

# Data-Driven Healthcare

Market State of Play and the Next Wave of Data Innovation



# EXECUTIVE SUMMARY

The average patient generates <u>close to 80MB of health data</u> each year in imaging and electronic health records. The healthcare industry generates approximately 30% of the world's data volume today; by 2025, the compounded annual growth rate of data for healthcare will reach 36% which is higher than industries like manufacturing, financial services, and media & entertainment.<sup>1</sup>

Over the past two decades, a wave of investments has gone into building our healthcare data infrastructure to support capturing these data assets with the vision that, in doing so, we could harness them to improve our health system and outcomes. The explosive launches of ChatGPT and other large language models (LLM) have demonstrated that the time to act is now. We believe that we are at the precipice of the second wave of data innovation. This wave will involve applying intelligence on top of our data foundation to unleash productivity and insights across business, clinical, and research use cases, and unlock true returns on our data infrastructure investments. We also believe that organizations (healthcare systems, payers, life sciences, innovators) that do not have a clear strategy for how they intend to leverage data meaningfully in their businesses will be left behind.

In this report, we will explore three use cases for data and intelligence where we are seeing significant momentum and potential: **business intelligence**, **clinical intelligence**, **and data networks and commercialization**.



# BACKGROUND



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HITECH Act provided over **\$35 billion** in incentives to promote "meaningful use" of electronic health records. The modernization of the U.S. healthcare system's data infrastructure started with the <u>government's push toward electronic health information exchange</u> (HIE) that was a part of the American Recovery and Reinvestment Act in 2009. A portion of the legislation, the Health Information Technology for Economic and Clinical Health (HITECH) Act, provided more than \$35bn in incentives to promote "meaningful use" of electronic health records (EHRs). Since then, the industry has invested billions more dollars in the implementation of EHRs. Prior to this Act, less than 10% of U.S. hospitals used EHRs; today, that <u>number sits north of 90%</u>.

While this first wave of investments to lay the foundations was critical, we are still far from achieving the original goals of the HITECH Act, which was to enable the use of data in healthcare to improve quality, safety, and efficiency; engage patients in their care; increase coordination of care; and improve the health status of the population. The bold march toward electronic health records and digitization of healthcare data has also introduced a new set of problems, such as <u>increased provider burden</u>, as well as a new set of constraints, such as data siloes and anti-competitive behaviors that limit <u>information sharing and innovation</u>.

More recently, the 21<sup>st</sup> Century Cures Act was passed, a component of which concerned interoperability, information blocking, and patient access to their health data. At its core, the law is intended to enable patients to have more ownership of their data by placing requirements on interoperability and requiring that providers offer patients access to their data upon request and without charge. The first pieces of the CMS Interoperability and Patient Access Rule came into effect in early 2021 despite setbacks from COVID, and we anticipate that bi-partisan support will continue to drive momentum in this space.



# FIGURE 1: OFFICE OF THE NATIONAL COORDINATOR FOR HEALTH IT: KEY REGULATORY ACTIVITIES



# Laying the foundation of EHRs across the industry

- \$40B CMS investment to subsidize EHRs for hospitals and ambulatory providers
- ONC certification of EHR systems to support CMS and CDC programs
- ONC certification now covers EHRs used by 97% of hospitals and 86% of ambulatory providers



# Leveraging EHRs to drive value

- <u>Information blocking</u>: Prohibits providers, technology developers, and health information networks from interfering with access, exchange, and use of electronic health information
- <u>Standards</u>: Requires access to information through APIs "without special effort"
- <u>TEFCA</u>: Requires nationwide governance for health information exchange networks – Trusted Exchange Framework and Common Agreement

Source: ONC

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In parallel with this regulatory progress, advancements in computer science and artificial intelligence (AI) have proliferated. More importantly, healthcare innovators and technology companies have found meaningful use cases within medicine and healthcare to apply these technologies and the industry has become increasingly acquainted with using new forms of data (i.e., SDoH, genomics). Consequently, billions of dollars in venture funding have gone into data and AI companies in healthcare.



# MARKET LANDSCAPE



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The generous amount of funding into data and AI has led to an extremely crowded market landscape. The first wave of investments surrounding the HITECH Act was largely focused on data infrastructure and laying the "pipes" for data capture and exchange across the healthcare system. In this decade, we saw the surge of EHR players such as Epic, Cerner, and athenahealth as well as the emergence of data interoperability players such as Redox and data networks such as Commonwell Health Alliance. While there is certainly more work still to be done to achieve true data liquidity across the system, we have deliberately decided to focus on the second wave of innovation, which is accelerating with the advancements of AI (the intelligence that will sit on top of this infrastructure).

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### IN PARTICULAR, WE HAVE SEEN THE MOST ENERGY IN THREE USE CASES:

2

Business intelligence to drive strategy and operations

1

Clinical intelligence to inform and augment the clinical enterprise Data networks & commercialization to foster new revenue streams and usage patterns

We have focused the rest of this brief on illuminating the state of play across each of these three areas.

# 1. Business Intelligence

Every company today relies on data to inform their business and strategy decisions. "The modern economic platform is based on a virtuous cycle with data and scale at its core. If you are not playing at this level, you are not playing the contemporary economy"<sup>2</sup>. In fact, an <u>overwhelming 90% of healthcare leaders</u> reported losing revenue due to inefficient data use.

The use of data to inform business decisions has become a critical imperative for healthcare organizations as the operating environment shifts rapidly and grows increasingly complex. Faced with pressures on multiple fronts, healthcare systems have an existential need to evolve their business models. However, the traditional adage of "build it and they will come" no longer applies; answers to strategic questions such as "should we build a new children's hospital" belie the need to understand national and local market demand and dynamics with precision.

Meanwhile, contracting between payers and providers has also become increasingly complex. As more lives move to risk and managed care, both payers and providers need to better understand utilization, outcomes, and cost across their populations and within specific populations.



At the same time, competitive forces are also increasing as the set of players that healthcare systems and healthcare plans need to compete with for patient volume and membership expands and evolves. It is critical to understand consumer preferences for where and how they seek care and coverage. These are three of the many examples of where data have become critical to drive business strategy development and planning

There is an ecosystem of vendors that have emerged to support these needs. They largely fall under three categories:



Service and Advisory Providers



Data Discovery and Visualization Tools

These are not mutually exclusive, and many companies are striving to become the primary strategic planning partner for healthcare organizations by offering solutions across all three categories.

	Da	Services & Advisory	Data Discovery & Visualization Tools			
	Market Demand		HEALTHCARE			
Market Intelligence	& Forecasting Financials & Operational Benchmarking	Optum     trilliant/health     SYNTELLIS       KaufmanHall     SHERLOCK & COMPANY     STRICT	Optum	⊁ Capitol Al		
	Patient Experience & Preferences	FPressGaney buxton	PREMIER <sup>®</sup> <b>KaufmanHall</b>	IIIIPOPULI		
Network & Contracting	Network Design & Performance	Clarify trilliant health	McKinsey & Company	GENERALIST		
	Provider Intelligence & Performance	Ribbon ⊠ DEFINITIVE andros <sup>™</sup> ₹ <sup>MONOCLENSCHTS</sup> ∛ Clarify trillianthealth IIIIPOPULI Optum	Deloitte.	🔆 + a ble a v S Looker		
	Contract Mgmt., VBC & Price Transparency	Clarify NUNA stellarhealth へRCADIA Turquoise Health  CEEDAR GATE Optum	G	Power Bl		
Cost and Health Mgmt.	Population Health	Health Catalyst ARCADIA <sup>®</sup> Anovaccer Carify Mede/Analytics Costalions Optum Cumeris Costalions		\$ sisense		
	Medical Cost & Utilization Benchmarking	Cohere AllMed Mealth Vizient		Qlik 🧕		

# FIGURE 2: BUSINESS INTELLIGENCE MARKET MAP



#### Data & Analytics Providers

Within this category, there are pureplay data aggregators who simply curate, standardize, and sell proprietary datasets and benchmarks for different use cases, although they are increasingly rare especially as access to datasets become more available. To differentiate themselves, most data providers also apply analytics and algorithms on top of a dataset to derive useful measures and insights for different customers and use cases.

Some players have focused on scale by building the widest and most diverse set of analytics that can be applied to a range of business problems and use cases (e.g., Definitive Healthcare, Clarify Health). This is particularly compelling for healthcare organizations that are reticent to work with many point solution players. Feedback from our network, however, is that many of these solutions often lack the fidelity they require and are not representative of their specific markets or populations. As a result, we've seen other players emerge that focus on data granularity by building local market datasets that would allow organizations to derive strategies that are unique to their specific market or populations (e.g., Trilliant). Another way that vendors have attempted to differentiate is by focusing on being the best-in-class for specific use cases (e.g., Ribbon Health for provider data, Turquoise Health for price transparency, Arcadia for population health management). While early, these players appear to be finding some market traction.

In general, healthcare organizations will need to make trade-offs between breadth of use cases versus precision and flexibility of the data and analytics when selecting a vendor to partner with.

#### Service & Advisory Providers

Many data and analytics providers also offer advisory services to help organizations turn their data into strategic insights and business decisions. Vendors are increasingly seeing the two offerings as complementary and necessary to compete. As a result, we have seen significant activity and consolidation in this space (e.g., Optum's acquisition of Advisory Board; Vizient's acquisition of Sg2 and Kaufman Hall; Trilliant Health expanding into research). The introduction of large language models (LLMs) and advanced analytics will lower the burden of doing basic strategic assessments and, thereby, focus advisory services towards more elevated and creative strategic thinking.



#### Data Discovery & Visualization Tools

Lastly, within this ecosystem, there are companies that provide the tools that allow organizations to explore the data and visualize it in a compelling way. While they are not data and analytics providers per se, we believe there will be significant energy in this space over the next few years with the pervasive adoption of generative AI, and we would be remiss to exclude this category of players.

The dominant players in this space have traditionally been Tableau, Power BI, and Qlikview. All of these players are generalists and, as a result, many healthcare organizations have had to develop their own customized dashboards using these tools to fit their specific organizational needs. Interestingly, we are beginning to see healthcare-targeted players emerge in this space (e.g., Capitol AI) as well as data and analytics providers who are beginning to extend their product stack to include more integrative data discovery and visualization tools (e.g., Populi, Trilliant, Sg2).

Most healthcare organizations we spoke with thought their data visualization solutions were "fine" but not particularly compelling or intuitive. We believe this space is ripe for innovation. The advancements of natural and large language models, such as GPT-4, have made it easier to do data guery and discovery in a more intuitive way. The advancements have also enabled more intuitive communication of insights through contextualization as well as storytelling of data. Capitol AI is an example of a player who is leveraging these technologies to allow healthcare organizations to explore their data and tell stories around them in a more seamless and intuitive way. We will see more and more players embed these types of technologies across use cases and platforms in healthcare. For example, Innovaccer recently launched a conversational AI assistant that helps health system executives make better use of their data. Meanwhile, the recent launch of Microsoft's partnership with Epic which resulted in several innovation launches in just a matter of weeks such as the integration of natural language queries and interactive data analyses into Epic's SlicerDicer reporting tool.

We believe these innovation trends will not only unlock more useful insights for healthcare organizations; it will also enable more self-servicing and thereby democratize data discovery and insight generation across as well as up-and-down organizations.



# 2. Clinical Intelligence

We have defined clinical intelligence as the application of advanced analytic models, including AI, to inform clinical decision-making, including for risk stratification, diagnoses, and treatment. We have seen a rapid acceleration of funding and development in this space alongside the advancement in AI technology and clinical understanding. In fact, billions of dollars of venture capital funding has gone into clinical intelligence companies and this trend continued into Q1 of 2023 despite an overall more tepid funding market (e.g., Onc.AI which raised a \$25M Series A and PathAI which raised a ~\$28.5M Series C).

For the most part, these companies tend to either focus on one modality and/ or one clinical service line.

# FIGURE 3: CLINICAL INTELLIGENCE MARKET MAP

		Modality		Clinical Service Line			
	Surgical	Radiology/Imaging	Pathology	Oncology	Neurology	Other Specialties	
Risk Stratification and Diagnostic		HeartFlow I M A G E N © enlitic Caption Health © DOVEN C Lunit O ULTROMICS	🔊 Paige 😵 PathAl 🛞 PROSCIA	Conc AI Valar Labs Owkin VISCUICE	C NeuraLight Life Sciences rune labs Viz.ai OCCTAVE % neurotrock	HeartFlowr Derette Scopes Odin Vision Discrete Disc	
Treatment	VICAROUS SUBSICAL Proprio			C ConcertAl C ConcertAl Unity ATROPOSHEALTH	Synapticure s E V A R O rippl isaac health Remo.	eko.ai 	

From a modality perspective, radiology and imaging have been the areas where clinical intelligence has gained the most traction given the wide availability of imaging data as well as the more standardized and widely accepted clinical protocols to interpret them. More than \$3.5bn has been invested in some large players in this space including Imagen, Caption Health, and Viz.Al.<sup>3</sup> In fact, ~70% of the 350+ FDA-approved AI/ML-enabled medical devices are in the area of radiology.<sup>4</sup> We are also seeing the increasing adoption of AI technology for pathology (e.g., Path AI and Paige) as well as surgical applications (e.g., Activ Surgical, Propio, and Touch Surgery).

From a **clinical service line perspective**, AI has found its way into cardiology most quickly given the significant market size potential. Cleerly and HeartFlow are both examples of cardiology intelligence companies that are leveraging AI/ML to advance the diagnoses and treatment for heart disease.



# **60%** of Americans are uncomfortable with providers relying on AI in determining their care.

We are also seeing clinical intelligence solutions emerge in other specialties and areas including oncology (i.e., Tempus, Onc.AI) and neurology (i.e., Octave Biosciences for multiple sclerosis, Rune Labs for Parkinson's, and Viz.AI for stroke).

While this is an exciting area for the application of AI within healthcare, it is nascent, fraught with hurdles, and misutilization has serious consequences.

Firstly, gaining provider acceptance has been a key challenge. Many clinical intelligence companies are focused only on risk stratification and diagnostics. The inability to recommend or execute on the next steps of what to do for patients who are diagnosed earlier has limited uptake by providers. Meanwhile, those that do attempt to impact clinical standards and protocols (e.g., Cleerly) also face an uphill battle; the perceived "black box" nature of some of these AI solutions and mixed AI literacy amongst some clinicians have led to reticence in adoption. Additionally, many clinical intelligence solutions typically target one specific clinical use case and one modality which has resulted in a confused market with many point solutions.

Secondly, consumers are also hesitant about these technologies. According to a recent Pew Research survey, <u>60% of Americans are uncomfortable</u> with providers relying on AI in determining their care.

The hesitation is neither unfounded nor helped by news headlines such as was the case with Epic's failed experiment with launching an embedded sepsis algorithm. There are legitimate concerns around Al biases and misutilization including but not limited to algorithms and tools that are trained on a dataset that may not be representative of the population to which they are applied. There is also the concern that the ability for Al to meaningfully improve outcomes is unproven in many specialties. A recent study published in JAMA found a "paucity of robust evidence" to support claims that Al could enhance clinical outcomes. The quality and accuracy of these Al models vary greatly; as a result, players have emerged to support the testing, validation, and curation of these models (e.g., Komodo Health, Mayo Clinic Platform).

This has resulted in the FDA announcing its intention to regulate Al-enabled clinical decision support tools as devices to provide a more strict framework for how these tools are put into practice. More recently, the National Institute of Standards and Technology (NIST) released a new <u>Al Risk Management</u> <u>Framework</u> that seeks to provide a framework for Al developers as well as for the broader healthcare community "to better manage risks to individuals, organizations, and society associated with artificial intelligence". We believe this will help add more clarity to the market including for developers of these solutions.



Lastly, the reimbursement landscape for these tools is still in flux. Payers are reticent to be the first in market to reimburse for novel clinical intelligence tools. Our experience with reimbursement in this space is that it is largely sporadic and dependent on the specific individual within a payer that is reviewing the claim.

There is great promise for the application of intelligence to inform clinical decision making. However, like all tools, they inherently have limitations. Clinical intelligence will not replace clinician judgement. Ultimately, providers will need to be involved in the decision making because they are ultimately accountable for the patient's care and outcomes. However, clinical intelligence can facilitate the work of physicians and, in doing so, liberate them from being "memorizers" to "knowledge navigators"<sup>5</sup>.

# 3. Data Networks & Commercialization

Finally, healthcare organizations, particularly healthcare systems, are showing a growing interest in commercializing their internal data and analytics for external deployment, algorithm development, or clinical research to diversify their revenue streams. There is enormous potential for aggregating vast amounts of data across healthcare organizations for research that can ultimately improve health outcomes. However, this data is currently fragmented across many electronic health records, and there are varying standards by which it is captured and stored, all of which presents a significant challenge to harnessing its full potential.

With multi-million biopharma contracts on the line, not to mention the promise of meaningful medical discoveries, many companies have emerged to break down these silos.

Truveta is one example of a company that was founded in this space that has been able to attract investment and form partnerships with 27 healthcare systems representing more than 75 million unique patient journeys over the last two years. The Mayo Clinic similarly launched its own platform (Mayo Clinic Platform) that serves as a marketplace connecting its participating members to a suite of Mayo Clinic Network products, services, and solutions, with the goal of improving clinical care and operational workflows, in part through advanced applications of AI and machine learning. Epic and Cerner have similarly established their own "learning networks" to allow health systems to share their data and analytics.

There are multiple factors an organization may consider when selecting a data commercialization partner, including the intended use cases for the data, degree of data ingestion support, as well as the investments and time required to implement the solution. For example, most organizations prioritize being able to use the data to drive value internally and to their own patients, in addition to being able to commercialize their data. They are looking for partners that will deliver strategic as well as financial value. Some organizations are further along in their data maturity than others. Those that are less advanced may look for partners that can support them in seamless ingesting, normalizing, and deidentifying of their data.

There is great promise for the application of intelligence to inform clinical decision making. However, like all tools, they inherently have limitations.



Two significant concerns in this space are around data privacy and data governance. Healthcare organizations are rightfully concerned that if they sell the data to an external party, patient privacy and HIPAA compliance may be at risk. There is also a concern that once their data is commercialized, they have no visibility into where that data goes and that they lose "control" over the data.

One lens to view this market is to look at the approaches various players are taking to address data privacy and governance.

## FIGURE 4: DATA NETWORKS & COMMERCIALIZATION MARKET MAP

De-Identification & Tokenization	Multi-Lateral Partnerships	Federated Networks	Synthetic Data		
	Cosmes Secener Enviza	RHINO HEALTH	MDCLONE SYNTEGRA TOFICE DATA COMPANY THE FAME DATA COMPANY THE FAME DATA COMPANY THE FAME DATA COMPANY THE FAME DATA COMPANY		
Marketplaces	bunkerhill		SYNTHO		
healthverity		🔀 OWKIN <b>seg</b> med	MOSTLY-AI		

#### **De-Identification & Tokenization**

One approach is through de-identification and tokenization. De-identification is the process of removing unique patient identifiers from a dataset, and tokenization is the process of substituting a sensitive data element with a non-sensitive equivalent. Data aggregators offer clean, standardized, and de-identified data that have been aggregated from many underlying sources. Typically, data are available to license as a one-time or continuous data feed and are analytics ready.

Some players (e.g., Health Verity) are marketplaces for different data aggregators and originators to commercialize their dataset. Their platform provides a mechanism for vendors to price and sell their datasets while allowing data users to explore and identify the datasets that are most relevant to their use case. Some players (e.g., Datavant, OMNY) serve as both data aggregators as well as marketplaces.

On the other hand, data platforms (e.g., Truveta, Mayo Clinic Platform, Datavant) provide a technology platform that has intuitive user interfaces (UI) for analyzing data within the platform. These companies have data science and data engineering teams that clean and standardize continuous streams of data coming into the platform, and, combined with the UI layer, can be considered user-ready. Working with a data platform is best for companies without data analytics or data engineering capabilities.



This both allows data stewards to **maintain control** of their data as well as allow algorithm owners to **protect their IP** while gaining access to the data they require.

## Multi-Lateral Partnerships

Forming data networks, as with any network, requires contracting with multiple entities which can be an arduous and lengthy process. Players have emerged to facilitate contracting and partnership formation. Epic and Cerner are naturally embedded within the data flow of most health systems and have enabled an "opt-in" model (known as Epic Cosmos and Cerner's Health Learning Network) that would allow healthcare systems to share their data with others for internal utilization. Bunkerhill is taking a different approach — they act as the data partnership contracting entity between multiple academic medical centers, thereby reducing healthcare systems' need to create individual net new contracts each time they want to establish a research partnership. Bunkerhill also supports these healthcare systems in commercializing the algorithms that are developed through these data partnerships. This approach is most effective where there are trusted relationships.

# Federated Learning Networks

There are still other players that are attempting to address the challenge of data governance through federated networks. Federated learning is the process of training algorithms collaboratively without exchanging the data itself. In this model, the data stays local and secure, only the algorithm travels, which protects sensitive patient and proprietary data. Rhino Health, Lynx.MD, and Segmed are all examples of companies which are leveraging this technology to connect biopharmas and researchers with healthcare organizations' datasets. They act as the intermediary, and handle contracting, negotiations, and pricing on behalf of these entities. Some of these players are built on the backbone of the federated learning technology built by other players (i.e., NVIDIA Clara); while others have developed their own technology (i.e., Owkin has built its own open-source federated learning software called Substra).

Another company that is taking a variation on this approach is BeekeeperAI. The company has built a zero-trust computing "enclave" that connects data owners with algorithm developers. An algorithm owner submits their encrypted algorithm to the "enclave", which then brings the encrypted algorithm to the data owners' environment which is itself encrypted. The algorithm then runs in the encrypted data environment and returns only the value it produces. In this manner, the data never leaves the data owner. This has a double benefit: it allows data stewards to maintain control of their data while allowing algorithm owners to protect their IP while gaining access to the data they require.



## Synthetic Data

Lastly, synthetic data and/or digital twins are gaining in popularity as generative AI becomes more advanced and widely accepted. Rather than transmitting the actual data, synthetic data providers create a dataset, via generative AI, that mirrors the original dataset across multiple core statistical features. Unlike deidentified data which could have the potential to be "re-identified", synthetic data negates that risk. There are many players emerging in this space (i.e., MD Clone, Syntegra) and they differ in several ways which largely center around the sophistication of their approaches. For example, one difference between these players is whether the synthetic dataset they create can be used only for a specific use case or for generalized use cases. Some players will validate the fidelity and privacy of the synthetic dataset while others do not offer that service. We expect many new players will continue to emerge in this space with more and more advanced techniques.

# FIGURE 5: EXAMPLE DATA NETWORKS & COMMERCIALIZATION PLAYERS

Dimension	TRUVETA	healthverity	ö bunkerhill	A BeeKeeperAl*	MAYO CLINIC	<b>Ø</b> owkin	RHINO HEALTH	SYNTEGRA
Data Owners	Health systems and AMCs	Data vendors; health systems; health plans	Academic research institutions	Health systems and AMCs	Academic research institutions and AMCs	24 AMCs and 8 consortia in Europe and US	Health systems; provider groups	Health systems and AMCs
Types of Data	Structured & unstructured clinical	Multi-modal (claims, clinical, lab, pharmacy, imaging, biospecimens , consumer)	Multi-modal (genomics, clinical, histology, imaging)	Multi-modal (genomics, clinical, histology, imaging)	Multi-modal (Claims, lab, genomics, pharmacy, clinical)	Multi-modal (genomics, clinical, histology, imaging)	Multi-modal (genomics, clinical, histology, imaging)	Multi-modal
Data Users & Customers	Life sciences; academic research institutions	Many types of customers	Users: Researchers; End customers: Life sciences	Algorithm developers	Life sciences; device manufacturer s; Health systems	Users: Owkin; End customers: Life sciences	Life sciences; academic research institutions	Life sciences
Data Use Cases	Drug discovery; clinical research; internal use by members	Multiple use cases	Algorithm development	Algorithm development	Drug discovery; clinical research; internal use by members	Biomarker- based drug discovery	Drug discovery; clinical research	Drug discovery; clinical research
Data Governance & Control	De- identification	De- identification	Master Agreement governing multi-lateral partnerships	Zero-trust secure enclave	De- identification; federated network	Federated network	Federated network	Synthetic data
Data Validation Supported?	No	Yes	No	Yes	Yes	Yes	Yes	Yes



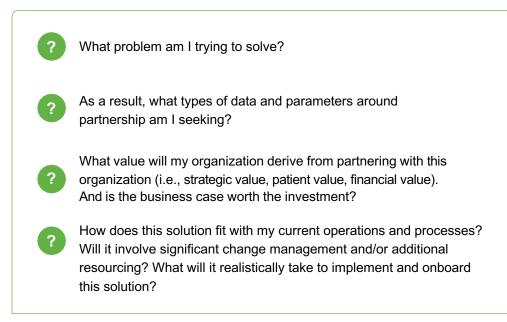
# CONCLUSION



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This space is evolving rapidly. The recent explosion of generative AI will attract a tsunami of investments into these and other use cases, accelerating the pace of innovation. We believe this next wave of innovation will be important because it will allow organizations to finally realize meaningful strategic and financial returns on their prior data investments.

As a healthcare system or healthcare plan that may be contemplating partnering with these organizations or choosing between several vendors, **you should ask the following questions:** 



As an investor, we are similarly asking new companies those questions; furthermore, we are interested in understanding a company's sustainable differentiation. The rapid pace of data and AI innovation is commoditizing certain areas of technological differentiation. As examples, natural language processing (NLP) is reducing the burden of processing unstructured data; large language models (LLM) are commoditizing information summarization and retrieval; and generative AI is reducing the hurdle for content creation such as for synthetic datasets. As a company that is innovating in this space, it is important to understand what areas of work are being commoditized. Use these technologies as enablers for an efficient organization rather than viewing them as the crux of your value proposition; instead, ruthlessly focus on addressing acute market needs that remain underserved despite these data innovations.

If you are a company innovating in this space or know of one, or if you are simply interested in exploring this topic with us as we monitor its evolution, please reach out to us.

#### Sources

- 1. RBC Capital
- 2. Ken Kaufman
- 3. Signify Research
- 4. <u>IQVIA</u>
- 5. Dr. John Halamka from the Mayo Clinic Platform





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