AUGMENTED INTELLIGENCE FOR HEALTHCARE OPERATIONS

Enterprise AI4Ops Solutions Come to Health Care

A Chilmark Research Market Trends Report

CHILMARK RESEARCH

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Key Takeaways

COVID-19 created an opportunity for AI to demonstrate real value in the operations space

Prior to the pandemic, AIML applications were often hammers in search of nails, COVID created an opportunity to demonstrate ROI in the context of tight margins and increasing financial pressures from patient loads and decreases in elective procedures.

The challenges across supply chains, reducing administrative costs, and automating the back office were critical test cases for the AIML market to pass under the financial pressures induced by COVID

The operations space is much more mature and reliable than the current clinical decision support applications and have the ROI to demonstrate value.

Operations applications are now realizing the value of learning from AIML in industries such as airlines for operational excellence

AI applications have been used for quite a while in the airlines industry, for example, and healthcare has lagged behind. Vendors with experience in other sectors are now realizing similar impacts in healthcare through automation of inefficient administrative functions.

AIML supply chain platforms also enabled superior analytics from aggregating hospital data across an ecosystem rather than single hospitals making more resilient supply chains and forecasting possible.

Startups and lead innovators in this space are providing tools well beyond the capabilities of EHR tools for the same functions.

Digital Transformation is still in the early stages in healthcare, but the AI and operations space is becoming a foundational component. Feedback loops across clinical and operations data can be leveraged effectively with AI4Ops

While AI4Ops is still in the early stages, the impact on both business models and customer journeys is already having an impact where organizations have been willing to consider broader platform approaches vs. point solutions.

A number of vendors are offering solutions with sufficient scope that can be implemented in weeks or a few months. Coupled with risk-based pricing models this may facilitate scaling up across administrative operations in the context of CIOs/CFOs increasingly adopting data-driven management approaches after the 2020-21 pandemic experience.

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AI in Healthcare Operations (AI4Ops) Definition

AI4Ops includes all activities linked to RCM, hospital operations (staffing, beds, assets, supply chains) and discharge planning.

- Operations: all administrative, claims, scheduling and general, non-clinical hospital operations functions
- Revenue Cycle Management: claims processing, payments, prior authorizations, revenue generation including eligibility, managing denials/errors
  - Prior Authorizations and Eligibility: Robotic Process Automation (RPA) for calls to payers,
- Discharge Planning and Asset Optimization(Scheduling): S/D optimization, bottleneck identification
- Supply Chain Optimization: Aggregating supply and demand across hospitals and suppliers, forecasting outbreaks and surge in demand

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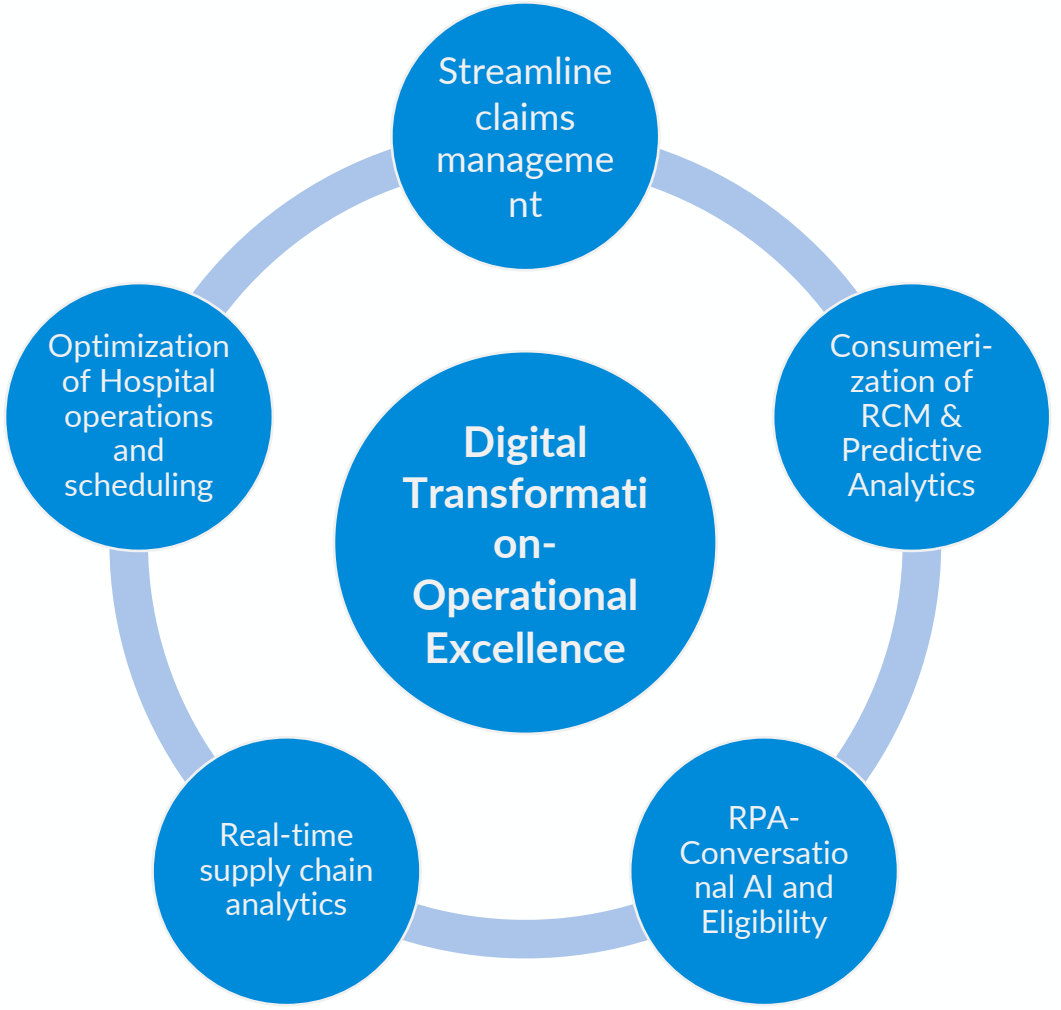
AI4Ops is Critical to Digital Transformation, Efficiency and Reducing Administrative Waste

AI4Ops can:

- Automate administrative back-end operations
- Decrease wait times, improve patient experience while optimizing use of expensive assets e.g., MRI, OR, etc.
- Manage complexity in transactions at scale while improving revenues
- Improve revenue cycles and payments via predictive claims management
- Step change improvements in matching supply and demand for resources in context of uncertainty, variability
- Real-time, aggregate view of supply chains creates resilience
- Improve patient journey and reduce staffing burdens



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Common Buyers

Providers

Hospitals are the largest buyer of AI and operations services in the current market.

Primary goals are to improve administrative efficiencies, asset utilization (eg. beds, surgical resources), scheduling and supply chains.

Secondary goals are to reduce Total Cost of Care, improve patient experience, situational awareness.

Payers

Claims adjudication, fraud detection and prior authorization processes are the most important uses that engage payers.

Consumers

Consumers are not yet buyers in the AI4Ops market but significant stakeholders with the buyers listed here. RCM automation has a direct impact on patients in billing and up-front financial transactions.

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Evolution in Operations Approaches

Organization Type	Conventional Approach to Operations	AIML Approach to Operations
Provider Organizations	➢ Highly manual workflows ➢ Scheduling utilizing traditional block method ➢ Manual process for prior authorizations ➢ Propensity to pay based on few metrics	➢ More automation, with targeted provider/staff effort ➢ From Block Scheduling to Asset Optimization at scale ➢ RPA for reducing time burden of eligibility calls ➢ Algorithmic determination of ability to pay and identification of best ways to assist patient in a manner that improves experience and outcomes
Hospital Clinical Operations	➢ Manual scheduling of surgical and infusion services ➢ Bottlenecks in discharge planning ➢ Manual, ad hoc processes for discharge ➢ May not integrate with PCP, other sources of care ➢ Focused on reduced utilization and overall cost of care	➢ Combined platform/app, real-time, and in-person services ➢ Earlier discharge planning with identification of barriers to discharge downstream ➢ Ability to go beyond the EHR for operations utilizing AI results in superior services from focused vendors/services
Payers	➢ Fraud detection: feet on the ground, post-facto analysis ➢ Call centers and human interactions, wait times for members ➢ Siloed IT systems with partners create higher costs and fragmented member experience ➢ Fragmented care offerings ➢ Significant privacy/cost concerns	➢ Outlier detection that identifies cases faster and prevents additional cases ➢ Conversational AI that is anticipatory of member needs based on 360 view of data ➢ AI and digital platforms offer more tightly coupled ecosystems and digital transformation of entire process, smart payer platforms ➢ Integrated data and service coordination across solutions or vendors

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Obstacles and Challenges

Immature Market

Overall market for AIML is infused with a great deal of hype and many broken promises.
Buyers are divided between early adopters with AIML strategy and personnel vs. late adopters and skeptics waiting to see more mature solutions

Data Interoperability

Different formats and systems for sending data without full adoption of standards that could make AIML adoption easier.

Unevenness in development of data strategies and datasets particularly when implementation involves clinical data.

CIO/CFO Buy in

COVID drove many CIOs/CFOs to take more risks and/or adopt more data-driven management. However, most organizations are still 2-3 years from having an end-to-end perspective on how to drive AI adoption across the operations spectrum of use cases. More tactical adoption rather than strategic approaches fueling digital transformation

Potential Bias

While operations data have different risk scenarios for bias from purely clinical data, the industry still needs to build stronger risk mitigation and data governance approaches. Similar bias issues for algorithms in finance can persist with claims, scheduling, and other RCM analytics.

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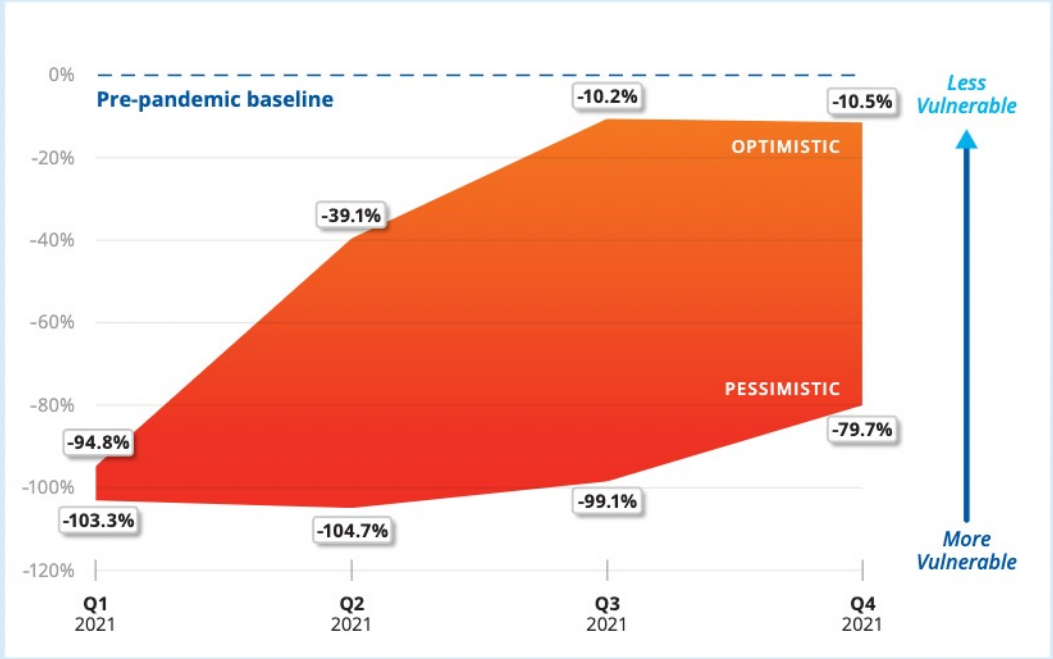
Impact of COVID on Hospital Margins will continue and drive adoption of AI

Operational efficiencies are key

COVID-19 is having depressive effect on margins

- Recovery towards more optimistic scenarios is dependent on vaccinations, recovery of volumes, and decline in cases
- AHA report estimated revenue declines between $53-122B in 2021 due to COVID-19
- Larger systems will adopt AI4Ops first as smaller hospitals continue to struggle with financial impact of the pandemic and lack of standards for operations

Quarterly Median Operating Margin Projections Change from Pre-Pandemic Levels



Under both optimistic and pessimistic scenarios, hospital median operating margins will continue to be below pre-pandemic levels throughout 2021. The optimistic scenario shows a recovery occurring primarily between the first and third quarter, but margins leveling off at more than 10% below pre-pandemic levels—a sufficiently depressed level to hamper some hospitals' ability to invest in community services. Under the pessimistic scenario, the recovery does not begin until the second quarter, and even then is very slow, culminating in 4th quarter margins that are 80% less than pre-pandemic norms—a devastating level for hospitals still reeling from the financial effects of COVID-19 in 2020.

*By the end of 2021, **hospital margins could be 10% to 80% below pre-pandemic levels***

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Move beyond point solutions to platforms

To date, most AIML adoption across the healthcare spectrum has relied on point solutions. The greatest ROI, particularly in operations, will be achieved through platform integrations across RCM, claims, eligibility and prior authorizations as well as provide feedback loops into clinical operations for quality and workflows.

- AI4Ops will be adopted in large systems first with standardized data. Small practices are too fragmented for substantial early adoption
- Many users start with automated solutions but often disconnected, fragmented. Platform offerings described in this report enable larger systems to leverage AI4Ops in more agile, impactful manner
- AIML works optimally across multiple functional areas and diverse datasets. Tactical, point solutions fail to take advantage of potential of AIML in overall data-driven management

TABLE 1

Administrative costs in the U.S. health care system

Estimated costs related to billing and insurance, 2019

Category	Annual cost in billions
Providers (physicians, hospitals, and others)	$282
Private insurers	$158
Public programs	$56
Total	**$496**

Source: Authors' calculations based on National Academy of Medicine, "Excess Administrative Costs," in Pierre Yong, ed., The Healthcare Imperative: Lowering Costs and Improving Outcomes: Workshop Series Summary (Washington: National Academies Press, 2011); Centers for Medicare and Medicaid Services, "National Health Expenditure Data," available at https://www.cms.gov/research-statistics-data-and-systems/statistics-trends-and-reports/nationalhealthexpenddata/nhe-fact-sheet.html (last accessed January 2019).

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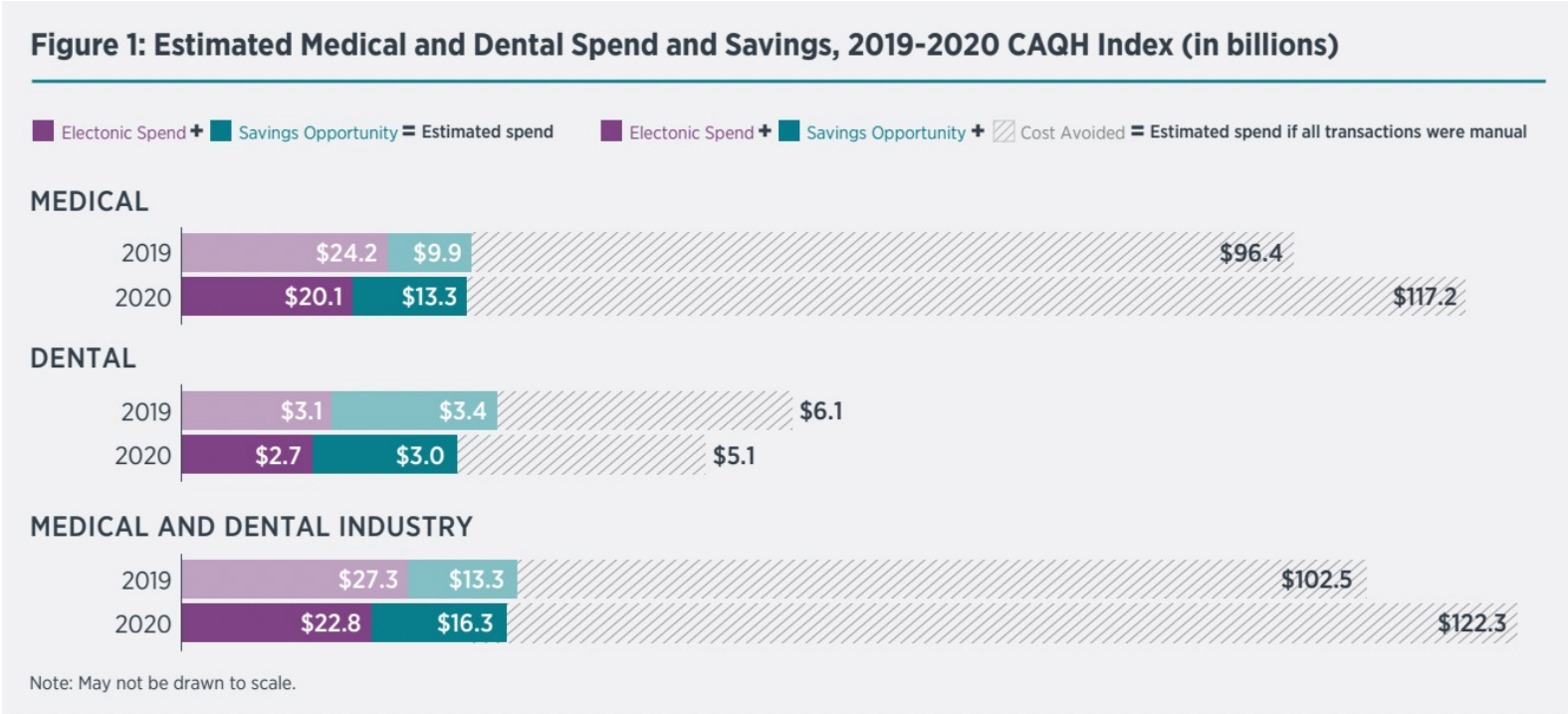
AI in operations will be essential to improving patient experience & revenues

The administrative burden and waste in the system has negative impacts on health outcomes. AI offers tools to improve efficiencies, patient experience and reduce provider burnout.

- A 2020 AMA study showed that 86% of physicians indicated their administrative burden was growing
- Prior authorizations contribute to $25B annual increase in costs and negative outcomes for patients (CAQH, Moving Forward)
- But still need standards to accelerate innovation in prior authorizations



Source CAQH Index 2020

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AI4Ops in Healthcare Operations and Bias: Systems will need to learn from finance and AI space and audit for bias (eg. eligibility) to mitigate risk and reputational challenges

Bias from many sources

- Credit checks, propensity to pay, benefits, etc can have historical bias that influence algorithmic outputs
- Growing focus on health equity needs to factor in algorithmic bias
- Recent study indicated Blacks experienced longer wait times in scheduling with AI (source: https://pubsonline.informs.org/doi/pdf/10.1287/msom.2021.0999)
- Growing need for AIML audits to uncover bias in algorithms
- Complexity from integrating clinical and financial data for some functions may require more risk mitigation effort

Trust is one of the most important barriers to adoption

Explainability, transparency and a commitment to ongoing algorithm development are essential to build and maintain trust in solutions

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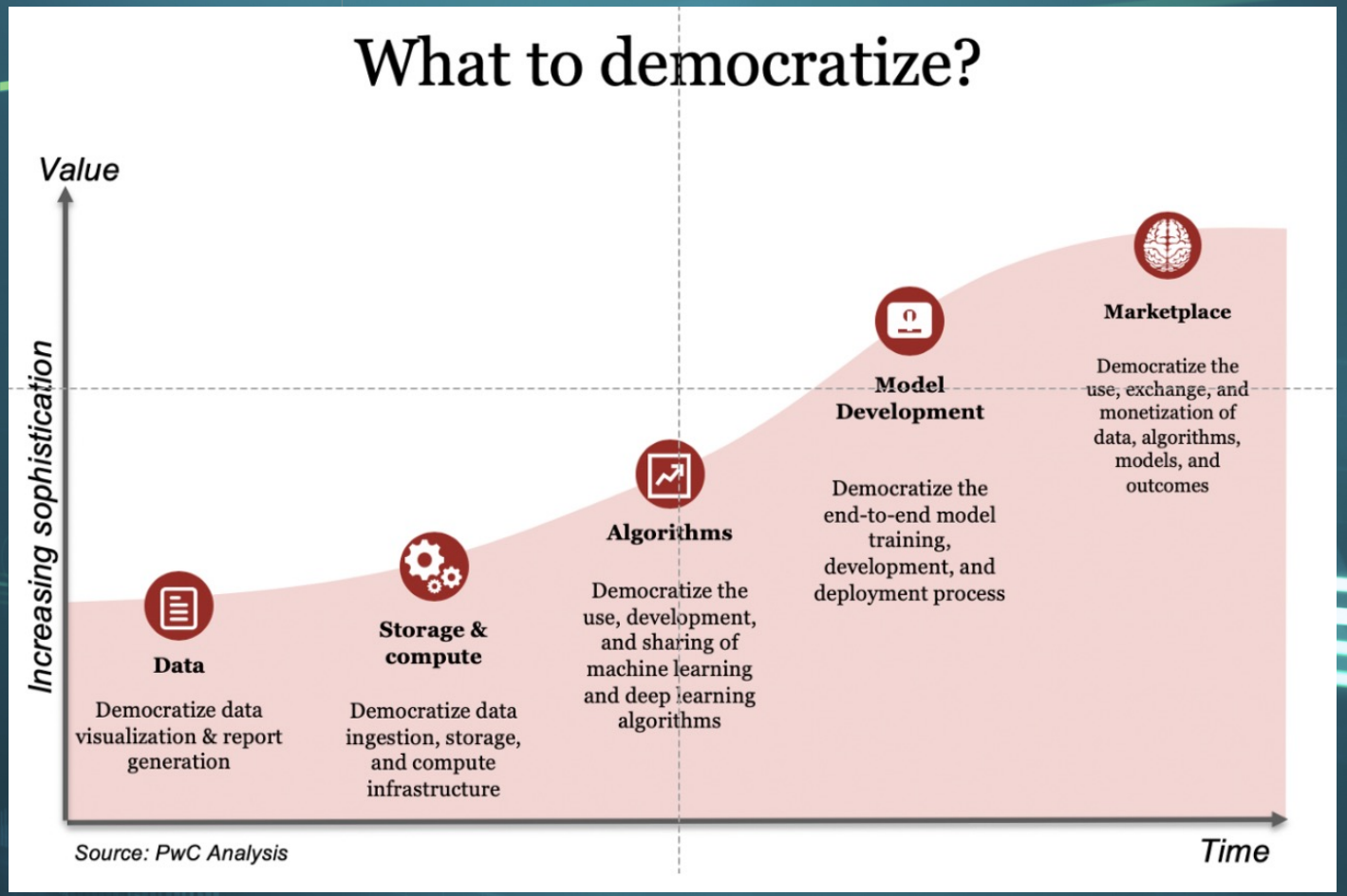
Democratization of AI4Ops lowers the need for data scientists: Vendors will need to respond to data scientist shortage in the market

Smaller providers often lack skilled data scientists in-house

- Evolution of the market will drive towards decreasing reliance on data scientists and more user-friendly solutions
- Chief Digital Officers will assume greater role and will need to adopt portfolio mentality of solutions/platforms that meet overall digital transformation goals. Hodge podge of point solutions for AI will lower ROI on these investments.
- Pay attention to AI solutions in other spaces that enable novices to rapidly develop and manage models for deployment
- Dashboard mindset from pre-AI era will continue for another 1-2 years as new predictive/prescriptive models come to the market.
- As management becomes more data driven we will see a stronger emphasis on predictive and prescriptive analytics and less first generation dashboard approaches



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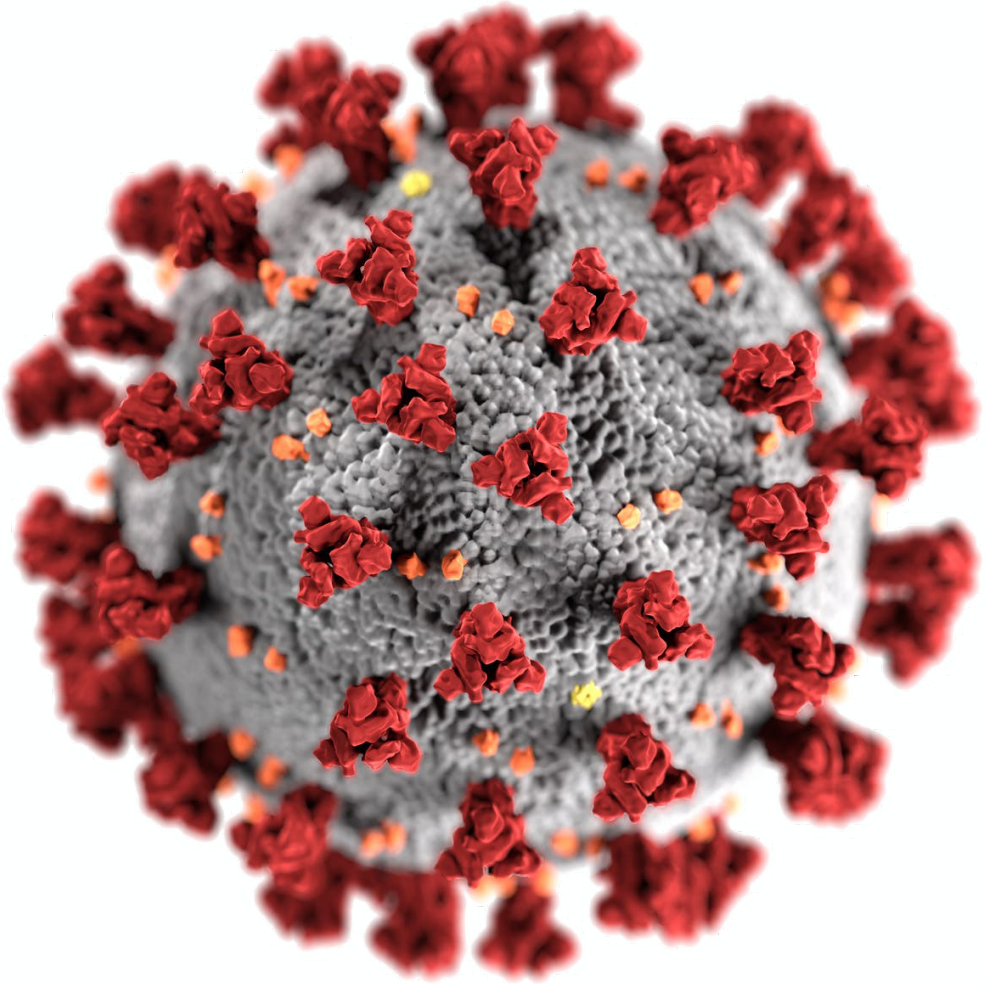
COVID-19: What Lasts and What Expires?



Hospitals required innovation in operations to survive the impact of COVID-19. This study found that AI and Operations vendors delivered on the promise which may be the untold story of health IT during the pandemic

Near term impacts

- Improvements in anticipating supply chain disruptions
- Improvements in asset utilization that impact narrow margins and bringing elective surgeries back online. Shift in mindset from scheduling to asset optimization
- Discharge planning improvements that anticipate barriers to discharge and improve accountability. Systems of accountability and enabling more resilient frontline health worker capacity
- RCM improvements and faster collections, streamlined claims processing, predictive denials

Longer-term impacts

- Shift to more data driven management styles at C-level
- Greater awareness of AI in overall digital transformation and need for overall AI strategy as core to digital transformation approach
- Shift from point solutions to platforms for addressing overall operations
- Rise of Chief Digital Officer
- VUCA (volatility, uncertainty, complexity, ambiguity) in operations means AI's ability to provide insights in non-deterministic, stochastic environments is becoming key to competitiveness and resilience

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Market Forecast

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Forecast Notes

CAGR Projections

- Hospitals and ambulatory care practices will see highest growth in next 2-3 years.
- Independent medical practices will experience higher growth in 3-5 years as solutions become mainstream.
- Large insurers are already ahead of the curve in AI use for claims, revenue.
- Estimated 40% CAGR from 2022-2026

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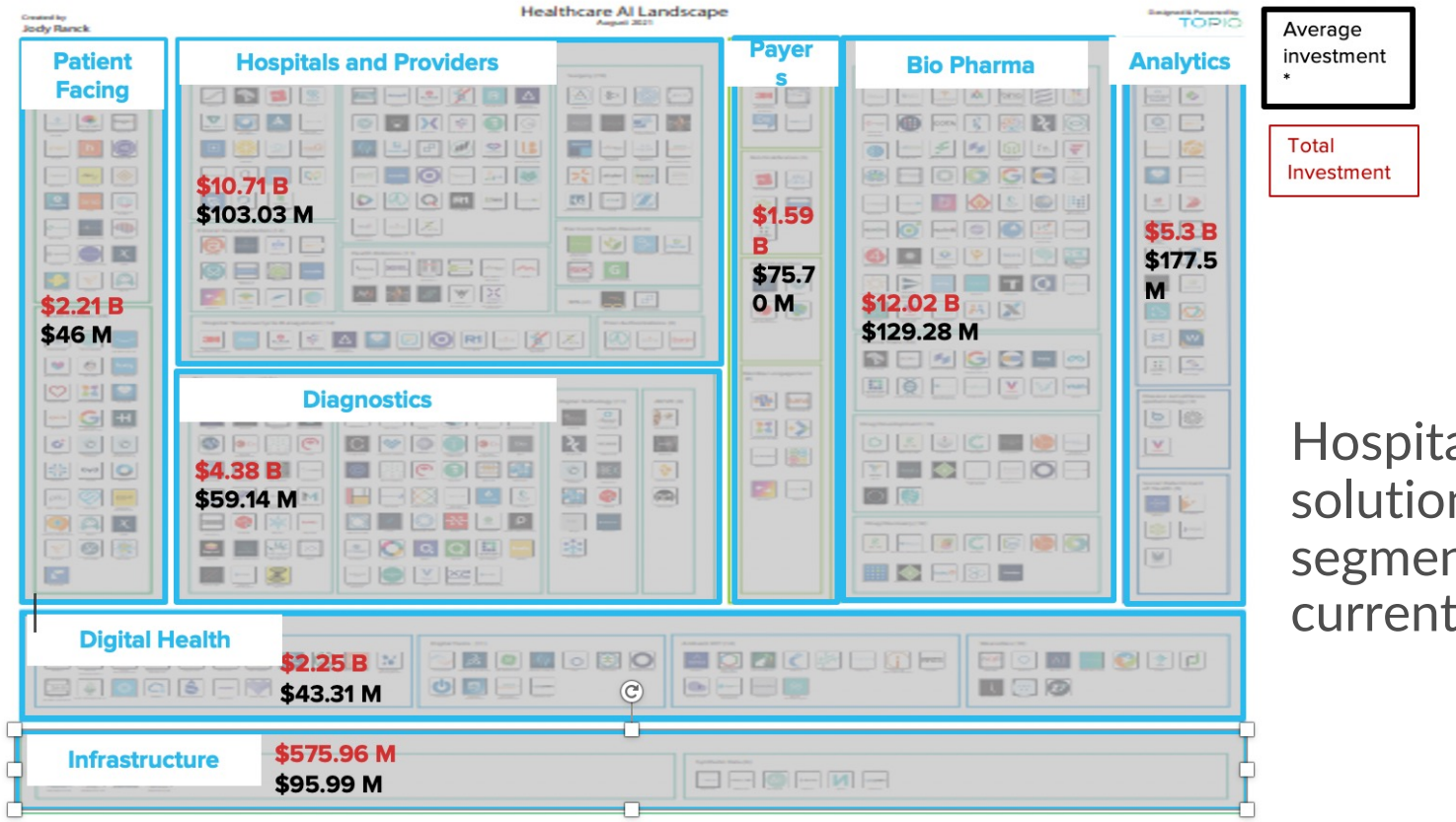
Investment in Healthcare AI by Market Segment

Operations across Hospitals and Payers is one of the largest segments by investments

TOPIO NETWORKS

Investment Heatmap



Hospitals and Provider focused solutions are one of the largest segments for investment currently

As of August 2021
Average investment = Total investment/ Number of companies in the segment
Funding for all companies in the segment is counted .This does not account for double counting for companies in multiple segments.

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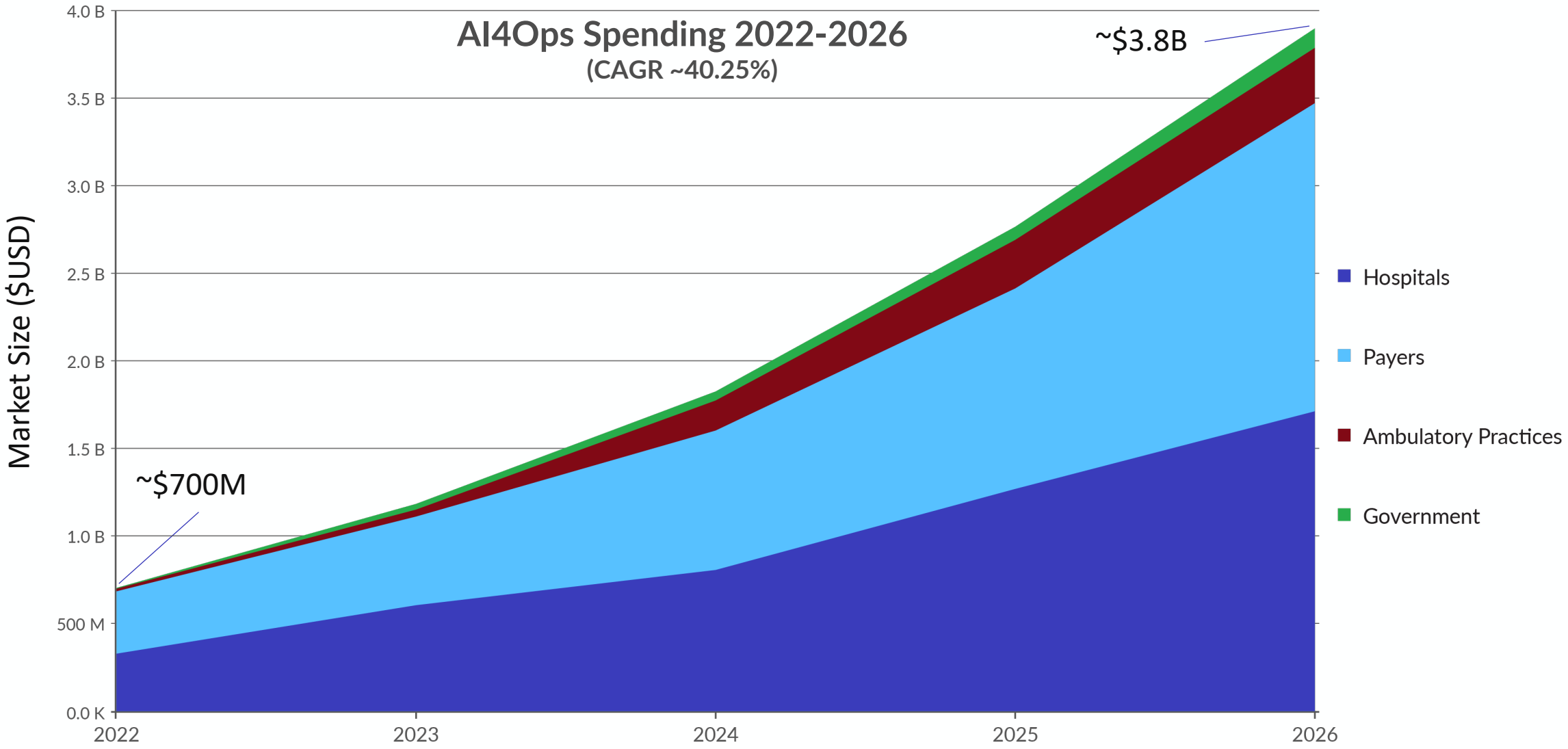
Forecast of Spending



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Forecast by Segment

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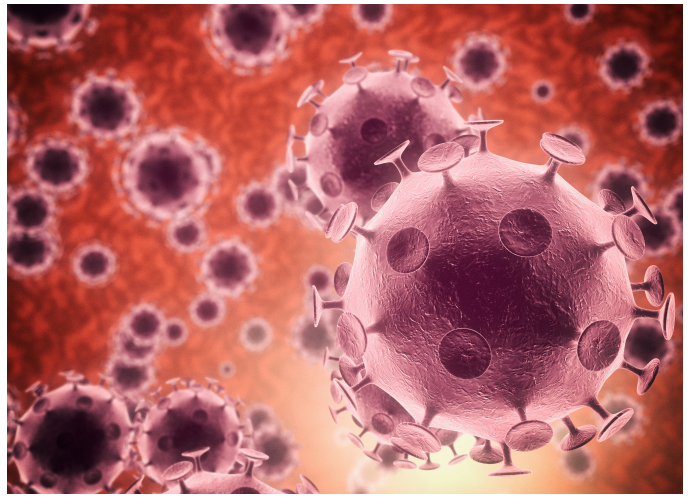
Market-Specific Trends



Hospitals and Health Systems

Market driven by impact of COVID-19 from 2020 through 2022 and need to maintain margins and manage revenues and elective surgeries, beds. Risk management and mitigation.

RCM becoming critical across revenue, customer experience, waste reduction and improving outcomes.

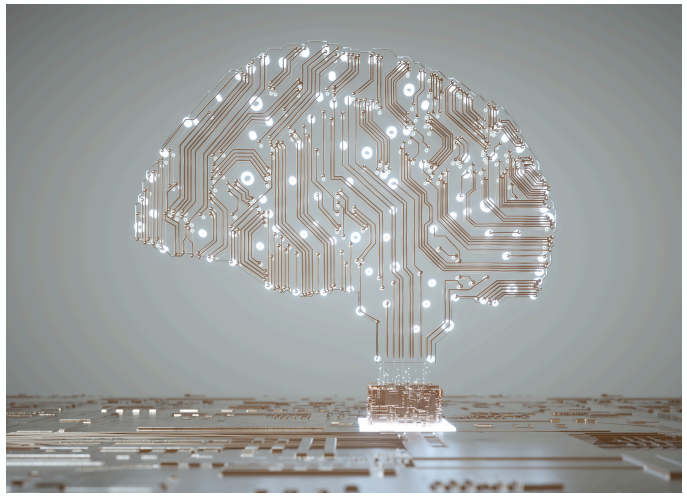
Forward thinking CIOs, Chief Digital Officers will need to think far more strategically about scalable AI and AI first approaches to digital transformation

Ambulatory and Independent Providers

More risk averse than hospital segment but a growing need for tools that attack administrative burden and back office costs.

Smaller practices will likely adopt lightweight RPA solutions from startups with robust technology to address prior authorizations and eligibility.

Point solutions are common today. Platform solutions will begin gaining traction in this segment by 2023.



Payers

Very high level recognition that AI is key competitive differentiator and necessary to build stronger relationships with providers

Fraud detection utilizing AI can demonstrate ROI rather quickly when working with SIUs.

Investors see the value in cutting administrative waste and providing funding for innovation with payers

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Top Five Trends to Watch

- “Top Five Trends to Watch” only available in full report

  Learn More:

  chlmrkrsr.ch/AI4OpsMTR

- Disruptors Enter – Operations is an area largely untouched by the big platform players entering health with the exception of Amazon (PBMs) and Microsoft but their footprints are relatively light in the segment covered in this report. Amazon may shift these dynamics in the coming two years. Incumbents such as 3M and IBM are also investing in this market segment.

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RCM Specific Trends to Watch

- “RCM-Specific Trends to Watch” only available in full report

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- Growing awareness of bias in AI and finance-type of applications will need to be addressed through audits of data sources, models and ongoing assessments of performance of models

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Vendor Categories

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Vendor Profile Inclusion Criteria

Vendor Category	Vendors Profiled
Hospital Operations	Hospital IQ, LeanTaaS, Health Catalyst, Qventus,
RCM/Claims	Olive, Change Healthcare, Codoxo, Infinitus, Waystar
Supply Chains	Premier

Incumbent Vendors
Optum, XIFIN, PriorAuthNow, Lightning Bolt, 3M, IBM

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Revenue Cycle Management (RCM)

Strengths

- Shift from rules-based to more complex billing codes and payer rules is driving faster adoption of automation
- Remote work trend is driving health systems to look at alternatives to the status quo and more innovative approaches including automation
- Nearly 2/3 of providers already use AI in RCM with 100% expected in next 2 years (Change Healthcare Survey)
- RCM and dealing with variability in current COVID-19 context is high on CFO's radars

Challenges

- Successful automation is linked heavily to organization's analytics platform strength and capabilities beyond the control of the vendor
- Trained workforce to manage the analytics for more advanced RCM analytics can be a challenge
- Workers' fear of replacement by RPA can lead to process tampering and impediments
- Estimated 1/3 of hospitals have no automation strategy or implementation currently
- Privacy and security fears constrain adoption in many HCOs

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Claims/Eligibility

Strengths

- Tremendous room for automation and technology is fairly mature
- Administrative burden is a significant pain point for providers who have faced increasing administrative burdens for years
- RPA for eligibility calls appears to be ready for market and effective at handling complexity of calls
- Predictive denials management is the next wave of innovation but few health systems have the capability in 2021

Challenges

- Lack of standards for prior authorization in particular creates challenges for AI implementation
- HCOs are still at relatively early stage for strategically deploying AI in a platform fashion for these capabilities
- Independent providers may have the need for the tools but skepticism and sitting on sidelines to understand vendors. Risk aversion with AI.

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Hospital Operations/Discharge Planning

Strengths

- COVID-19 provided solid context for demonstrating test case and the need for solutions for hospitals to manage beds, supplies, etc.
- Mature solutions from other industries such as airlines are available and applicable to healthcare and operational excellence
- Vendors showing clearly demonstrable ROI within reasonable timeframes
- Change management beyond the technology solution is critical for adopting technology and rethinking workflows

Challenges

- Entrenched practices around traditional scheduling and hospital operations
- Data standards and interoperability can slow progress
- EHR vendors develop own tools but they frequently lack the robustness that specialized startups can provide

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Supply Chains

Strengths

- Supply chains acutely impacted by COVID gave vendors that could aggregate across many hospitals a clear advantage in forecasting, responding to disruption
- Supply chain insights also carried over into epidemiologically modeling and helped with readiness
- Hospitals' awareness of need for improvement in resilience of supply chains is mission critical
- Ripe for automation and demonstrating high ROI and improvements for margins

Challenges

- Interoperability of diverse supply chain software systems can be a major challenge
- Security of supply chain software ecosystem is a major vulnerability for cybersecurity breaches
- FDA delaying UDI mandates by two years is an impediment for vendors in this space

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Product Categories and Descriptions

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Caveats, Qualifications & Assumptions

AI4Ops Sub-Categories

- Revenue Cycle Management
- Claims Management
- Hospital Operations
- Eligibility/Prior Authorizations
- Asset Optimization
- Discharge Planning
- Supply Chains

Notes:

- The product categories we define in this market may not align exactly with existing offerings
- A vendor's offering may combine the functionality defined by us as discrete with other functionalities

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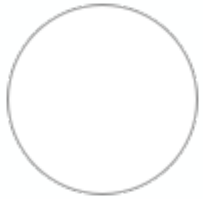
Harvey Ball Ratings Key



Not applicable

Meets Some Market Requirements

Meets Market Requirements

Exceeds Market Requirements

Market Leading

- Every vendor receives a rating in every Product Category
- Most vendors do not offer functionality in every category
- Harvey ball rating is relative to all other vendors in report and product requirements defined in the broadest sense

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Product Ratings Categories

Revenue Cycle Management	Hospital Operations	Discharge Planning	Supply Chains
Eligibility	Patient Beds	ER Management	Predictive Caseload
Prior Authorizations	Surgical Scheduling	Discharge Barriers	Supply Chain Forecasting
Collections/Propensity to pay	Infusions	Perioperative	Resource Prioritization
Predictive Claims Denials	Situational Awareness		
	Asset Optimization		

Note: Sub-product categories roll-up into broad category/use case ratings that are used to identify Flagship vendors

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AI in Healthcare Operations: Flagship Vendors

CHANGE HEALTHCARE

Qventus

LeanTaaS

Revenue Cycle Management	Hospital Operations / Change Management	Operational Excellence / Asset Optimization
➢ Comprehensive RCM platform with strong links to clinical data ➢ Major marketshare of transactions for building robust models ➢ Innovators in AI and adopting an AI First approach that moves the needle for digital transformation at the enterprise level	➢ Most sophisticated approach to integration of human element (change management) and AI ➢ Gaining market with several major health systems ➢ Recognition of the challenges to workflows that AI solutions require and deep experience beyond machine learning	➢ Largest footprint in the market in over 40 states and majority of the top 20 health systems ➢ Focused approach to strategic assets of hospitals ➢ Relatively straightforward implementation facilitates adoption ➢ Competitive edge over tools created by EHR vendors for scheduling

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Automation of Operations/Administrative Functions

	Innovation	Description
Asset Optimization Models/Algorithms	➢ Reframes block scheduling to mathematical solutions for addressing variability in supply and demand	➢ Mathematical approach to scheduling that requires vast number of permutations and calculations to optimize use of assets such as beds, surgical theaters, etc and optimize returns while decreasing wait times and building resilience to changes in patient flows
RPA for Eligibility	➢ Use of conversational AI to automate outgoing calls to verify eligibility and replicate human interaction	➢ Conversational AI can be used to reduce the time spent by human agents contacting payers to verify patient eligibility. A chatbot interacts with a human agent to verify insurance benefits, co-payments, etc. needed to initiate insurance claims and clinical procedures and pharmaceutical benefits.
Predictive Denials Management	➢ From rules-based if-then systems to ML-based predictive analytics for denials based on more complex rules	➢ Models are created to "game-out" the possible scenarios with a wide range of payer rules to facilitate actions that lower denial rates and create efficiencies in claims management
Prior Authorization Automation	➢ Robotic process automation utilizing voice and ML to reduce human workload in completing prior authorizations	➢ More complex version of automated eligibility calls that requires accessing wider range of data points. As standards for these procedures are developed this area will begin to mature in the coming years.

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Vendor Product Ratings

Vendor	Primary Sector	Hospital Ops	Asset Management	RCM	Claims Management	Prior Authorizations/ Eligibility	RPA	Supply chain Management
Change Healthcare	Payers and Providers							
Codoxo (Fraudscope)	Payers							
Health Catalyst	Hospital							
Hospital IQ	Providers/Hospitals							
Infinitus	Independent Providers							
LeanTaaS	Hospitals							
Olive	Providers/Hospitals							
Premier	Hospitals							
Qventus	Hospitals							
Waystar	Providers							

Individual vendor evaluations only viewable in licensed versions of report

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Market Categories and Descriptions

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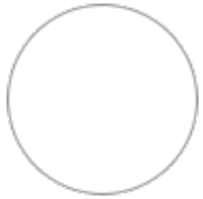
Harvey Ball Ratings Key



Not applicable

Meets Some Market Requirements

Meets Market Requirements

Exceeds Market Requirements

Market Leading

- Every vendor receives a rating in every Market category
- Most vendors do not participate in every market described here or have relevant programs in every one of these categories
- Harvey Ball rating is relative to all other vendors in report and market requirements in the broadest sense

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Markets for Health IT Solutions

Category	Description
Hospital or Health System	Any facilities-based care delivery organization that own or control hospitals.
Independent Community Provider	Any care delivery organization that is not owned by, controlled by, or sited in hospital or health system.
Outpatient/Ambulatory Network	A care delivery organization offering access to both primary and specialty care, with multiple locations.
Medical Imaging and Radiology Practices	Imaging specialty practices using vendors for operations
Payers	Any organization which pays for healthcare services on behalf of members.

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Vendors: Current Target Markets

Vendor	Independent Community Provider	Hospital or Health System	Payers	Pharmacies	Pharma / LifeSci	Labs
Change Healthcare						
Codoxo						
Health Catalyst						
Hospital IQ						
Infinitus						
LeanTaaS						
Olive						
Premier						
Qventus						
Waystar						

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Vendor Market Ratings

Vendor	Market Vision	Extensibility and Engagement	Complementary Services	Momentum
Change Healthcare				
Codoxo (Fraudscope)				
Health Catalyst				
Hospital IQ				
Infinitus				
LeanTaaS				
Olive				
Premier				
Qventus				
Waystar				

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Aggregate Vendor Rankings and Individual Profiles

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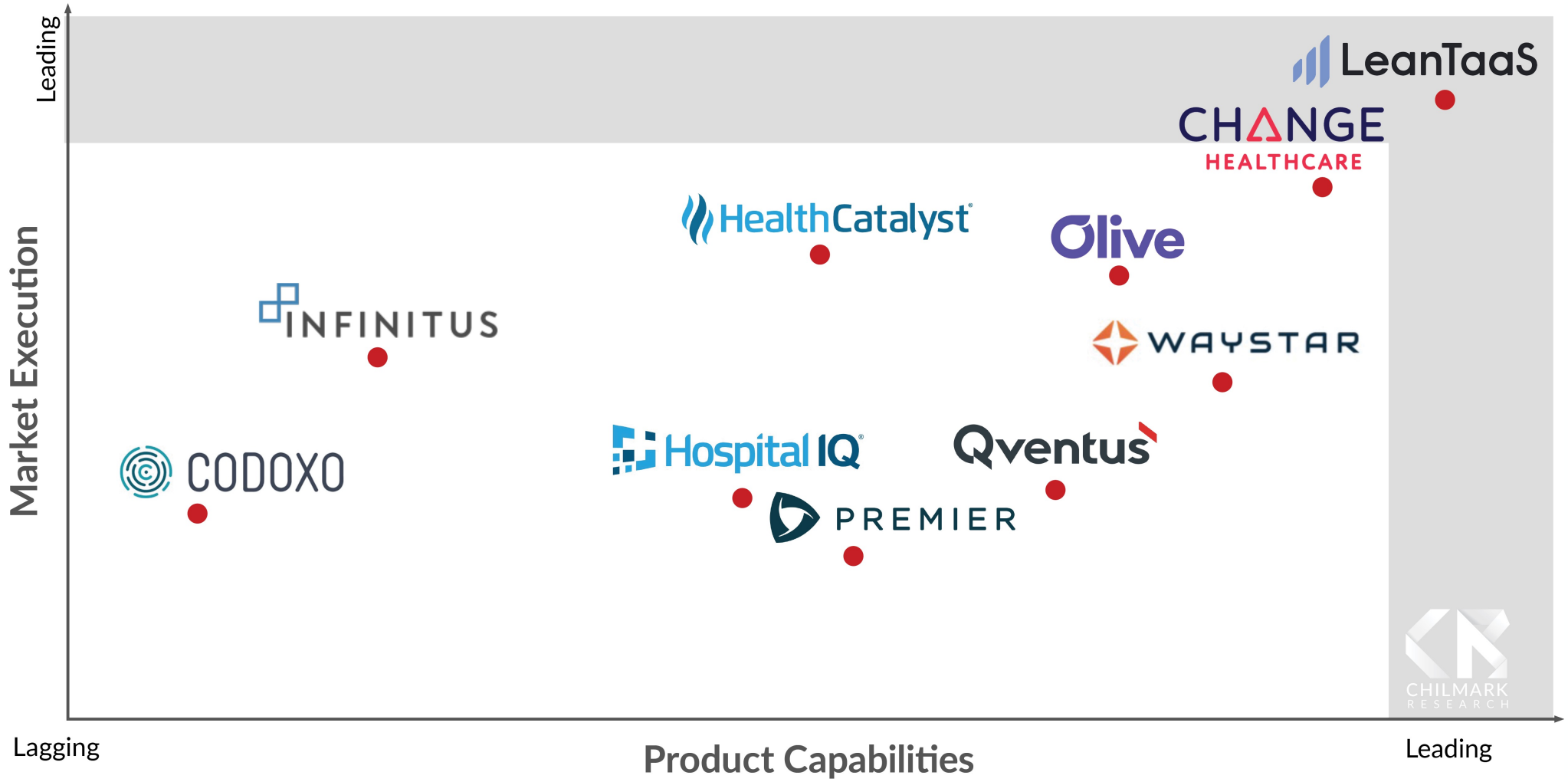
Chilmark Bearing: How do Offerings Compare?

AI4Ops vendors



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Slides 43-75 only available in full report

Section includes detailed product capabilities breakdown, and in-depth profiles of the following vendors' offerings:

Learn More:

chlmrkrsr.ch/AI4OpsMTR

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Vendors to Watch

- One of the largest players in this segment with access to over 120m transactions
- Currently awaiting acquisition of Change Healthcare approval
- Very robust innovation efforts in AI and RCM as well as other operations functions

- Philips Command Center has a major footprint in the hospital operations space with substantial partnerships.
- Ability to connect clinical and operations data for better planning in operations space.
- Deep experience uniting multiple Philips' teams for operations insights.

- Focus on RCM for laboratories.
- Links workflow automation in labs to financial and clinical diagnostic data to improve reimbursement.
- Raised approximately $6m to date and is in earlier stage than most companies in our report but focuses on important market segment.

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Vendors to Watch

PriorAuthNow

- Focus on prior authorizations for eligibility where there is strong demand from provider market.
- Raised approximately $15.7m to date and strong player in niche.
- We expect acquisitions of niche-focused players as platforms mature.

AKASA™

- Focus on full automation of RCM processes.
- Raised $85m in funding to date.
- Early stage with limited marketshare at the moment but reputation for strong technology approach and team for executing in RPA.

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Appendices

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Appendix A: Methodology

- To compile this report, Chilmark Research combined extensive primary and secondary research techniques to create a composite profile for each vendor.
- Primary research was divided into two distinct steps, beginning with soliciting targeted vendors for their involvement in the research.
- We asked participating vendors to complete a questionnaire whose purpose was to collect qualitative and quantitative information about the company and the markets it serves. Questions included among others: relevant revenue, number of employees, primary market, number of healthcare entities currently using its solution, and more in-depth questions regarding features and functions.
- When possible, upon receiving the completed questionnaire we conducted a follow-up interview with each vendor. These in-depth telephone interviews typically lasted 60 minutes and built on the responses to the questionnaire. This portion of the research effort also focused on topics that cannot easily be captured within the context of a written questionnaire including competitive positioning, product roadmap, partnership strategy, and which solution features are most attractive to prospective customers.
- Chilmark Research performed a final analysis of the vendors via secondary research and telephone interviews with end users and consultants that have advised on, deployed, or used a vendor's system. This information was compiled to provide the in-depth reviews and ratings of the profiled vendors. Prior to publication comments and feedback were considered and where relevant, incorporated into the final profile narratives.
- In developing this extensive report, Chilmark Research maintained absolute objectivity throughout the entire research process and it is our sincere hope that this report brings greater clarity to this evolving market.

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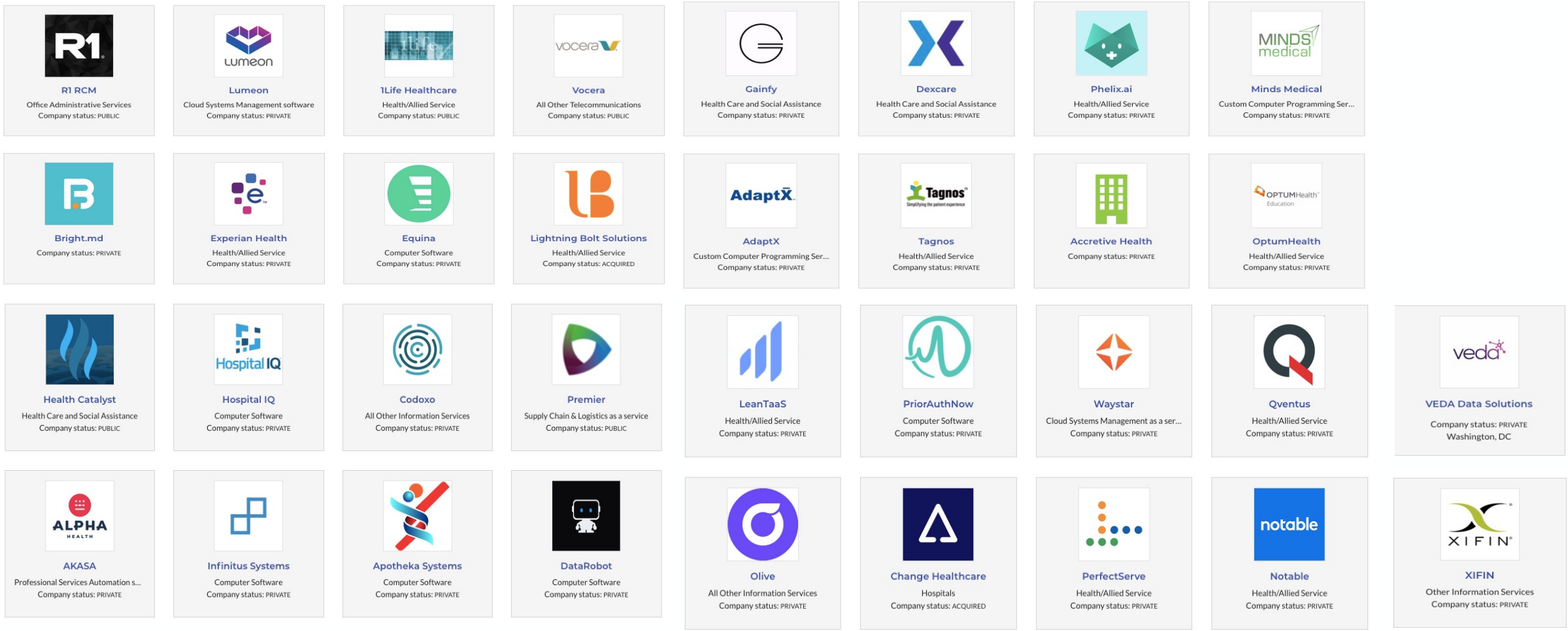
Appendix B: Overall AI4Ops Vendor Landscape

Operations-Related Vendor Ecosystem



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Appendix C: Acronyms Used

AIML - Artificial Intelligence/Machine Learning
AI4Ops - AI in Operations
AMA - American Medical Association
CAGR - Compound Annual Growth Rate
EHR - Electronic Health Records
ER - Emergency Room
HIS - Health Information System
RCM - Revenue Cycle Managment
ROI - Return On Investment
RPA - Remote Process Automation
S/D - Supply/Demand
SKU - Stock Keeping Unit

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About the Author

Dr. Jody Ranck has nearly 30 years of experience working in the global health arena and has helped lead a number of major health technology initiatives throughout his career. Author of two books on digital health, he is a globally recognized thought leader on digital health and has been listed in the “Always On” top 100 minds in Global mHealth (2013). His past clients have included Humana, TM Forum, CLSA, T-Systems, Stanford University’s School of Medicine, UC Berkeley, the UN, and ARM to name a few. He has been a frequent advisor to large healthcare companies and startups focused on providing more patient-centric care and transitioning to value-based care. In the past he has been appointed as a member of an Institute of Medicine Committee on ICTs in global health/violence prevention and helped launch a major global eHealth initiative with the Rockefeller Foundation. He has been a frequent keynote speaker at health IT conferences and recently organized and chaired the Healthcare Blockchain Summit (2017-18).

Jody has written and worked extensively on mobile innovations, the Internet of Things (IoT), wearables, blockchain and the analytics market in healthcare. He is also working with cutting edge startups on next generation biosensor platforms, patient generated data for clinical research, and emerging blockchain applications in healthcare. His education includes a Doctorate in Public Health (University of California, Berkeley), MA in International Relations and Economics (Johns Hopkins University) and a BA in Biology (Ithaca College).

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About Chilmark Research

Our Mission:

Help organizations adopt, deploy, and utilize modern information technologies to improve the healthcare experience.

Our team is united by a core belief that effective deployment and use of IT is essential to modernizing care delivery and improving the care journey.

Chilmark analysts monitor trends and developments in the industry with a focus on those technologies that will be transformational to healthcare delivery.

We provide comprehensive, objective, high quality research for busy executives. It is our way to help create a more informed, future-ready market of products and customers.

Bringing clarity to an uncertain time.

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