces for prepackaged business capabilities, composition tools and a broad range of clinical and business solutions.
- Healthcare providers who have accelerated innovation of products and services are increasingly offering their own digital marketplaces for peer-to-peer marketing.

Obstacles

- The proliferation of digital marketplaces contributes to buyer confusion.
- Marketplace owners are at different stages of maturity and some with only a grouping of partner or co-developers present themselves as digital marketplaces leading to a mismatch with customers' expectations
- Managing the digital marketplace is usually the domain of the vendor of the core system of record (e.g., an electronic health record (EHR), picture archiving and communication system (PACS) or virtual care vendor). Healthcare providers may be unable to work within the commercial and integration constraints imposed by those vendors.
- Patient privacy and security requirements can be demanding, necessitating third-party application vendors to meet specific standards. These requirements can increase development costs and time to value.
- For some clinical system vendors, digital marketplaces undermine their business model of providing all functionality in the core product.

User Recommendations

- Raise enterprise awareness of the value of using digital marketplaces, and explain the advantages versus in-house development for technical and nontechnical team members.
- Explore marketplace options to avoid being overly influenced by the offerings available in your marketplace of choice.
- Leverage industry cloud platforms and their digital marketplaces and composable architectures to speed and scale your development.
- Determine how your core system vendors (e.g., EHR, PACS and virtual care) currently support the integration of third-party apps or seek to monetize new application integration.
- Extend your application and information governance policies to ensure apps and algorithms acquired through digital marketplaces meet clinical, infrastructure, support, privacy, and security requirements and standards.

Sample Vendors

Amazon Web Services (AWS); athenahealth; Google Cloud; Innovaccer; Microsoft; NTT DATA; Salesforce; SMART Health IT; SNOMED International; The Agile Application Platform (TAAP)

Gartner Recommended Reading

Tool: IT Sourcing and Procurement Guide to Using Digital Marketplaces

Predicts 2023: Composable Applications Accelerate Business Innovation

To Create a Successful API Marketplace or API-Based Ecosystem, Look Before You Leap

Innovation Insight for Digital Health Platform

IoT for Healthcare

Analysis By: Gregg Pessin

Benefit Rating: Transformational

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Internet of Things (IoT) for healthcare is a collection of devices, applications, equipment, appliances and building systems that can connect, communicate, and interoperate within an ecosystem of smart things, using industry standards. IoT for healthcare is foundational to the real-time health system.

Why This Is Important

IoT for healthcare is foundational to digital business. IoT provides the digital representation of activities and events in the provider environment, enabling situational awareness. IoT facilitates automation and smart care venues, allowing providers to do more with less. IoT will positively impact healthcare providers' ability to deliver care more efficiently and cost-effectively. Connected things will drive revenue, and improve operational efficiency and asset utilization.

Business Impact

IoT for healthcare is a core enabler for healthcare provider digital transformation. IoT provides:

- Improved operations, productivity, efficiency, logistics and coordination.
- Optimized asset utilization, reliability, predictive maintenance and performance management.
- Enhanced remote monitoring in virtual care.
- Increased engagement among care providers, patients and caregivers.
- Improved care delivery and self-care for improved patient wellness, longevity, and quality of life.
- Enhanced security for physical assets and patient safety to reduce risk.

Drivers

IoT provides the required informational input that enables digitally transformed healthcare delivery organizations (HDOs). This collected data feeds systems that address core needs of the industry:

- The need to transition clinical operations to population health and value-based models.
- Requirements to transform the orientation of operations around the patient.
- The need to improve operational bottlenecks and the patient journey, which are addressable through the implementation of real-time situational awareness technologies.
- The need to reduce clinical and administrative costs.
- Fiscal pressure to capture revenue opportunities and create new business.

Obstacles

- Lack of security and privacy measures built into IoT devices creates an additional workload for IT departments.
- IoT populations generally cannot be centrally governed through device policies as other IT devices, such as endpoint computers and mobile devices.
- Internet of Medical Things (IoMT)/cyber-physical system (CPS) selection oversight, during the clinical device acquisition process, is not an IT function. This leaves critical decisions that impact IT to functional departments that may be unable to assess security, privacy and IT operational impacts.
- Creating a patient-centric view remains difficult due to the lack of IoT data standards. Combining multisourced data requires custom integration.

User Recommendations

- Build business cases with ROI extending across core business processes.
- Engage your customers in solution development and use prototypes to help explore opportunities.
- Ensure architecture teams can incorporate IoT across IT and operational technology (OT) technology stacks.
- Find opportunities to apply IT governance principles to IoT, where the daily operation of IoT lies outside of IT.
- Increase your capabilities to leverage big data cost-effectively.
- Plan to invest in skills and technology to support healthcare-specific IoT platforms and IoT software integration, data and analytics, and managed security solutions.
- Select your technology and service provider partners, based on their technology stack and partner network.
- Ensure end-to-end compliance of your IoT solution with local health information protection legislation.

Gartner Recommended Reading

2021 Strategic Roadmap for the Real-Time Health System

Healthcare Delivery Organization IoT Scale Demands a Platform Approach

Semantic Interoperability

Analysis By: Andrew Meyer, Mike Jones

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Semantic interoperability in healthcare is achieved when two or more information systems can exchange and process business and clinical information with an unambiguous and common understanding. Furthermore, the participating systems need not know how the information will be used before any information exchange. This technology covers the technologies and working groups that support this objective.

Why This Is Important

Semantic interoperability is essential for connecting digital care across clinical settings, care teams and organizations as it enables sending and receiving systems to identify both the data and clinical context for shared information. For care providers, payers, government agencies and regulators, semantic interoperability is becoming a reality. The shared goal of well-defined and enforceable standards and terminologies is increasingly essential across care ecosystems and system vendors.

Business Impact

Semantic interoperability applies to care pathways that span the health ecosystem. Use cases include:

- Regional health information exchanges (HIEs).
- Complex care pathways such as for cancer and behavioral health.
- End-of-life care coordination.
- Urgent care where the first responder needs access to information on current medicines, known allergies or adverse reactions.
- Referral, discharge and care coordination for planned care.

- Packages of health and social care with multiple agencies involved.

Drivers

- Increasing availability of Health Level Seven International (HL7) Fast Healthcare Interoperability Resources (FHIR)-based APIs in electronic health record (EHR) and other clinical systems is frequently mandated or a “must-have” core requirement for healthcare providers procuring EHR and HIE solutions.
- Increased focus on population health and value-based care means greater demand for sharing data to improve the quality of care, contain cost and address the wider determinants of health.
- In the U.S., the evolution of Qualified Health Information Network (QHIN) and Trusted Exchange Framework and Common Agreement (TEFCA) with the first set of networks to be approved to implement TEFCA as prospective QHINs were recognized.
- Increased investment at the national and regional level in HIEs is driving the adoption of HIE platforms.
- The demand from consumers for patient-held records, including the ability to store copies of their medical records on consumer-managed devices is growing.
- Some governments enforce interoperability rules through regulators such as the Centers for Medicare & Medicaid Services (CMS) and the Office of the National Coordinator for Health Information Technology (ONC).
- The increased investment by the tech giants into new architectural approaches for digital health platform construction and operation that focus on creating a common data fabric that exists beyond the proprietary control of individual health IT vendor systems.
- Presence of enforceable procurement frameworks that translate business needs for HIE into more technical functional specifications. (For example, the U.S. requirements set out by the National Academy of Medicine).
- We expect the time to maturity for semantic interoperability to become mainstream between five and 10 years. This will be achieved earlier in some regions like the U.S. and countries in EMEA where semantic interoperability standards and terminologies are now being enforced at a national level.

Obstacles

- Lack of enforceable national policy and legislation in some regions which dictate the pace of adoption of semantic interoperability standards by healthcare providers and local health IT vendors (e.g., local EHR, PACS and other clinical system vendors).
- Acceptance by providers of basic methods of exchanging information (e.g., where C-CDA or scanned document with fax exchange is culturally accepted) as opposed to open APIs, which expose structured clinical data and conformance with international standards such as FHIR.
- Low incentives and vendor investment to achieve semantic interoperability or where existing means of information exchange (e.g., point-to-point interfaces) are part of a vendor's existing support fees and revenue generation strategy.

User Recommendations

- Use industry best practices to gain agreement for an interoperability strategy and focus on the specific use cases that will yield the greatest business value.
- Develop a deeper understanding of your interoperability needs by taking an outside-in view of how patients, clinicians and your business would benefit from improved access to and shareability of data.
- Create a roadmap for what you want to achieve with semantic interoperability and address data ownership and oversight questions at the outset of your journey.
- Revisit commercial agreements with your EHR vendor and explore their capabilities for improving interoperability versus your needs. Insist on open APIs that are published on publicly available resources, have freely accessible documentation, are available free of charge for testing, and have transparent and scalable commercial arrangements for third-party use.

Sample Vendors

Better; CommonWell Health Alliance; IHE International; openEHR International; The Sequoia Project; Tietoevry

Gartner Recommended Reading

Innovation Insight for Digital Health Platform

Quick Answer: What Healthcare Data Models or Ontologies Are Publicly or Commercially Available?

Critical Condition Surveillance Systems

Analysis By: Veronica Walk

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Critical condition surveillance systems monitor clinical data from the electronic health record (EHR) and point-of-care medical devices in real time. Using evidence-based algorithms, these systems detect signs of clinical decompensation that could be life threatening or warrant urgent transfer to a higher level of care and then trigger alerts to appropriate care team members.

Why This Is Important

Historically, healthcare providers in the acute care setting have relied on manually calculated or partially automated early warning scores to monitor for signs of clinical deterioration. Critical condition surveillance systems drastically improve on these methods by using real-time clinical data to continuously monitor and predict deterioration across a broader patient population. Unprecedented clinical workforce shortages have increased these solutions' value proposition and interest.

Business Impact

Healthcare provider organizations can use these solutions to:

- Enable earlier intervention for deteriorating patients — improving their chance of survival and reducing the need for emergency treatments and higher-cost care.
- Automatically notify caregivers of potential clinical decompensation, reducing the burden on resource-constrained care teams.
- Provide the research and evidence base for predictive algorithms and associated interventions.

Drivers

- While EHR vendors offer capabilities for monitoring and alerting to signs of clinical decompensation, solutions have come under scrutiny for lack of high sensitivity and specificity and the potential for bias. This has driven interest in critical condition surveillance solutions, offering evidence-based, proprietary algorithms that integrate with the EHR. These solutions also include capabilities to improve the coordination of the care team response and related clinical documentation.
- Patient monitoring platform vendors offer the most robust set of critical condition surveillance capabilities by ingesting data directly from various medical devices and clinical systems to provide the most comprehensive view of patient conditions. These solutions can also be used for additional use cases beyond critical condition surveillance, such as e-ICU and remote patient monitoring.
- Unprecedented clinical workforce shortages, especially among highly skilled nurses, will likely drive continued adoption of these solutions.

Obstacles

- Leveraging real-time data requires robust and potentially costly medical device integration to continuously monitor patients using a comprehensive set of clinical data points beyond what is readily available in the EHR.
- Some healthcare providers will default to their EHR vendor's native capabilities to avoid perceived integration issues, although possibly at the cost of a more precise solution.
- Regulatory oversight for solutions that incorporate advanced capabilities, such as AI or ML, is still evolving. For example, the U.S. Food and Drug Administration (FDA) recently issued final guidance on clinical decision support software, indicating that certain solutions may classify as medical devices, thus falling under the purview of FDA regulation.
- Patients and providers are still skeptical about the use of AI in healthcare. Solutions that rely on unexplainable "black box" algorithms will likely face provider and patient resistance.

User Recommendations

- Establish the need for critical condition surveillance solutions by evaluating sepsis, mortality and patient safety data, as these will provide the most compelling rationale for adopting these solutions. Compare what can be accomplished within the EHR and identify gaps that might be addressed by a best-of-breed vendor or patient monitoring platform.
- Judiciously vet any potential solution by examining the evidence base and frequency of review and update of the underlying clinical algorithms. Look for real-world evidence of outcomes improvement, such as reduced mortality.
- Address clinician and patient mistrust by prioritizing vendors using explainable algorithms backed by real-world evidence. Do not overlook the need to localize solutions to your patient population.
- Minimize alert fatigue by tracking false-positive alert rates and evaluating a vendor's ability and willingness to improve their solution accordingly.

Sample Vendors

AgileMD; DECISIO Health; Epic Systems; Lightbeam Health Solutions (Jvion); Medical Informatics; MEDITECH; Oracle Cerner; Philips; Spacelabs Healthcare (PeraHealth); Wolters Kluwer

Gartner Recommended Reading

Market Guide for Clinical Decision Support Solutions

Innovation Insight for Patient Event Bus

2021 Strategic Roadmap for the Real-Time Health System

Case Study: Critical Care Beyond Hospital Walls (Showa University Hospital)

Case Study: Virtual Inpatient Nursing Program Advances Progress Toward the Quadruple Aim

Health Data Curation and Enrichment

Analysis By: Laura Craft

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Emerging

Definition:

Health data curation and enrichment represents the processes and technologies that add value to data gathered from across the consumer/citizen/patient health and wellness continuum. These technologies and processes apply cleansing, normalization, and other enrichment services (such as episode grouping, predictive model scoring or outcome labeling) to maximize value in downstream consumption and use, and facilitate agile data governance.

Why This Is Important

At a time when data sources in healthcare are expanding rapidly and advanced analytic techniques, such as AI, are entering mainstream use, many healthcare organizations struggle with the basics of data quality and governance. Data curation and enrichment capabilities are becoming critical elements of advanced analytics architectures to derive value from new data sources, improve and automate data quality, and enable more sophisticated and pervasive use of data.

Business Impact

Successful deployment of a comprehensive health data curation and enrichment capability is a foundational component of the real-time health system, conducting digital healthcare, and the ability to execute population health and community-based care. When data curation and enrichment tools are well-deployed, they can significantly reduce the total cost and risk of data management and the incremental cost of connecting to new data sources.

Drivers

- New regulatory requirements from national eHealth initiatives and local government initiatives to share data more effectively in serving a common set of citizens across the traditional boundaries of health and social care.
- A growing number of healthcare “data strategy” initiatives, with significant funding, which focus on deeper data management capabilities, such as data quality and enrichment (as opposed to implementing new digital health applications or operational tools).
- Increasing use and maturity of data standards (such as Fast Healthcare Interoperability Resources [FHIR] and Observational Medical Outcomes Partnership [OMOP]) in analytic environments.
- Scarcity of talent, especially in data engineering and data science, which has driven a search for more automated ways to support analytics environments.
- The integration of analytics technology and operational technology architecture, which has created the requirement for a combined approach to curation and enrichment for these traditionally separated processes. In this way, data curation and enrichment is a key capability on the path to more comprehensive data fabric architecture.

Obstacles

- Creating a coherent solution architecture for health data curation and enrichment is complicated. Many data enrichment and curation hub technology and service providers either offer a broad platform across the data enterprise life cycle, or offer capabilities narrowly targeted on a particular data source (such as EHR-originating data), enrichment type or functional domain (such as care quality improvement).
- Many technology and service providers in this solution space promise “out-of-the-box adapters” for various data sources. However, end-user and vendor feedback suggests there remains substantial custom integration work performed in the background of most implementations.
- Problems with health data curation and enrichment are often several layers of technology behind the issue a clinical or business user is actually experiencing. Making the case for additional investment in the core capability can be challenging for healthcare technology leaders.

Analyst Notes: We have advanced health data curation and enrichment forward beyond the peak in 2023, in line with signals from payers and providers indicating increased focus on enterprise data management, but falling into the Trough of Disillusionment as the market irons out capabilities across different vendors. We will watch this technology and market closely to see how it aligns with emerging interoperability platforms.

User Recommendations

- Proactively assess data integration demands across the organization over the next three to five years. Cull insight from the organization's strategic plan and through other deliberate short- and midterm visioning exercises.
- Evaluate emerging data management frameworks, such as data fabric, and determine if today's data integration strategies will be sufficient in three years.
- Create requirements by mapping out patient, provider and administrative journeys. Document ideal movement of data across the enterprise. Update enterprise and information architectures to reflect the future state and develop your five-year roadmap.
- Prepare the business for a multivendor, build-and-buy, insource-and-outsource solution for enterprise data curation and enrichment needs. This is particularly true in organizations where business leadership may expect an incumbent megavendor or a new partnership with a digital giant to address all requirements. This is unlikely in the near term and midterm.

Sample Vendors

Alteryx; Availity; DataMotion; DXC Technology; IMAT Solutions; Informatica; Medical Informatics; Validic; Verinovum

Gartner Recommended Reading

Emerging Technologies: Critical Insights on Data Fabric

Healthcare Consumer Persuasion Analytics

Analysis By: Kate McCarthy, Faith Adams

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Emerging

Definition:

Healthcare consumer persuasion analytics uses consumer, clinical, experiential, engagement, social, environmental and behavioral data to derive and understand needs and preferences, key motivators and influencers of individual health behaviors and outcomes. It combines this insight with advanced analytics technologies and data sciences to identify techniques and tactics to persuade consumers to undertake actions that benefit their individual health.

Why This Is Important

Consumer persuasion analytics have potential to break through one of the biggest hurdles in the improvement of health outcomes — how to change behavior within individuals who may be uninformed, unmotivated or biased against changing unhealthy behaviors. Though this technology is in its early stages within HCLS, the use of similar technology within other consumer-oriented industries, such as retail and entertainment, has demonstrated success in nudging consumer behavior.

Business Impact

We expect the efforts of digital therapeutic companies, and the wellness and chronic care management efforts of HCLS organizations, will demonstrate the value of persuasion analytics within the next five years. Factors like use case and level of customer understanding will influence maturity and results. This trend is evidenced by progressive organizations investing in leaders to direct behavioral change and economics.

Drivers

- The increased use of digital touchpoints has driven HCLS organizations to invest in solutions that enable them to leverage persuasion techniques effectively.
- Estimates vary, but according to research published by the U.S. National Institutes of Health, consumers' physical environments account for up to 10% of health outcomes, while clinical care accounts for up to 20% of outcomes. Health behaviors account for 30% of outcomes, and social/economic factors account for 40% of outcomes. These health determinants matter more as value-based care programs shift risk and modify business model incentives.
- Population health and consumer health risk models, or chronic condition management such as obesity and diabetes, require more effective consumer behavior interventions and modifications. HCLS organizations and public health agencies seek to become as sophisticated as other consumer-oriented industries in analyzing consumer data that helps uncover both root causes of human behavior and effective nudges to change it.
- The ability to influence behavior and motivate action will be the key to transformative long-term management of cost and quality outcomes, while also improving consumer satisfaction.
- Life science and startup company growth is observed in the creation of digital therapeutics that capitalize on behavioral science. We also see interest among healthcare providers that are embracing value-based care models, and within healthcare payers who are using persuasion analytics to nudge members to undertake preventative, wellness and risk assessment activities.
- There have been demonstrated successes. For example, gamification with continuous monitoring to encourage diabetics to smooth out their A1C levels during the day has helped reverse Type 2 diabetes.
- This year, this profile continues further into the Trough of Disillusionment as adoption increases, but the anticipated behavior change and results don't always follow. It is expected to reach maturity in two to five years.

Obstacles

- While there is progress deploying consumer persuasion analytics that can successfully identify and nudge people to take a next best action, HCLS adoption continues to lag more mature industries, like retail and banking.
- Most HCLS companies lack sufficient data elements on their own to effectively build persuasion analytics, and struggle to scale digital behavior change, due to insufficient technologies and processes.
- Progress will be hindered by digital ethics issues that complicate the use of healthcare data for persuasion.
- We expect the complexity of persistently influencing consumer behavior over their journey will delay the maturity of healthcare consumer persuasion analytics technologies.
- Many organizations find legacy environments limiting, given the volume and velocity of data necessary to make persuasion analytics successful.
- Emotion AI and large language models like ChatGPT are apt to be more effective than consumer persuasion analytics, and will ultimately replace these solutions.

User Recommendations

- Evaluate your legacy platforms and architectures to determine the best deployment strategy. Persuasion analytics can be deployed through a variety of platforms, including EHR, CRM, MXDP and marketing technologies.
- Begin experimenting with incremental solutions, while preparing for investment in enterprisewide data fabric.
- Identify opportunities for persuasion analytics by focusing on use cases that require incremental nudges and lead to measurable outcomes.
- Develop trials that exploit short-term opportunities, while establishing long-term potential for personalized engagement.
- Engage vendors with the data that combines epidemiology, economics and consumer behavior insights, as well as the data scientists who serve the same function.
- Raise organizational awareness by teaming with marketing on education and influence campaigns.

Sample Vendors

CareCentra; Happify; Indegene; Lirio; ProChange; Softheon; Thrive Global; Virgin Pulse

Gartner Recommended Reading

Innovation Insight for Consumer Experiences in Healthcare and Life Sciences

U.S. Healthcare Payer CIOs Improve Member Engagement in Health and Wellness Programs

Healthcare and Life Science Business Driver: Total Experience Transformation

Genomics Medicine

Analysis By: Reuben Harwood

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Definition:

Genomics medicine enables the use of genetic information for medical research and treatment (for example, diagnosis, therapy, risk management). It is a component of precision medicine and focuses on leveraging a patient's genomic data and clinical insights derived from it. Technologies include gene sequencing, variance calling, high-performance computing, AI-informed risk assessment and clinical decision support.

Why This Is Important

Genomics medicine is already saving lives, and its promise to improve health outcomes is driving adoption in healthcare. Upstream technologies supporting research and gene sequencing data collection are well-developed and yield increasing amounts of efficiency in genomics. Technologies that use genetic information in clinical care delivery are progressing toward delivering quick, reliable and actionable patient-specific insights.

Business Impact

Genomics medicine's business and population health impact is substantial and an essential component of precision medicine. The value of genomics medicine is demonstrated across multiple areas, including:

- Targeted therapies for cancer and rare diseases
- Accurate and patient-specific clinical diagnosis and treatment decisions
- Patient-genetics-based diagnostic tests to eliminate or reduce extra costs during treatment
- Precision care for prenatal and genetics-directed therapies

Drivers

- Next-generation sequencing (NGS) and third-generation sequencing (such as nanopore sequencing, single-molecule real-time [SMRT] sequencing) have enabled vendors to bring new capabilities at the end-user level, broadening the utilization of genetic information across multiple clinical specialties (such as chronic disease management) and beyond oncology.
- Achievement of key milestones has brought additional momentum to genomics medicine, such as the Broad Institute's launch of a $1,000 sample-to-report clinical whole-genome sequencing service and the new Guinness World Record awarded to a team at Stanford University in California, U.S. for the fastest DNA sequencing at five hours and two minutes.
- Technology and services related to genomics are progressing as the cost of genomic sequencing decreases. Research has identified more practical uses in diagnosing and treating patients, for example, companion diagnostics that indicate an individual's likely receptivity to a specific medicine by measuring a specific genetic biomarker. Other uses of genomics range from genetic testing for rare and undiagnosed diseases, next-generation therapeutics including gene therapy and RNA therapy, testing for treatment receptivity, to precision cancer treatment.
- Adoption will continue to grow as researchers identify more correlations between genetic biomarkers and health, disease prevention and treatments. The adoption of electronic health records (EHRs) globally creates rich sources of health data ripe for epigenomic exploration.
- EHR vendors have begun incorporating discrete genomic data into the patient record, enabling genomics medicine via point-of-care pharmacogenomic clinical decision support (CDS).
- Data analytics, including AI and machine learning, now have great potential to aid in discoveries leveraging that data. For these reasons, we move this innovation further along on the Hype Cycle with five to 10 years to the mainstream.

Obstacles

- Translating genomic data into actionable clinical insights has required decades of research. However, the maturation of AI and machine learning approaches will accelerate the pace of scientific discovery and translation into clinical action.
- It is equally challenging to make this knowledge actionable by physicians. Many are not well-trained to incorporate actionable insight from genomics within their workflows.
- Although new genetic markers are constantly being discovered, they require frequent reanalysis of patients' sequencing data. This comes with high costs that hinder the development of new tests, drugs and therapies.
- Researchers, life science and healthcare providers demand more genomics information integrated into the EHR, including raw sequencing data, analysis and clinical recommendations. Interoperability remains a barrier to information exchange among scientists, providers, patients and families for collaboration and counseling.

User Recommendations

- Establish a surveillance process to stay updated with the practical use of genomics in diagnosis and treatment and the implications for IT. Initiate discussions with peers as to whether it is worth pursuing an in-house genomics center of excellence or outsourcing this function.
- Outline business process, compliance, laboratory, regulatory and IT implications when including genomics medicine disciplines for decisions about research, therapies and business opportunities, while ensuring patient privacy.
- Architect an IT infrastructure, inclusive of outside services, that supports the acquisition, storage, collaboration and analytics requirements demanded by genomic datasets and therapy delivery.
- Evaluate your EHR vendor for their plans to support genomics medicine needs. Determine if the EHR can record, store, secure and access genetic marker data from patients, and their ancestors and family members at the point of care.

Sample Vendors

DNAnexus; Genedata; Helix; Igenbio; Illumina; L7 Informatics; NantHealth; Velsera

Gartner Recommended Reading

Healthcare and Life Science Business Driver: Medical Technology Innovation

Healthcare and Life Science CIO's Genomics Series: Part 1 — Understanding the Business Value of Omics Data

Healthcare and Life Science CIO's Genomics Series: Part 2 — Formulating an Omics Vision

Healthcare and Life Science CIO's Genomics Series: Part 3 — Prioritizing Omics Investments

Enterprise Virtual Care Platform

Analysis By: Sharon Hakkennes

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

An enterprise virtual care platform represents a set of integrated digital solutions and related services that enable augmentation and substitution of conventional face-to-face care delivery. This is achieved through delivery of care where the clinician is not in the same physical location as the patient, either synchronously (i.e., in real time) or asynchronously. Capabilities fall under three core categories: virtual visits and consultations, remote monitoring, and digital clinical encounters.

Why This Is Important

Enterprise virtual care platforms enable healthcare providers to deliver a broad range of clinical services to enhance patient experience, expand into new populations and service lines, and transform service delivery efficiency under alternative payment models. These platforms offer functionality that complements or is not available in existing electronic health record (EHR) megasuite offerings.

Business Impact

Healthcare providers are investing in an enterprise virtual care platform strategy to:

- Expand into new markets, improve staff productivity and increase revenue.
- Bring care delivery to where patients are (e.g., home, office, school) — improving consumer engagement, care experience and satisfaction.
- Increase quality of care leading to improved outcomes in care, health and well-being.

Drivers

- The need to contain healthcare costs, offer more convenient care delivery options, improve staff productivity, and remain competitive is driving the rapid adoption of virtual care. In response, healthcare providers must continuously evolve enabling digital capabilities to meet increasingly diverse clinical requirements and use cases. This includes investing in interoperable solutions and platforms that can scale across multiple use cases.
- Healthcare providers are expanding their virtual care strategies to more complex virtual care service models such as hospital at home. This is requiring a broader range of enabling digital capabilities and integration with existing solutions.
- Health equity concerns are driving healthcare providers to invest in a broad range of digital capabilities to increase their geographical reach and meet the unique requirements of different patient populations.
- Market options are expanding as vendors double down on their product development, seeking to continually expand their solution offerings to meet the ever-increasing requirements of healthcare providers. Vendors are developing these capabilities by fast-tracking their internal development roadmap, acquisitions and strategic partnerships.
- Increasing healthcare provider and vendor interest in composable architecture, combined with advances in interoperability, including the adoption of industry standards (e.g., FHIR), is driving the evolution of virtual care solutions. As the modularity and interoperability of solutions continues to develop, so will the healthcare provider's capability to realize its enterprise virtual care platform vision.

Obstacles

- Clinician frustration with the workarounds associated with poorly integrated solutions
- Organizational disillusionment as healthcare providers identify that no single solution will meet all of their required use cases
- Ongoing uncertainty regarding long-term payment models for virtual care services that are currently being funded through waivers introduced during the COVID-19 pandemic
- Cost pressures and financial constraints experienced by healthcare providers that impact appetite and capacity to invest in new enterprise solutions and concomitant pressure to leverage existing investments into the EHR
- Challenges achieving required integration into EHR solutions to support seamless integration of virtual care services into core clinical workflows

User Recommendations

- Justify investment in virtual care platform technologies by developing a strategic vision and roadmap for enterprise virtual care across your organization. Develop a business case for expanding service models to explore new markets such as direct-to-consumer options.
- Ensure technology solutions are fit-for-purpose by reviewing use cases and identifying enabling digital capabilities that can be leveraged across multiple use cases and those with specialist requirements, necessitating a best-of-breed solution.
- Optimize clinician and patient experience by prioritizing modularity of solutions and availability of APIs in your procurement process. Achieving deep integration into core clinical workflows and a seamless patient experience is essential for long-term success.
- Minimize implementation costs and risks by reviewing vendor capabilities and commercial terms to ensure a scalable pricing model and compatibility with existing medical devices and network policies.

Sample Vendors

Amwell; Caregility; Current Health; Datos Health; Teladoc Health; Validic

Gartner Recommended Reading

Tame Virtual Care Complexity With a Defined Architecture

Market Guide for Remote Patient Monitoring

Ace These Proof Points to Create a Sustainable Virtual Care Strategy

Use Gartner's Virtual Care Maturity Model to Transform Care Delivery

RTHS Command Center

Analysis By: Sharon Hakkennes, Gregg Pessin

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

A real-time healthcare system (RTHS) command center is an enterprise-level composition of clinical, operational and administrative data powered by advanced analytics, including AI, ML and predictive models. As the core of the RTHS platform model, the command center uses real-time operational intelligence to anticipate, optimize and orchestrate healthcare provider enterprise and network resources, workflows, and capacity in response to changing internal and external conditions.

Why This Is Important

The rise of RTHS command centers satisfies healthcare provider leadership's need for reliable, real-time operational and clinical intelligence to support proactive, precise, and predictive decision making and interventions. RTHS command centers provide visibility to operational and clinical processes and workflows, enabling a current, integrated, holistic view of these previously disparate domains.

Business Impact

Integrated real-time and predictive operational and clinical dashboards applied to high-impact use cases is the ultimate manifestation of the RTHS. They:

- Enable real-time adjustment of operations in response to clinical demand, transforming hospital management and improving patient satisfaction and outcomes.
- Eliminate unjustified variance in processes, quality and cost delivering improvements in operational efficiency, patient throughput, bed capacity and quality of care.

Drivers

- Progressive healthcare providers recognize the increased value of enterprise command centers over departmental and domain-specific dashboards they have relied on for years.
- The importance of monitoring and understanding the current operational and clinical environment in real time is increasing. This occurs as healthcare providers seek to effectively respond to rapidly changing conditions, manage hospital demand, capacity and patient throughput, improve operational process efficiencies and decrease costs.
- The shift to virtual care models necessitates increased visibility of patients receiving care outside of the four walls of the healthcare facility.
- There is increasing availability and access to data through investment into electronic health records (EHRs) and connected devices, and an associated imperative to deliver value from these investments.
- Hospital mergers and acquisitions and organic growth drive the need for clinical and operational insights at the system level to proactively optimize resource use and maximize clinical outcomes across sites.
- Advances in artificial intelligence (AI) and machine learning (ML) are driving improvements in the relevance and accuracy of predictive algorithms to support proactive, data-driven decision making.

Obstacles

- Successful implementation relies on solutions informing and helping healthcare providers respond, in real time, to current and future predicted hospital conditions and on reengineering clinical and operational processing for continuous improvement. This represents a fundamental shift in approach for many healthcare providers.
- The value of the insights delivered through the RTHS command center depends on data availability and quality. Healthcare providers continue to experience data quality issues and challenges with access to data across multiple disparate sources in real time. These issues impact the accuracy of underlying algorithms and erode stakeholder trust in outputs.

User Recommendations

- Set your command center initiative up for success by ensuring executive leadership support and sponsorship. Assemble clinical informatics leaders and operational and clinical subject matter experts to form a command center steering committee.
- Determine the technology design and vendor strategy for your command center by evaluating your organization's requirements against the capabilities of the emerging market.
- Build engagement and trust across stakeholders by selecting pilot use cases linked to organizational strategic priorities, ensuring the availability of high-quality, comprehensive datasets.
- Enable and orchestrate the successful use of an RTHS command center by deploying process engineering capabilities, such as lean principles, across medical, nursing and supporting resource teams.
- Ensure the outputs from the command center drive proactive decision making and actions by embedding alerts and escalation processes into clinical and operational workflows.

Sample Vendors

Alcidion; Care Logistics; Epic Systems; GE HealthCare; Oracle (Cerner); Qventus; TeleTracking Technologies; VitalHub (Transforming Systems)

Gartner Recommended Reading

Innovation Insight for Real-Time Health System Command Center

Real-Time Health System Vision

Use Gartner's Model to Assess Real-Time Health System Maturity and Plan Investments

Consent Management for Healthcare

Analysis By: Andrew Meyer, Mike Jones

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Consent management for healthcare is the combined system, process and set of policies for citizens to establish how care providers can access or exchange their health information. Individuals can confirm participation via patient portals and health information exchanges (HIEs) and dynamically update their health data's granular privacy, access and use preferences.

Why This Is Important

Consent management for healthcare provides citizens, care delivery and other organizations confidence that citizens' health sharing preferences are being upheld regardless of where or how data is used. Health organizations must ensure citizens' wishes are upheld, and transparency is built into their electronic record systems and visible to the interoperability solutions that exchange information among care providers, payers and other third parties.

Business Impact

The impacts of consent management for healthcare include:

- Without effective consent management, organizations find it hard to scale the secondary use of health data for population health, clinical trials, precision medicine, and genomics or algorithmic medicine.
- Healthcare providers must ensure citizens' wishes are respected and rights are retained as protected health information moves between entities.

- Effective consent management and robust governance of protected health information will give consumers the confidence they seek before they agree to share their data.

Drivers

- The development of new capabilities for consent management for healthcare has been accelerated by continuing regulatory shifts across the privacy landscape at the regional, state and country level. This is driven by consumer demand for transparency on how health data is processed and shared outside of the immediate care delivery domain (e.g., for research into vaccines or recruitment of patients into clinical trials).
- Improvements and increased adoption of interoperability standards and networks throughout the healthcare provider sector are leading to more systems and workflows that can now share health information. In the U.S. the first set of networks to be approved to implement TEFCA as prospective (QHINs) were recognized.
- Many countries where shared care records are part of national or regional healthcare reforms have increased the funding and formation of national and regional HIEs.
- This innovation has advanced toward the Slope of Enlightenment due to the greater focus on care orchestration and information sharing needs across health and care agencies. This has resulted in the continued global interest in citizen data privacy and protection.

Obstacles

- Providing citizens clarity about control over their data is central to most privacy laws. Translating complex regulations into operational systems and protocols for a variety of regions means that vendor solutions often require considerable configuration before deployment.
- Many organizations have found themselves constrained by their product choices within 12 months of deployment. Demand for additional capabilities develops rapidly due to market shifts and a greater need for granularity and transparency in first-party-consented data.
- Capabilities chosen and deployed in isolation of consultation with patients and providers are rarely representative of consumer needs, resulting in weak adoption and loss of time and investment.
- Consent solutions are easy to acquire but notoriously difficult to implement throughout all affected systems.

User Recommendations

- Review regional legislation and determine what is required from internal systems to remain compliant with health information protection clauses.
- Evaluate existing application portfolios to determine how these systems record consent and authorize users or external systems to access protected health information.
- Carry out a risk assessment to better understand organizational financial exposure on data processed and shared outside of the provider domain.
- Identify the target level of transparency by analyzing customer preferences and documenting consumer expectations.
- Avoid purchasing an overly “fitted” solution by defining a clear list of requirements based on future needs rather than immediate ones.
- Offset the volume of right-to-information requests by individuals commonly associated with modern privacy regulations by advancing the maturity of the organization’s consent management for healthcare offerings from reactive toward a self-service model.

Sample Vendors

Global Public Inclusive Infrastructure (GPII); InterSystems; IQVIA; Medable; OneTrust; ZeOmega (HealthUnity)

Gartner Recommended Reading

The USCDI Needs a National Patient Identifier Optimized for Accuracy, Privacy and Consent

Market Guide for Consent and Preference Management

Quick Answer: What to Look for in an Enterprise Master Patient Index Solution

Quick Answer: Who Owns Electronic Health Information?

Computer-Assisted Physician Documentation

Analysis By: Andrew Meyer, Mike Jones

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Definition:

Computer-assisted physician documentation (CAPD) optimizes clinical documentation by leveraging AI technologies including natural language processing (NLP), speech recognition and rule engines. CAPD augments clinician documentation in real time at the point of care, as opposed to computer-assisted clinical document improvement (CACDI) solutions which support clinical documentation improvement specialists and clinical coders.

Why This Is Important

CAPD augments human intelligence and provides insights to clinicians at the point of care. This enables clinicians to accurately document the severity and acuity of each patient in real time, thereby minimizing the documentation-cognitive load. These solutions also help to address the increasing complexity of reimbursement requirements that vary for each payer — capturing complete and accurate clinical documentation ensures accurate, timely billing and regulatory compliance.

Business Impact

The main value of CAPD is revenue and efficiency improvement. Benefits include:

- Improved case mix index (CMI), a revenue factor in many payment models.
- Real-time capture of rendered services, clinical complexity and severity.
- Administrative and clinical efficiencies such as improved coding accuracy and fewer physician queries.
- Increased quality of collected data and of core measures under value-based care.

Drivers

- Improved integration of CAPD with electronic health records (EHRs) has enabled clinicians to access real-time, evidence-based insight without having to use multiple systems, and that in itself has become a strong facilitator in improving the adoption rate among medical professionals.
- Physicians can spend more quality time with their patients as opposed to documentation, reducing physician burnout and improving patient satisfaction.
- Healthcare delivery organizations are experiencing increased pressures to increase revenue, improve margins and act to manage outcomes under a value-based care model.
- CAPD is important to the overall management of revenue cycle operations and clinical documentation. However, we rate its relative value as “moderate,” recognizing that CAPD is an adjunct to other transformational and high-value systems, such as patient financial system (PFS), medical encoders, EHRs and CDI programs, for cumulative impact on revenue improvement.

Obstacles

- Clinicians are still building trust in CAPD technology. Healthcare professionals are trained to apply logic and evidence-based multidimensional thinking while treating their patients. The lack of visibility into the rule and "black-box algorithms," and without understanding the what, why and how behind the technology can deter clinicians from gaining confidence or endorsing the technology.
- Clinicians can become numb to the constant alerts in a workflow which is more of a nuisance than it is a help.
- The broad support for specialty workflows impedes scalability of CAPD across the care delivery organization.
- CAPD as a tool mainly emphasizes missing documentation without clearly applying the evidence-based clinical practices. Therefore, physicians can see this as an extra step in completing clinical documentation as opposed to seeing the true value delivery when compared to the real-world skill sets of physicians.

User Recommendations

- Share responsibility for clinical data integration and CAPD strategy, planning and implementation by partnering with Chief Medical Informatics Officers (CMIOs) and health information management leaders. Starting small with ambitions to scale, picking target medical specialties carefully and incentivizing clinician adoption must be the way forward.
- Find the balance between revenue optimization and physician productivity by collaborating with CMIOs and HIM leaders. Physician-facing, time-saving tools such as CAPD can help improve revenue and quality outcomes.
- Establish CAPDI KPIs, such as efficiency and financial performance. CIOs should align the design and adoption of CAPD features and automation protocols to meet these documented outcomes.

Sample Vendors

3M; Artificial Medical Intelligence (AMI); Dolbey; HITEKS; Nuance

Gartner Recommended Reading

Healthcare Delivery Organization CIOs Must Accelerate Revenue Cycle Optimization to Meet Financial Goals

The Healthcare Delivery Organization CIOs' Guide to Computer-Assisted Coding

Create a Patient-Centric Revenue Cycle by Addressing 6 Critical RCM Shifts

Climbing the Slope

Patient Throughput and Capacity Management

Analysis By: Barry Runyon

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Definition:

Patient throughput and capacity management (PTCM) is an interoperable application ecosystem that offers a less-siloed approach to managing patient flow, care transition and capacity challenges. PTCM anticipates demand, monitors throughput, alerts to bottlenecks and issues, and balances hospital resources with needs as circumstances change. PTCM systems include admissions, bed management, patient flow, transfer center, resource scheduling, discharge processing and postacute care coordination.

Why This Is Important

Monitoring and managing patient flow and capacity are persistent healthcare provider challenges, and optimizing the use of facilities, staff and equipment remains a healthcare provider's operational priority. While many healthcare providers have invested in stand-alone bed management and patient flow solutions, PTCM represents a more integrated, holistic and strategic approach.

Business Impact

The PTCM value proposition includes:

- Advancing clinical operations performance and key performance measures (e.g., bed occupancy rate, length of stay and time to service).
- Delivering higher patient throughput, enhanced resource utilization and revenue at lower resource costs by eliminating waste and delays.
- Facilitating value-based care payment models favorable to PTCM key performance measures.
- Addressing staffing shortages (doing more with less) and clinical burnout (streamlining workflows).

Drivers

- Looming economic downturn and inflationary pressures.
- Labor and supply chain shortages that can be ameliorated by automation.
- The need to improve patient-related key performance measures (e.g., patient satisfaction scores and wait times).
- The need to improve enterprise key performance measures (e.g., bed occupancy rate and length of stay).
- The need to increase patient days and recover revenue impacted by the COVID-19 pandemic.
- Increased adoption of command centers and enterprisewide performance dashboards giving rise to potential operational bottlenecks and opportunities for improvement.
- Advances in location services and associated technologies (e.g., Bluetooth low energy) and real-time analytics that position and track patients, care team members and equipment.

Obstacles

- Lack of pervasive sensor and Internet of Things (IoT) technology necessary to acquire real-time presence and location telemetry data to inform real-time operational intelligence and analytics.
- The requisite reorganization and centralization of PTCM responsibilities (e.g., bed assignments) required to leverage PTCM interoperable application ecosystem (IAE) capabilities.
- Delays in the delivery of vendor R&D in areas, such as predictive analytics, open interoperability standards, acquisition and integration of situational awareness data for real-time decision making, and shortages of proof-of-value pilots and references.
- Overreliance on incumbent electronic health record (EHR) vendors for PTCM capabilities.
- Cost and complexity of PTCM interoperability and automation requirements.

User Recommendations

- Establish an enterprisewide PTCM strategy and roadmap by engaging key stakeholders in areas like admissions/discharge/transfer, transition management, referral management, transfer center, discharge planning, nursing operations and the emergency department.
- Align health system leadership by activating PTCM champions to socialize the PTCM value proposition.
- Share data and work among the component systems within the PTCM IAE by updating or replacing conventional message brokering technology with open interoperability support, such as Health Level Seven (HL7) Fast Healthcare Interoperability Resources (FHIR) and event-driven automation.
- Select individual PTCM component solutions with the strategic intention and forward-looking product roadmaps and architectures necessary to fulfill your broader PTCM strategic vision.

Sample Vendors

ABOUT; BedWatch; Care Logistics; DECISIO Health; GE HealthCare; LeanTaaS; Philips; QGenda; TeleTracking Technologies

Gartner Recommended Reading

Put Patient Throughput and Capacity Management at the Center of Your Performance Improvement Plan

Establish Interoperable Application Ecosystems Early in Your Composable Healthcare Provider Roadmap

Innovation Insight for Real-Time Health System Command Center

CRM in HCLS

Analysis By: Kate McCarthy, Faith Adams

Benefit Rating: High

Market Penetration: More than 50% of target audience

Maturity: Mature mainstream

Definition:

CRM systems facilitate, support and enable relationships with individuals by planning, tracking, recording and delivering moments of engagement. CRM capabilities across healthcare and life sciences (HCLS) are a feature of multiple systems including marketing, patient and member engagement, claims payment, provider network management, clinical trial management and commercial operations as well as independent CRM systems.

Why This Is Important

CRMs create and support building relationships with individuals over multiple communication touchpoints, episodes of care and settings. Investments in CRM systems continue to accelerate as many healthcare organizations seek to improve consumer engagement initiatives. Advanced healthcare organizations are recognizing the proliferation of CRM systems and have begun adopting an enterprise approach to CRM deployment by implementing consolidated CRM platforms.

Business Impact

Healthcare CRMs offer a seamless user interface that incorporates diverse datasets and orchestrates touchpoints for intelligent consumer engagement. CRMs make it easier to attract and engage members, patients, providers and trial participants. Organizations that deploy CRM observe increased consumer satisfaction scores and reduced complaints. They can also improve chronic disease and population health management outcomes by ensuring visits at appropriate intervals.

Drivers

- CRM has advanced from a tool to engage individuals in wellness, prevention and chronic care management to a must-have enabler of stakeholder engagement, for instance, donor relations. The attraction, conversion and retention capabilities of CRM systems have become a minimum requirement for competitive healthcare organizations.
- There is demand for systems that can create a 360-degree view of the healthcare consumer. This is the benchmark for other highly consumerized industries that HCLS organizations aspire to emulate.
- CRM can help lower costs and improve outcomes by enabling engagement across touchpoints for healthcare consumers as they traverse wellness, prevention and chronic care management efforts.

- CRM enables improved relationship management and total experience. In healthcare, CRM can enable a variety of relationships. It can optimize delivery networks through the management of provider relationships and interactions and enable precision marketing efforts to attract and convert consumers for specific service lines or facilities.
- When successfully deployed, CRM enables deeper relationships with affiliated physicians, business partners, suppliers and benefactors, as well as improved recruitment and retention of patients as they navigate complex healthcare ecosystems. CRM can also improve the employee experience by providing better tools and touchpoints to do their jobs.
- The growing importance of AI bots, RPA and speech interfaces accelerates the need for a CRM system to document and manage an increasingly digital relationship with consumers. The use of AI and machine learning (ML) enables the analysis of engagement across the multiple communications channels, care settings, episodes of care and business partners that are part of the health journey. AI allows healthcare organizations to gain unprecedented insight into the behavior of healthcare consumers and how to influence them.

Obstacles

- Integrating CRM into legacy systems, such as electronic health records (EHRs) and core administration platforms, is challenging and can result in unnecessary data replication and cost.
- Many organizations already have CRM for marketing or other programs and struggle to reconcile multiple environments, often with multiple vendors.
- Full-stack CRM solutions are at risk of becoming the next monolith and are often cost-prohibitive to organizations with essential, high-cost legacy technologies, such as an EHR.
- Increasing numbers of organizations are considering next-generation, AI-based technologies in place of a full-stack CRM such as Microsoft, Nuance Communications and Epic Systems partnership around GPT-4.
- Healthcare organizations continue to accelerate the adoption of CRM solutions. We advance this profile up the Slope of Enlightenment with maturity expected in the next two years.

User Recommendations

- Identify opportunities to use CRM whenever a relationship must be established, such as in chronic disease management, sales and provider network management.
- Reduce the risk of having multiple systems attempting to manage a relationship with a consumer by creating a framework for longitudinal relationships that harmonizes engagement across an increasing number of disparate CRM systems.
- Leverage an implementer, such as a systems integrator (SI), that has demonstrated success with the vendor you have selected. This will ensure improved reconciliation of systems and processes and speed up time to value.

Sample Vendors

Creatio; Mercury Healthcare; Microsoft; Oracle; Pegasystems; Salesforce; Sequence Health; Veeva Systems; Zipari

Gartner Recommended Reading

The Eight Building Blocks of CRM: Strategy

Healthcare and Life Science Business Driver: Total Experience Transformation

The Elusive CRM Magic Quadrant

Use Gartner's Generations Model in Planning Healthcare Consumer Engagement Initiatives

Resource Scheduling for Healthcare

Analysis By: Barry Runyon

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Definition:

Resource scheduling is an umbrella term that refers to information systems and services that plan and track the availability of essential human and material healthcare provider resources, such as staff, nurses, physicians, facilities, beds and equipment. It includes standard scheduling systems such as patient, physician and nursing and specialty systems such as patient self-scheduling, on-call, acuity-based, hospitalist, nocturnist, ED, OR, virtual care and scheduling optimization services.

Why This Is Important

Resource scheduling systems are at the core of patient access management and contact center activity and clinical workflow and nursing operations optimization. They are foundational to operational efficiency, staff productivity and morale, care-coordination effectiveness, patient throughput and capacity management, facility and equipment utilization, and consumer and patient satisfaction. Interest in resource scheduling has increased along with increased interest in workflow automation.

Business Impact

Effective resource scheduling positively impacts:

- Patient satisfaction and quality measures by moving patients through their care journey with the least friction.
- Operational efficiency and asset utilization by optimizing access to critical staff, facilities and equipment based on clinical necessity, agreed-upon rules and historical usage patterns.
- Staff morale and retention through schedules considering business and clinical demands, skills, certifications and individual preferences.

Drivers

Resource scheduling solutions address the abiding need for increased efficiencies and optimization in the following healthcare provider disciplines and domains:

- Bed management: Visibility of the current and anticipated status of bed availability based on factors such as acuity levels, case mix and staff availability;
- Capacity management: The ability to support the resource scheduling requirements of the current and predicted census;
- Operating room (OR) management: Optimize OR access, efficiency and utilization;

- Patient access: Timely access to up-to-date provider schedules and on-call status;
- Patient flow: Efficiently transition patients between all care venues, including virtual care;
- Patient throughput: Optimize patient throughput while satisfying care quality and patient satisfaction requirements;
- Staffing: Addresses the severity and pervasiveness of clinical workforce shortages;
- Waiting times: Reduce ambulatory, urgent care and emergency department (ED) waiting times;
- Acuity: Matching staff competence and credentials with the needs of patients and care venues.

Obstacles

- Increasingly unpredictable patient scheduling requirements due to evolving consumer and workforce expectations.
- Limitations of the reservation-style approach to resource scheduling that has been traditionally employed in the healthcare provider industry. It has become clear that resource scheduling must take a “total experience” approach that balances consumer and employee needs.
- Local, regional, regulatory, and union-mandated staff scheduling rules and constraints limit healthcare providers’ ability to accommodate consumers and patients.
- Acceptance of “good enough” resource scheduling capabilities embedded in clinical software platforms and suites versus best-of-breed solutions.
- Lack of an enterprisewide approach to resources scheduling, resulting in departmental constraints that conflict with organization throughput and capacity objectives and KPIs.

User Recommendations

- Take inventory of the various resource scheduling systems within the enterprise, and characterize their features, capabilities, effectiveness, and product roadmap.
- Retain those systems that can adapt to increasingly less predictable staffing and scheduling requirements and accurately forecast future demand based on past activity.
- Retain those systems whose product roadmaps are representative of the digital care delivery paradigm shift and are increasingly enabled by automation and AI.
- Ensure retained systems are interoperable (via industry protocols and standards) with application ecosystems that require real-time scheduling intelligence, such as care team collaboration, patient throughput and capacity management, and patient relationship management.

Sample Vendors

Kyruus; LeanTaaS; PerfectServe (Lightning Bolt Solutions); QGenda; symplr; TigerConnect; UKG

Gartner Recommended Reading

Use Gartner's Model to Assess Real-Time Health System Maturity and Plan Investments

Advanced Analytics Architecture for Providers

Analysis By: Laura Craft, Jeff Cribbs

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Advanced analytics architecture for healthcare providers represents the next-generation approach to derive value from data. Traditional provider analytics architecture typically includes information portals (reports and dashboards) and an analytics workbench (data exploration). Advanced architecture adds data science and machine learning platforms (for advanced modeling), as well as a decision hub (to deploy real-time insight into operations), and coordinates all four functional elements.

Why This Is Important

The healthcare industry has experienced rapid digitization, and with that, accelerated demand for new analytics capabilities. Because no single vendor today will be able to fulfill all the analytic demands of a health system, healthcare data and analytics leaders must design their architecture to adapt to an ever-changing spectrum of use cases and consumption modalities. This spectrum ranges from dashboards to process automation.

Business Impact

The effectiveness of a healthcare provider's analytics architecture is paramount to its success. This architecture is a necessity for providers to be able to pervasively influence actions, often in real time, across operational, clinical and business processes. This architecture also prepares a provider organization to adopt AI engineering with its more sophisticated emphasis on DataOps, ModelOps and DevOps.

Drivers

- Healthcare providers increasingly acknowledge advanced analytics generally, and artificial intelligence in particular, as critical enterprise competencies. This is especially true in academic medical centers with strong affiliate informatics research labs or in regions where COVID-19 response included rapid deployment of analytic models.
- Megasuite EHR vendors continue to build out their advanced analytic capabilities. This includes both marketplaces with prebuilt analytic models and reporting and development environments for local models (for example, Epic's cloud-based advanced analytics environment, Nebula). This trend has the dual effect of normalizing the use of analytics in clinical and administrative workflow while also clarifying the ongoing need for more adaptable analytics architecture outside of the EHR.
- The continued growth in the volume, variety and velocity of data sources originating outside of the EHR (such as remote monitoring devices, genomic data, asset tracking and ambient sensing) demands a more flexible and agile architecture that supports more advanced data orchestration pipelines.
- Healthcare analytic vendors are significantly updating their architecture to support more complicated data needs and advanced analytic demands.
- There is increased momentum to modernize D&A environments as part of the migration to the cloud in order to take advantage of advanced data management features, increased collaboration opportunities and faster time to innovation.
- Digital analytics architecture for healthcare providers advanced significantly this year, largely due to the accelerated investment in data science and machine learning.

Obstacles

- Providers' data and analytics investments are often focused on urgent, departmental capability gaps. These capabilities are typically supported in a segmented fashion — with canned reporting tools working in isolation from more sophisticated data science and machine learning platforms.
- Identifying critical capability gaps requires a view across departments and use cases. However, in some provider organizations, the organizational structure does not allow for a data and analytics leader who has this view (such as a CDAO). Where there is such a leader, he or she often does not have the budget or decision-making authority to advocate for the best architectural investment over, say, an "EHR-first" solution approach.
- Many organizations will see "lower hanging fruit" in cleaning up existing data, reducing latency of key reports and dashboards, or initiating fundamental data literacy programs. These initiatives will compete for limited budget dollars with longer-term investments in architecture.

Analyst Notes:

We position advanced analytics architecture for healthcare providers right before the Plateau of Productivity. We expect this profile to move quickly over the next year as the coordination of the "four functional elements" enumerated in the definition begins to catch up with technology investments that have already been made. We will follow the market closely to see how the evolution of the advanced architecture as defined here plays out with cloud analytic and health data platform vendors.

User Recommendations

- Prepare executive leadership to invest in new data management and analytics tools, as neither the legacy enterprise data warehouses (EDWs) nor the megasuite EHRs will be sufficient to enable the data and analytics capabilities required to be competitive in the healthcare provider market today.
- Ensure that data and analytics has prominent placement in your organization's business and technology strategy.
- Consider what data fabric capabilities your incumbent vendor(s) offer that can help advance your analytic and data science/ML services.
- Address organizational structures that are inhibiting progress toward digital analytics architecture. While the right organizational structure will vary substantially based on the business and operating model, all organizations need a leader focused on analytics, with a cross-departmental purview. This leader should be empowered with decision-making authority and budget to prioritize analytics architecture across the enterprise.

Sample Vendors

Arcadia; Dimensional Insight; Epic; Health Catalyst; Innovaccer, Oracle; SAS; Snowflake

Gartner Recommended Reading

Toolkit: Creating a Modern Data and Analytics Strategy and Operating Model

Critical Capabilities for Analytics and Business Intelligence Platforms

Evolving Capabilities of Analytics and Business Intelligence Platforms

Critical Capabilities for Data Science and Machine Learning Platforms

How to Create an Optimal Data and Analytics Organizational Model

Enterprise EHR Systems (Non-U.S.)

Analysis By: Veronica Walk, Sharon Hakkennes

Benefit Rating: High

Market Penetration: More than 50% of target audience

Maturity: Early mainstream

Definition:

Enterprise electronic health records (EHRs) are clinical systems used in acute and ambulatory (outpatient) care settings. They capture, store, maintain, and share patient-centric encounter, treatment, and health status information. The EHR supports tasks directly related to patient care and facilitates clinical documentation, order processing and clinical decision support. This innovation tracks non-U.S. adoption of enterprise EHRs.

Why This Is Important

Enterprise EHRs provide broad capabilities spanning core clinical functions, interoperability with other clinical systems and medical devices, and analytics. These capabilities are critical for healthcare providers who want to optimize care quality and safety through data-driven improvement. The level of EHR adoption needs to increase in non-U.S. regions to achieve the quality, safety and access goals of healthcare providers and government health systems.

Business Impact

An enterprise EHR system can enable various clinical activities affecting caregivers and patients. It can reduce the rate of medical errors, eliminate unwarranted practice variations, improve operational efficiency and compensate for the shortage of skilled healthcare workers. Although the potential benefits are considerable, it takes substantial planning, financial investment and vendor collaboration to realize the full value of an EHR.

Drivers

- Government regulations, policy and funding continue to drive the adoption of EHRs to improve care coordination among health and social care agencies, manage population health, and support a shift to value-based care. For example, the U.K. has allocated funding to help NHS trusts to achieve Stage 5 or above on the Healthcare Information and Management Systems Society (HIMSS) Electronic Medical Record Adoption Model (EMRAM).
- Global EHR procurement activity is on the rise with the heaviest activity in Australia, Canada, France, Germany, the U.K, and parts of the Middle East and Benelux and Nordic regions.
- As the U.S. enterprise EHR market becomes saturated, U.S.-based EHR vendors are seeking growth outside the U.S., competing directly with regional vendors.

Obstacles

- Time to value (or ROI) for an enterprise EHR is typically five years or more from initial strategy formulation.
- The total cost of ownership (TCO) is significant and enterprise EHRs require advanced levels of configuration, maintenance, support and continuous optimization, requiring ongoing investment.
- Many of the global enterprise EHR vendors are U.S.-based and their solutions are designed for the U.S. delivery system, which can create challenges in localizing to regional workflows and requirements.
- Following significant acquisition activity in the global enterprise EHR markets, the product roadmaps of some vendors are uncertain.
- Regional data residency requirements can limit options for cloud-hosted solutions.
- Digital health platforms are garnering interest as an alternative to monolithic EHR architecture.

User Recommendations

- Adopt a life cycle approach from initial strategy through to procurement and optimization once deployed.
- Work with senior business and clinical leaders to promote EHR benefits and ensure all stakeholders fully understand what is involved in implementation and benefits realization.
- Evaluate vendors in terms of benefit, cost, risk and suitability for long-term strategic partnerships noting that each vendor has a different profile regarding TCO, usability and the speed at which benefits are realized.
- Establish clinical informatics roles, such as the chief clinical informatics officer (CCIO), to lead the required changes to clinical workflow and ensure that the EHR is properly designed, implemented and optimized to facilitate safe, efficient and evidence-based care.
- Evaluate whether an alternative architecture and modular approach to acquiring clinical capabilities might better suit your organization and its digital ambitions.

Sample Vendors

Altera Digital Health; ChipSoft; Dedalus; Epic Systems; ezCaretech; Health Insights; InterSystems; MEDITECH; Oracle Cerner; Philips

Gartner Recommended Reading

Market Guide for Enterprise Electronic Health Record Solutions

Tool: Best Practices for EHR Success, Stage 3 — Select

Tool: Best Practices for EHR Success, Stage 4 — Deploy

Gauge Readiness and Mitigate Risk to Succeed in EHR Implementations

Population Health Management Solutions

Analysis By: Amanda Dall'Occhio, Roger Benn, Jeff Cribbs

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Population health management (PHM) solutions are sets of IT capabilities and related services that enable healthcare organizations to achieve health, cost and experience goals for a discrete population of individuals. These capabilities commonly include data integration, performance analytics, care management and patient engagement.

Why This Is Important

Many global health systems struggle with a common set of challenges: rising medical costs, disparities in access, inconsistent clinical outcomes and aging populations. As an operational model of value-based care, PHM focuses on care management and coordination initiatives to improve the quality of care and reduce healthcare costs.

Business Impact

Fully implemented PHM technology will enable improvement in most aspects of healthcare operations. However, organizations typically deploy PHM progressively as they gain experience in value-based care, learn more about the technology, and find more of their financial incentives reliant on successfully operating in a PHM model. The typical progression, in order, is: (1) data management, (2) reporting, (3) performance management, (4) workflow (care management) and (5) patient engagement.

Drivers

- Value-based care continues accelerating in both public and privately funded health systems. More organizations are signing at-risk contracts, and more money is at stake in renewing those contracts.
- National, state and local e-health initiatives often include more mature PHM capabilities — such as integrating health and social care, community-based care coordination, and remote patient monitoring.
- Business models are changing incrementally, and organizations often install initial technology without a full vision of PHM capability. However, the vendor market has adapted and many offer a sequential playbook and modular capabilities to better align to the roadmap stage and progress.

Obstacles

- Healthcare organizations often make PHM investments very narrowly to support the new requirements of a value-based contract or initiative. This includes acquiring claims data, managing an attribution patient registry or maintaining certified quality reporting. The lack of a comprehensive PHM technology vision means initial capabilities are often not forward-compatible with new capabilities or requirements.
- Technology solution design for PHM, particularly for healthcare providers, is complicated by a lack of comprehensive PHM vision from healthcare organizations. This is also the case for PHM capabilities that overlap with adjacent spaces (like electronic health record [EHR], CRM and health information exchange [HIE]) and confusing vendor hype.
- Megasuite EHR vendors that offer PHM capabilities often do not keep pace with more mature PHM program requirements. However this is slowly shifting.
- Efforts to configure the EHR for PHM compete with a long list of conventional care delivery-focused EHR optimization projects.

User Recommendations

- Ensure that immediate PHM solution decisions are compatible with a robust population health vision that extends at least five years into the future.
- Evaluate your incumbent EHR vendor objectively by asking for its reference clients with the most mature population health implementations. Then compare those experiences with PHM vendor references with similar program maturity levels.
- Assess the vendor's support model beyond the technical nuts and bolts. Understand their commitment to helping you transform your operations and achieve your targeted PHM objectives.
- Explore each vendor's built-in social determinants of health (SDOH) and community resource connection capabilities, as well as the ability to incorporate new external data sources as best practices continue to advance.

Sample Vendors

Arcadia; CareEvolution; Cedar Gate Technologies; Forward Health Group; Health Catalyst; Innovaccer; Lightbeam Health Solutions; Optum; Persivia

Gartner Recommended Reading

Population Health Management Framework for Healthcare Provider CIOs

3 Critical Views of Population Health Management Capabilities for Healthcare CIOs

Healthcare CIOs: Enable Real-Time Ecosystem Collaboration to Excel in Value-Based Care

OpenNotes

Analysis By: Sharon Hakkennes

Benefit Rating: Moderate

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

OpenNotes is an initiative to give patients convenient access to their clinical notes stored within electronic health records (EHRs). This is accomplished through local healthcare provider initiatives — using a portal tethered to the EHR or a patient's preferred third-party application — or through regional and national initiatives that enable patient access to shared care records.

Why This Is Important

OpenNotes is an international movement, rather than a product. Clinical notes document the interactions that patients have with doctors, nurses and other clinicians, and make up the "story" of a person's healthcare. The types of notes made available to patients, the timing of release of notes, which roles are included and which clinical areas participate vary across health services and geographical regions.

Business Impact

OpenNotes supports improvements in healthcare delivery through greater information transparency. Many studies have demonstrated the value of OpenNotes in:

- Empowering individuals to become active participants in their own care
- Enhancing patient understanding of their health and medical conditions
- Increasing collaboration and trust between patients and clinicians
- Improving adherence to treatment and care plans (for example, medication management)
- Increasing the accuracy of clinical documentation

Drivers

- The 21st Century Cures Act's Interoperability, Information Blocking and the ONC Health IT Certification Program Final Rule, in effect, mandates adoption of OpenNotes in the U.S. The rule applies to all healthcare providers across all clinical settings. In October 2022, the restrictions were lifted that limited the required information for sharing to the United States Core Data for Interoperability (USCDI) data classes. As a result, patients now have the right to access, without delay, all of their electronic health information (EHI), including clinical, billing, enrollment, payments, claims adjudication and case management records.
- In other regions across the globe, government-led regulations and initiatives are driving adoption of OpenNotes. For example, in the U.K., general practitioners have until the end of October 2023 to ensure all patients have prospective access to their full health records (including free text). National e-health records have also been established in countries such as Australia, Austria, Denmark and Estonia.
- As adoption of OpenNotes grows, efforts are evolving to further enable communication and shared decision making between patients, their care partners (often, family members or close friends), and clinicians. For example, OurNotes is a shared documentation initiative in which patients compose and submit an interval history, goals and questions prior to their visits. Similarly, OurNotes for Care Partners is a care partner version of OurNotes. The aim is to identify care partners and assess their needs to enable delivery of care partner resources and support.

Obstacles

- Clinician resistance due to the perception that workloads will increase as a result of additional time required to write each note or to respond to increased communication from patients reading the notes.
- Clinician concerns that access to EHI may create undue patient anxiety due to misinterpretation of information or through access to distressing information, such as real-time patient access to laboratory and imaging test results.
- Lack of access to medical record information in an electronic format. This limits the adoption of OpenNotes for healthcare providers outside of the U.S., in geographies where EHRs have not yet achieved universal adoption.
- EHR systems vary in maturity in enabling OpenNotes initiatives, particularly in relation to providing controls required to restrict sharing for legitimate reasons, such as concerns over privacy or potential harm.

User Recommendations

- Position OpenNotes as a strategic priority by ensuring that transparency in data sharing is a core component of your organization's consumer engagement strategy.
- Enable seamless patient access to their EHI by partnering with your EHR and digital front door vendors to map current capabilities against your organization's requirements. Agree on a development roadmap for identified gaps.
- Address clinical concerns and minimize risks of adverse impacts to patients by developing policies and processes that exempt patients from online access to parts of their records where access would be detrimental to the individual.
- Maximize patient value derived through OpenNotes by establishing systems and processes to support patients in their access to and use of their EHI.

Sample Vendors

Altera Digital Health; Apple; CommonHealth; Epic; Evergreen Life; MEDITECH; OneRecord; Oracle Cerner; Patients Know Best (PKB)

Gartner Recommended Reading

Quick Answer: The Expanding Universe of Patient Safety Risks

Top Healthcare Provider HIPAA Questions and Answers

Entering the Plateau

Healthcare Interoperability

Analysis By: Barry Runyon

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Definition:

Healthcare interoperability refers to accessing, sharing, exchanging and using electronic health information (EHI) to deliver, coordinate and manage care. Interoperability encompasses adopting and advancing interoperability rules, standards, frameworks, technologies and platforms. Rather than plotting the adoption and progress of each area individually, the aggregate maturity of healthcare interoperability and its impact on the industry are highlighted further.

Why This Is Important

Healthcare interoperability rules, standards, trust frameworks, technologies, and platforms enable the compliant interchange and sharing of EHI, allowing clinicians and legitimate stakeholders safe access to a patient's medical record data when and where they need to. They establish best practices in their respective domains and collectively facilitate safe and secure sharing of EHI at scale.

Business Impact

Globally, standards-based interoperability and health information exchange have been recognized as chief enablers of digital transformation. In the U.S., the 21st Century Cures Act and accompanying interoperability rules have enabled increased access and sharing of EHI, and the mitigation of information-blocking practices. Open APIs, trust frameworks and the United States Core Data for Interoperability (USCDI) have set the stage for a Nationwide Health Information Network (NHIN).

Drivers

- The increased adoption of electronic health record (EHR) systems globally.
- The need to share EHI to facilitate care coordination across all care venues.

- In the U.S., the 21st Century Cures Act (Cures Act) facilitated the adoption of open APIs, trust frameworks, health information exchanges (HIEs), the creation of an NHIN, and the development of a standardized set of core data classes and elements for interoperability (the USCDI).
- Health Level Seven International's (HL7's) Fast Healthcare Interoperability Resources (FHIR) related interoperability initiatives such as the Da Vinci project (to advance value-based care and payer-provider collaboration) and Gravity Project (social determinants of health data sharing standards) projects.
- Increased interest in using HL7 FHIR to advance public health challenges.
- A global consensus on interoperability by the Global Digital Health Partnership (GDHP).

Obstacles

- Legacy interfaces: HL7 messaging interfaces still handle the bulk of interoperability use cases within and between health systems. The legacy interfaces will not be decommissioned in favor of modern open APIs any time soon until a new mix of use cases reaches critical mass that favors more granular, direct access to EHI.
- Inherent complexity: The complexity of interoperability is considerable despite easier-to-implement specifications, such as FHIR. Healthcare interoperability includes a daunting array of exchange standards, trust frameworks, information models and domain vocabularies, and apprehension about managing this complexity has slowed adoption.
- Data quality: Semantic interoperability is the exchange of clinical information with enough meaning and granularity to support meaningful decision support, care coordination, quality initiatives and analytics. Meaningful semantics depend on consistent data quality, which remains an industrywide challenge.

User Recommendations

- Participate in local and regional health information exchange networks that employ industry interoperability standards and granular consent management.
- Promote HL7 FHIR and SMART on FHIR support of your EHR system vendor.

- Report suspected information blocking by referring to the guidelines set forth within Office of the National Coordinator for Health Information Technology's (ONC's) Information Blocking Exceptions, keeping in mind that there are circumstances where information blocking is legitimate.
- Strengthen patient engagement by preparing for consumer-mediated health information exchange.
- Investigate notable industry alliances and advocacy groups, such as the CARIN alliance, and government initiatives such as MyHealthEData and Australian Digital Health Agency.
- Assess your interface/integration platform vendor's support for modern and open APIs and health information exchange (HIE) participation to ensure it will support your digital transformation needs.

Sample Vendors

Carequality; CARIN; CommonWell Health Alliance; Health Level Seven International (HL7); IHE; Surescripts Network Alliance

Gartner Recommended Reading

The USCDI Needs a National Patient Identifier Optimized for Accuracy, Privacy and Consent

Appendixes

See the previous Hype Cycle: Hype Cycle for Healthcare Providers, 2022

Hype Cycle Phases, Benefit Ratings and Maturity Levels

Table 2: Hype Cycle Phases

(Enlarged table in Appendix)

Phase	Definition
Innovation Trigger	A breakthrough, public demonstration, product launch or other event generates significant media and industry interest.
Peak of Inflated Expectations	During this phase of overenthusiasm and unrealistic projections, a flurry of well-publicized activity by technology leaders results in some successes, but more failures, as the innovation is pushed to its limits. The only enterprises making money are conference organizers and content publishers.
Trough of Disillusionment	Because the innovation does not live up to its overinflated expectations, it rapidly becomes unfashionable. Media interest wanes, except for a few cautionary tales.
Slope of Enlightenment	Focused experimentation and solid hard work by an increasingly diverse range of organizations lead to a true understanding of the innovation's applicability, risks and benefits. Commercial off-the-shelf methodologies and tools ease the development process.
Plateau of Productivity	The real-world benefits of the innovation are demonstrated and accepted. Tools and methodologies are increasingly stable as they enter their second and third generations. Growing numbers of organizations feel comfortable with the reduced level of risk; the rapid growth phase of adoption begins. Approximately 20% of the technology's target audience has adopted or is adopting the technology as it enters this phase.
Years to Mainstream Adoption	The time required for the innovation to reach the Plateau of Productivity.

Source: Gartner (July 2023)

Table 3: Benefit Ratings

Benefit Rating ↓	*Definition* ↓
Transformational	Enables new ways of doing business across industries that will result in major shifts in industry dynamics
High	Enables new ways of performing horizontal or vertical processes that will result in significantly increased revenue or cost savings for an enterprise
Moderate	Provides incremental improvements to established processes that will result in increased revenue or cost savings for an enterprise
Low	Slightly improves processes (for example, improved user experience) that will be difficult to translate into increased revenue or cost savings

Source: Gartner (July 2023)

Table 4: Maturity Levels

(Enlarged table in Appendix)

Maturity Levels	Status	Products/Vendors
Embryonic	In labs	None
Emerging	Commercialization by vendors Pilots and deployments by industry leaders	First generation High price Much customization
Adolescent	Maturing technology capabilities and process understanding Uptake beyond early adopters	Second generation Less customization
Early mainstream	Proven technology Vendors, technology and adoption rapidly evolving	Third generation More out-of-box methodologies
Mature mainstream	Robust technology Not much evolution in vendors or technology	Several dominant vendors
Legacy	Not appropriate for new developments Cost of migration constrains replacement	Maintenance revenue focus
Obsolete	Rarely used	Used/resale market only

Source: Gartner (July 2023)

Document Revision History

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Hype Cycle for Healthcare Providers, 2019 - 29 July 2019

Hype Cycle for Healthcare Providers, 2018 - 18 July 2018

Hype Cycle for Healthcare Providers, 2017 - 14 July 2017

Hype Cycle for Healthcare Providers, 2016 - 14 July 2016

Hype Cycle for Healthcare Provider Applications, Analytics and Systems, 2015 - 20 July 2015

Hype Cycle for Healthcare Provider Applications, Analytics and Systems, 2014 - 25 July 2014

Hype Cycle for Healthcare Provider Applications, Analytics and Systems, 2013 - 31 July 2013

Hype Cycle for Healthcare Provider Applications and Systems, 2012 - 31 July 2012

Hype Cycle for Healthcare Provider Applications and Systems, 2011 - 2 August 2011

Hype Cycle for Healthcare Provider Applications and Systems, 2010 - 27 July 2010

Hype Cycle for Healthcare Provider Applications and Systems, 2009 - 23 July 2009

Hype Cycle for Healthcare Provider Applications and Systems, 2008 - 27 June 2008

Hype Cycle for Healthcare Provider Applications and Systems, 2007 - 11 July 2007

Hype Cycle for Healthcare Provider Applications and Systems, 2006 - 3 July 2006

Recommended by the Authors

Some documents may not be available as part of your current Gartner subscription.

Understanding Gartner's Hype Cycles

Tool: Create Your Own Hype Cycle With Gartner's Hype Cycle Builder

Healthcare and Life Science Digital Optimization and Modernization Primer for 2023

Creating the Composable Healthcare Organization for Healthcare and Life Science CIOs

Infographic: Top Priorities, Technologies and Challenges for Healthcare Providers in 2023

Tool: Healthcare Provider CIO Executive Presentation for a Composable Digital Health Initiative

Create a Patient-Centric Revenue Cycle by Addressing 6 Critical RCM Shifts

2023 Healthcare Provider Business Drivers of Technology Decisions

Innovation Insight for AI-Enabled Diagnostic Imaging Interpretation

Innovation Insight for Digital Health Platform

Table 1: Priority Matrix for Healthcare Providers, 2023

Benefit	*Years to Mainstream Adoption*			
↓	***Less Than 2 Years*** ↓	***2 - 5 Years*** ↓	***5 - 10 Years*** ↓	***More Than 10 Years*** ↓
Transformational		Algorithmic Medicine Digital Front Door IoT for Healthcare Large Language Models for Care Delivery Total Experience	Data Fabric in HCLS Digital Health Platform Genomics Medicine Personalized Health Precision Medicine	Blockchain Platforms for Healthcare Digital Twins for Healthcare
High	Advanced Analytics Architecture for Providers CRM in HCLS Enterprise EHR Systems (Non-U.S.) Population Health Management Solutions	Care Pathway Orchestration Critical Condition Surveillance Systems Healthcare Consumer Persuasion Analytics Healthcare Digital Marketplace Healthcare Interoperability Health Data Curation and Enrichment Resource Scheduling for Healthcare RTHS Command Center	AI-Enabled Diagnostic Imaging Interpretation Ambient Digital Scribe Autonomous Clinical Coding Digital Clinical Voice Analysis Patient-Centered CDS Patient Throughput and Capacity Management Semantic Interoperability	

Benefit	*Years to Mainstream Adoption*			
↓	***Less Than 2 Years*** ↓	***2 - 5 Years*** ↓	***5 - 10 Years*** ↓	***More Than 10 Years*** ↓
Moderate	OpenNotes	Computer-Assisted Physician Documentation Consent Management for Healthcare Enterprise Virtual Care Platform		
Low				

Source: Gartner (July 2023)

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