



Pharmaceutical **DIGITAL HEALTH INNOVATION INDEX** *3rd Edition*

GLOBAL DIGITAL HEALTH 2023

**TOP 25 PHARMACEUTICALS • STRATEGIES • PARTNERSHIPS
VENTURE SPOTLIGHT • GLOBAL TRENDS**



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Foreword by Evaluate: Galen Growth Health Innovation Index

As part of our partnership with Digital Health experts, Galen Growth, we are pleased to bring you the third annual edition of the Pharmaceutical Digital Health Innovation Index. This report indexes the most active biopharma companies in the global Digital Health space.

2023 was a challenging year across the Digital Health sector, but it is heartening to see the level of commitment and investment that some of the largest players in the biopharma industry are putting into this area. Many of the top pharma players are facing significant revenue falls for long-standing drugs as patent expiries loom, and while their R&D drug pipeline remains their primary focus, the opportunities presented by digital technology innovation provides another way to make up the shortfall.

For readers in the biopharma space, this report provides an excellent snapshot of the current landscape, with a view of which companies are strategically best placed to thrive in the Digital Health arena and which have the most establish portfolios. There is clearly an increase in the number of pharma players getting into the Digital Health space and it's probably not a shock to learn that almost three-quarters of Digital Health partnerships with pharma include some form of Artificial Intelligence. If you've not seen the recent report that Galen Growth published on the rise of Generative AI, you can [find it here](#).

From a clinical perspective, the therapy area that currently accounts for the largest share of partnerships in Digital Health is oncology. Given oncology's prominence across the biopharma space, this is perhaps to be expected, but the other largest areas include women's health and neurology, showing how the digital space offers some variation from the traditional pharma landscape.

For large pharma players, biotechs and those investing in them, this report provides a fascinating view into the way in which pharma and Digital Health are interacting. Over to the Galen Growth team to share the detail.

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Galen Growth proudly unveils its third annual Pharmaceutical Innovation Index, indexing the most active biopharmaceutical companies in the global Digital Health innovation ecosystem. This year, we've honed our methodology to zero in on a critical pain point for the industry: drug development efficiency. We've also shifted focus to partnerships forged within the past three years, acknowledging the dynamic evolution of biopharma Digital Health strategies over the last decade.

Building upon our previous assessments, we've evaluated the Digital Health venture portfolios of each biopharma company, looking at both the strategic alignment with the corporation's goals and the inherent strength of the ventures themselves. Amidst the ongoing partnership activity between Digital Health startups and biopharma companies, this report sheds light on the evolving landscape of these collaborations.

Powered by HealthTech Alpha, Galen Growth's proprietary solution and the global leading Digital Health private market data, intelligence, and insights platform, this report provides unmatched, unparalleled, and indispensable coverage of the global Digital Health ecosystem.





CONTENTS

TL;DR	5
GALEN GROWTH DIGITAL HEALTH INNOVATION INDEX	6
TOP 10 STRATEGIC FIT	7
TOP 10 VENTURE PORTFOLIO SCORE	8
PHARMA PROFILES	10
METHODOLOGY	15
FOCUS ON RESEARCH AND PATIENT ENGAGEMENT	16
CRITICAL SUCCESS FACTORS	17
DEEP DIVE PHARMACEUTICAL PARTNERSHIPS	18
KEY INFORMATION	29
ABOUT GALEN GROWTH	33

TL;DR

45%
Partnerships

More biopharma companies are becoming active in Digital Health. In 2021, the top 25 biopharma companies, determined by their number of partnerships with Digital Health ventures, held 57% of all such global partnerships. However, in 2023, these leading companies' share of partnerships has decreased to 45%.

33%
Research
Solutions

Since 2020, Research Solutions has emerged as the top Digital Health Cluster for partnerships with biopharma companies. Among the top 25 biopharmas most active in partnering, **33% of the Digital Health partnerships since 2020 have focused on the Research Solutions cluster.**

72%
Artificial
Intelligence

72% share of Digital Health ventures partnering with biopharma are using AI or GenAI (a subset of AI) technology. While AI is critical for understanding and learning from large data sets, GenAI systems can be implemented to help identify new drug targets and design new drugs, by simulating molecular interactions and predicting possible drug candidates.

AstraZeneca 

AstraZeneca captures the top spot for Strategic Fit, with 36 Digital Health partnerships announced over the past 3 years and 28% of the new partnerships contributing to the drug development process.

 **Otsuka**

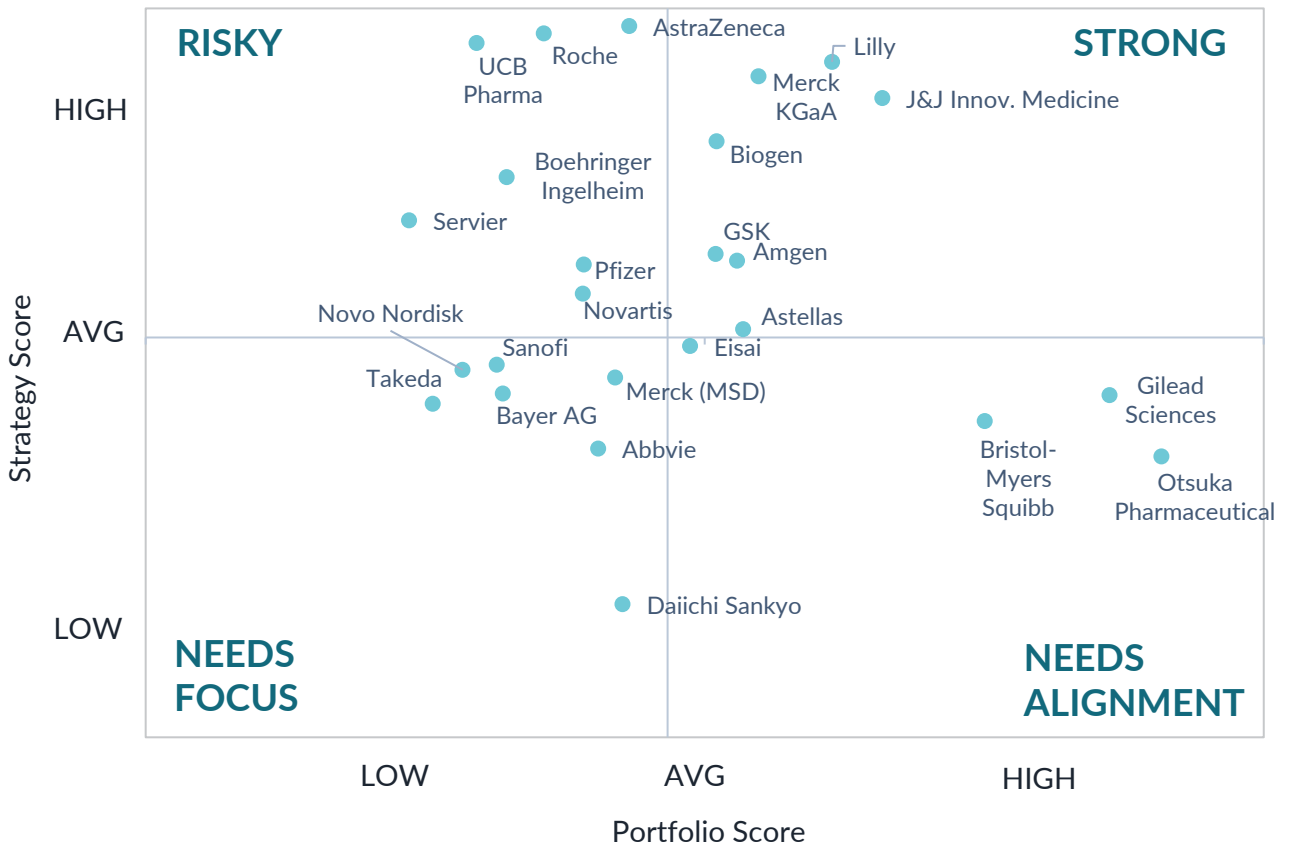
Otsuka Pharmaceutical leads in Portfolio Strength, moving up from #2 in the 2022 rankings. Otsuka's portfolio has the highest share of ventures using AI and the highest share of ventures with evidence of clinical strength among the top 25 biopharma companies.

Galen Growth commends each of the top 25 biopharma companies for securing a position in the 2023 Digital Health Innovation Index.

Galen Growth's Pharmaceutical Digital Health Innovation Index 2023

In today's rapidly evolving healthcare landscape, Digital Health has emerged as a transformative force, revolutionizing the way healthcare is delivered, managed, and experienced. Biopharma companies, recognizing the immense potential of Digital Health to enhance patient outcomes and streamline drug development processes, have increasingly invested in building and expanding their Digital Health portfolios. This report delves into the portfolios of the most active biopharma companies across the globe, providing a comprehensive evaluation of their strategic focus, partnerships, and potential impact on the future of healthcare.

For this year's analysis,, **Daiichi Sankyo and Eisai** made it on the list, while **Lundbeck** and **Ferring** have fallen out of the top 25. With corporate restructuring ongoing in many biopharmas, early Digital Health adopters, who previously had strong portfolios, seem to be losing focus. Each company has their unique priorities in Digital Health, so this analysis is not intended to replace a strategy. It is however intended to indicate the strengths and areas requiring focus in order to inform the next phase of Digital Health partnership building.



Pharmaceutical - Digital Health Innovation Index 2023











Top Strategic Fit Ranking

Top performers in the **Strategic Fit** analysis have expanded their portfolios globally and are focusing their partnerships to accelerate drug development. Additionally, there is strong alignment between the biopharma companies' target therapeutic areas and the ventures' focus areas, which is essential for addressing both patient and franchise needs.

The Strategic Fit must be balanced with ensuring that the portfolio is sufficiently mature and ready for market. This way, the company can ensure that its Digital Health strategy is both effective and efficient rather than distracting from critical business tasks.

AstraZeneca captures the top spot in 2023, with 36 Digital Health partnerships announced over the past 3 years and 28% of the new partnerships contributing to the drug development process.

Strategic Fit Ranking

2023 Ranking	Companies	2022 Ranking
1 	AstraZeneca	#4 ↑
2 	Roche	#1 ↓
3 	UCB Pharma	#5 ↑
4 	Lilly	#8 ↑
5 	Merck KGaA	#9 ↑
6 	J&J Innovative Medicine	#7 ↑
7 	Biogen	#15 ↑
8 	Boehringer Ingelheim	#14 ↑
9 	Servier	#23 ↑
10 	GSK	#16 ↑

Pharmaceutical - Digital Health Innovation Index 2023

Top Venture Portfolio Score Ranking

The selection of ventures is critical to partnership success and determines the speed at which solutions are brought to market. Partnering with established ventures led by experienced leadership teams increases the likelihood of bringing a product to market more quickly and with minimal development effort. However, partnerships with less mature ventures may yield groundbreaking results, but carry a higher risk; ventures may require greater involvement from the biopharma partner, and the path to return on investment may be prolonged. Increasingly, biopharma companies have recognized the need to collaborate with ventures that leverage the power of technology and data, resulting in greater adoption of artificial intelligence solutions.

Nevertheless, strong venture portfolios should be aligned with the biopharma's corporate pain points and strategy, to avoid Digital Health theatrics, where the partnership has little added value to the patient or business beyond PR.

The **top spot this year goes to Otsuka Pharmaceutical**, moving up from #2 in the 2022 rankings. Among the top 25 biopharma, Otsuka's portfolio has the highest share of ventures using AI and the highest share of ventures with evidence of clinical strength.

Portfolio Score Ranking

2023 Ranking		Companies	2022 Ranking
1		Otsuka Pharmaceutical	#2 ↑
2		Gilead Sciences	#1 ↓
3		Bristol-Myers Squibb	#5 ↑
4		J&J Innovative Medicine (<i>Janssen</i>)	#8 ↑
5		Lilly	#4 ↓
6		Merck KGaA	#12 ↑
7		Amgen	#7 →
8		Astellas	#15 ↑
9		Biogen	#16 ↑
10		GSK	#18 ↑

DIGITAL HEALTH INNOVATION INDEX - Pharmaceutical

The criteria for evaluating portfolios has been updated in 2023 to reflect the growing emphasis of Biopharma companies on increasing efficiency and advancing Digital Health tools for Biopharma research. The Digital Health Innovation Index for biopharma measures how effectively companies have integrated Digital Health into their business models, as well as the degree to which strong ventures have been selected for partnership development.

Has the company made Digital Health a strategic priority across the global organization? Has the biopharma company:

- **Distributed partnerships globally**
- **Integrated Digital Health into the strategic therapeutic areas**
- **Adopted the use of artificial intelligence**
- **Integrated Digital Health tools in drug development**
- **Maintained a focus on building a Digital Health portfolio through strategic partnering**



Strategic Fit

Portfolio Strength



Does the portfolio include Digital Health ventures that will contribute to the success of the partnerships and the speed to market of the solution? Do they have:

- **A strong management team**
- **Evidence of scientific or medical benefit**
- **Use of artificial intelligence technology**
- **Financial strength**
- **Proven Digital Health maturity¹**

SCOPE: The analysis considers ventures in the six global regions for Digital Health: Asia Pacific, the Middle East, Western Europe, North America, South America (key ecosystems), and Africa.

1) HealthTech Alpha's proprietary analytics, including the Maturity Score and Evidence Signal are defined on page 31



Galen Growth Digital Health Innovation Index 2023

TOP PERFORMERS | STRATEGIC FIT

AstraZeneca  [AstraZeneca](#)

#1



Strategic Fit



Portfolio Score

PARTNERSHIPS **136**

N. America	29%
Asia Pacific	44%
Europe	25%
Middle East & S. America	3%

Average Venture Maturity 66.9

Sales At Risk (2022 - 2027)³ from Patent Expiries (% of WW Rx & OTC) \$19.3B (45%)

Selected Portfolio Ventures (not complete lists)

Research Solutions



Artificial Intelligence



Roche  [Roche](#)

#2



Strategic Fit



Portfolio Score

PARTNERSHIPS **153**

N. America	38%
Asia Pacific	28%
Europe	27%
M. East, Africa & S. America	7%

Average Venture Maturity 65.6

Sales At Risk (2022 - 2027)³ from Patent Expiries (% of WW Rx & OTC) \$25.1B (52%)

Selected Portfolio Ventures (not complete lists)

Research Solutions



Artificial Intelligence



Note: Roche portfolio includes Chugai and Genentech partnerships

Galen Growth Digital Health Innovation Index 2023

TOP PERFORMERS | STRATEGIC FIT & PORTFOLIO STRENGTH



UCB Pharma

#3



Strategic Fit



Portfolio Score

PARTNERSHIPS **37**

N. America	53%
Asia Pacific	14%
Europe	31%
Middle East	3%

Average Venture Maturity **63.3**

Sales At Risk (2022 - 2027)³ from Patent Expiries (% of WW Rx & OTC) **\$5.1B (90%)**

Selected Portfolio Ventures (not complete lists)

Research Solutions



Artificial Intelligence



Lilly **Eli Lilly**

#4



Strategic Fit



Portfolio Score

PARTNERSHIPS **63**

N. America	50%
Asia Pacific	32%
Europe	18%
Other regions	0%

Average Venture Maturity **70.9**

Sales At Risk (2022 - 2027)³ from Patent Expiries (% of WW Rx & OTC) **\$17.0B (63%)**

Selected Portfolio Ventures (not complete lists)

Research Solutions



Artificial Intelligence





Galen Growth Digital Health Innovation Index 2023

TOP PERFORMERS | STRATEGIC FIT

MERCK Merck KGaA

#5



Strategic Fit



Portfolio Score

PARTNERSHIPS 49

N. America	43%
Asia Pacific	24%
Europe	22%
Middle East	10%

Average Venture Maturity 67.2

Sales At Risk (2022 - 2027)³ from Patent Expiries (% of WW Rx & OTC) \$6.8B (81%)

Note: Merck KGaA portfolio includes EMD Serono

Selected Portfolio Ventures (not complete lists)

Research Solutions



Artificial Intelligence



Otsuka Pharmaceutical

#1



Strategic Fit



Portfolio Score

PARTNERSHIPS 18

N. America	65%
Asia Pacific	29%
Europe	6%
Other regions	0%

Average Venture Maturity 69.6

Sales At Risk (2022 - 2027)³ from Patent Expiries (% of WW Rx & OTC) \$4.3B (58%)

Selected Portfolio Ventures (not complete lists)

Research Solutions



Artificial Intelligence





Galen Growth Digital Health Innovation Index 2023

TOP PERFORMERS | PORTFOLIO STRENGTH



Gilead Sciences

#2



Strategic Fit



Portfolio Score

PARTNERSHIPS 20

N. America	75%
Asia Pacific	15%
Europe	10%
Other regions	0%

Average Venture Maturity 72.8

Sales At Risk (2022 - 2027)³ from Patent Expiries (% of WW Rx & OTC) \$1.6B (6%)

Selected Portfolio Ventures (not complete lists)

Research Solutions



Artificial Intelligence



Bristol-Myers Squibb

#3



Strategic Fit



Portfolio Score

PARTNERSHIPS 41

N. America	62%
Asia Pacific	12%
Europe	24%
Middle East	2%

Average Venture Maturity 68.8

Sales At Risk (2022 - 2027)³ from Patent Expiries (% of WW Rx & OTC) \$34.9B (77%)

Selected Portfolio Ventures (not complete lists)

Research Solutions



Artificial Intelligence





Galen Growth Digital Health Innovation Index 2023

TOP PERFORMERS | PORTFOLIO STRENGTH

Johnson & Johnson
Innovative Medicine

J&J Innovative Medicine

#4



Strategic Fit



Portfolio Score

PARTNERSHIPS

60

N. America	47%
Asia Pacific	27%
Europe	23%
Middle East & S. America	4%

Average Venture Maturity **68.1**

Sales At Risk (2022 - 2027)³ from Patent Expiries (% of WW Rx & OTC) **\$34.4B (65%)**

Selected Portfolio Ventures (not complete lists)

Research Solutions



Artificial Intelligence



Note: J&J Innovative Medicine (aka: Janssen) portfolio includes Actelion

Lilly **Eli Lilly**

#5

(The Eli Lilly profile in position #4 of the Strategic Fit evaluation, page 10)



Digital Health Innovation Index - Methodology

STRATEGIC FIT METHODOLOGY

A Digital Health portfolio of a biopharma should reflect the commitment of the global corporation to adopt advanced Digital Health tools into the fabric of the company and their implementation of these tools according to the company's prioritized therapeutic focus areas.

Strategic Fit considers:

Global Venture Distribution. It is expected that Digital Health ventures are distributed globally to provide solutions for entire patient populations, as the biopharma firms considered in this analysis are multi-national corporates.

Alignment with the Core Strategic Therapeutic Areas. The venture portfolio has been compared to the publicly stated core therapeutic areas for each biopharma to assess the alignment and the commitment from the biopharma to integrate Digital Health into the highest priority areas of its business.

Integration of Digital Health tools for Drug Development. To keep up with developments in drug discovery and precision medicine, biopharma companies are increasingly partnering with ventures with solutions for drug discovery and drug design.

Number of Digital Health Venture Partnerships. With a stronger commitment to Digital Health, the number of Digital Health venture partnerships will increase. For this analysis, the number of partnerships has been evaluated in proportion to the size of the biopharma². Additional weighting has been given to partnerships that were announced within the past 3 years.

With the growing trend for biopharma to focus their Digital Health partnering activities towards research, patient engagement and improving workflow, the assessment of integration across the healthcare value chain is no longer a strong differentiator and has not been included as a criteria for this year's portfolio analysis.

2) Number of employees. Data source: Evaluate Pharma



Digital Health Innovation Index – Methodology

PORTFOLIO STRENGTH METHODOLOGY

A strong Digital Health partnership portfolio reduces the risk of partnership failure (although this can never be eliminated), and it ensures a minimum time-to-market for the product.

Portfolio strength considers:

Venture management team. The optimal management team for a Digital Health ventures includes members with experience from previous successful startups. In addition, it should include members with a strong educational background in relevant fields. These attributes are evaluated using the Team Signal¹ calculated in HealthTech Alpha.

Proven evidence of scientific or medical benefits. Regulatory filings, clinical trials, and peer-reviewed publications are indicators of the difference between a venture with good intentions and a venture that has a product with proven benefits. Evidence is most relevant in the following Digital Health clusters: Medical Diagnostics, Remote Devices, Patient Solutions, Clinical Trials, and Research Solutions, as well as the Prescriptive Analytics category (within the Health Management Solutions Cluster).

Adopted the Use of Artificial Intelligence. Artificial Intelligence (AI) models can learn from data and identify patterns that would be difficult or impossible for humans to see. In order to keep up with speed of drug discovery and precision medicine, biopharma companies should look to adapt R&D processes and integrate AI tools.

Venture maturity¹. Galen Growth's proprietary venture maturity score includes the following indices:

- Momentum index: evaluates the present performance and fitness of the venture relative to its ecosystem peers.
- Market index: measures the health of the sector category and sub-category in which a venture competes
- Money index: quantifies the financial strength and wellbeing of a Digital Health venture based on its financial history, and investor quality
- Innovation index: evaluates the degree to which the venture is solving healthcare pain points

Digital Health Innovation Index – Methodology

GENERAL CONSTRAINTS

This analysis takes a snapshot of Digital Health portfolios of the 25 most active, global pharmaceutical and biotech companies (collectively referred to as biopharma). Therefore, biopharma that are locally or regionally focused are not included in the analysis. Biopharma that have fewer than fourteen partnerships with private ventures are not considered, and partnering relationships that are limited to incubator/accelerator programs or corporate venture capital are not considered.

Data contained in this report is exclusively sourced from HealthTech Alpha. Biopharma companies are neither required nor incentivized to participate or contribute to the data.

Moving the Bar Higher

As Digital Health portfolios mature and are refined for biopharma to capitalize on the commercial potential of Digital Health, the portfolio ventures also mature, generate more clinical evidence, and expand across multiple therapeutic areas. Consequently, the threshold for Digital Health portfolio size required to rank among the top 25 biopharma companies increases annually.

Being recognized as a top 25 biopharma company in Digital Health is a remarkable achievement in itself. The scoring across the two analysis axes becomes more competitive, and therefore, a company's placement within the competitive landscape does not necessarily imply complacency or regression. It is a relative comparison against a peer group that is continuously moving, and therefore, it can be used to assess activities in relation to other top performers.

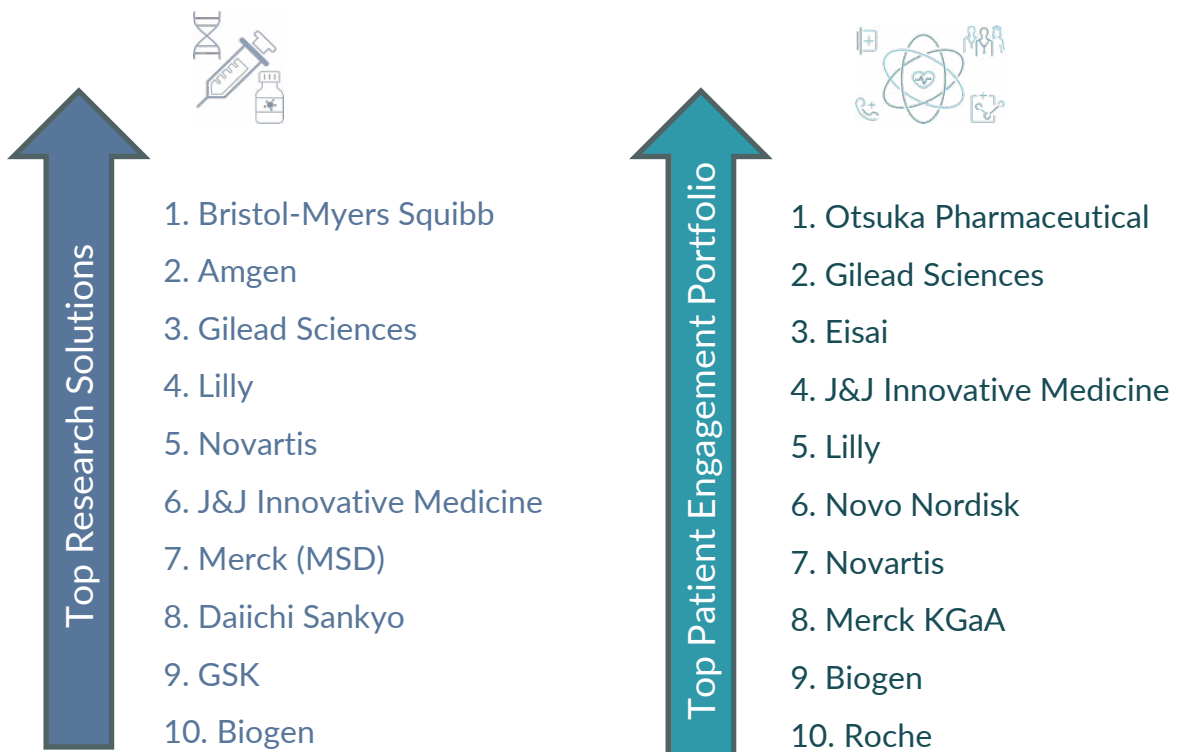
Top 25 Biopharma Companies	<u>2021</u>	<u>2022</u>	<u>2023</u>
Minimum number of publicly announced partnerships to place in the top 25	5	11	14

Focus on Research and Patient Engagement within the Biopharma Portfolio

To better understand the venture portfolios, it is useful consider the strength of each based on key strategic business areas: Research and Patient Engagement.

The Portfolio Strength for each biopharma was evaluated separately for ventures in the portfolio that had solutions in the Research Solutions cluster, or in patient engagement tools (Patient Solutions cluster or Awareness and Adherence value propositions)*.

This perspective shows that Gilead Science and Lilly are both in the top 5 names on each list. **Bristol-Myers Squibb takes the top spot for the best-performing ventures for research, and Otsuka Pharmaceuticals tops the best-performance list for ventures with a focus on patient engagement.**



* note: see page 30 for Galen Growth's Digital Health Taxonomy, defining the Digital Health Clusters

Pharmaceutical - Digital Health Innovation Index Becoming or Remaining Optimal

The year 2023 remains a period of upheaval for Digital Health. However, as the industry continues to consolidate, we are seeing the emergence of best practices and the definition of solutions that offer the greatest benefits to patients and healthcare systems worldwide. There is an ongoing emphasis on ventures to produce clinical evidence to validate the effectiveness of their solutions. Moreover, the downfall of some Digital Health unicorns has underscored the importance of high-quality clinical evidence, as well as a pathway to profitability.

While the journey into 2024 presents clear obstacles, the evolving landscape promises to strengthen the pipeline of ventures and drive innovation to deliver the benefits of Digital Health to a broader population. In this new phase of Digital Health, disengagement is not an option for biopharma companies. Patients are growing wary of the disjointed digital solutions, and health systems are demanding that biopharma deliver a more comprehensive solution because they cannot sustain the current model of healthcare due to staffing and financial strain. If biopharma companies fail to provide appropriate solutions, they risk being sidelined in the digital arena.

The criteria for a biopharma's Digital Health portfolio will also continue to evolve to meet the market expectations. Looking ahead, to be optimal in 2024, the biopharma portfolio will additionally need to address the following Critical Success Factors (CSFs):

- Only recently have biopharma companies started to bring in digital experts with a better understanding of how to effectively leverage technology in the context of biopharma. A strong digital team must be built to adapt to the evolving landscape of healthcare.
- With pipeline droughts and patent cliffs looming, research productivity and innovation must be supplemented with the right Digital Health tools to help streamline clinical trials, accelerate drug development, and improve patient outcomes.
- Drug reimbursement and market access strategies are becoming contingent on post-launch patient outcome data, which is primarily collected through Digital Health innovations. For biopharma companies, access to these technologies is essential for securing both market access and reimbursement.



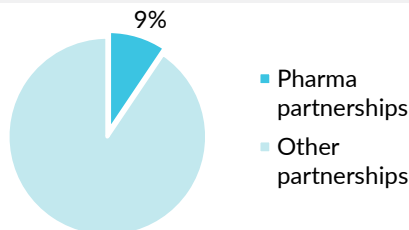
DEEP DIVE: DIGITAL HEALTH PARTNERSHIPS WITH BIOPHARMA



Global Partnership Distribution in Digital Health

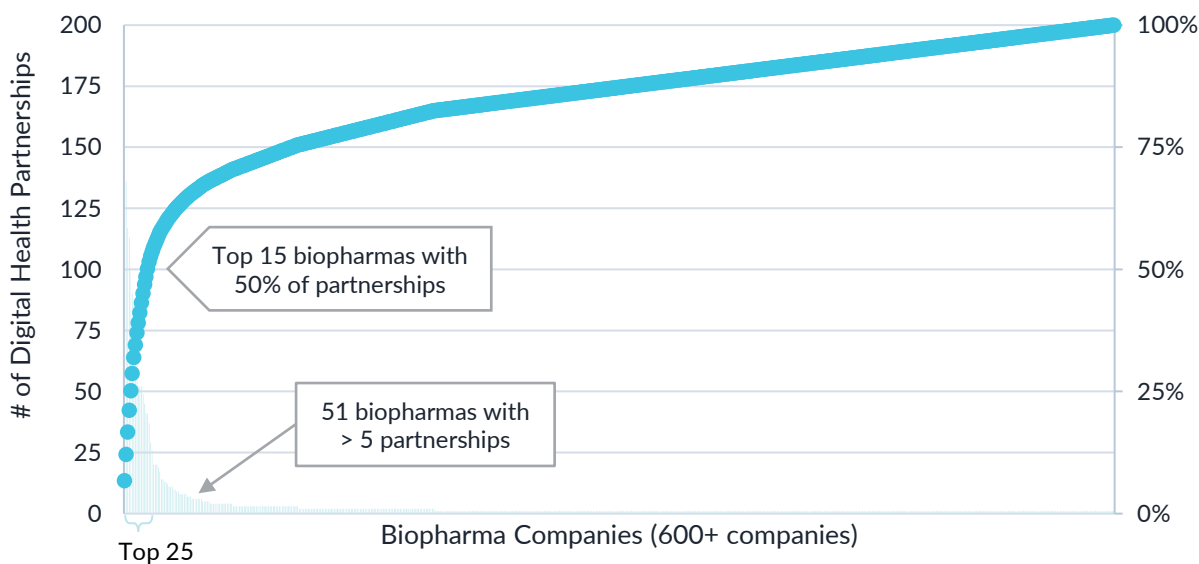
Galen Growth has recorded **more than 9,000 partnerships globally** with Digital Health ventures in the past 5 years, where **9% of those partnerships are with biopharma companies**. Other partnerships are recorded with insurance companies, hospitals, academia, institutions, tech companies, other Digital Health ventures, government, and other organizations.

Share of Pharma Partnerships in all Partnerships (2019 - 2023)



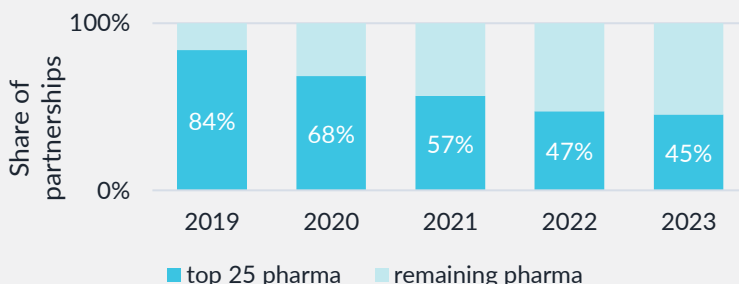
Focusing solely on the partnerships between Digital Health ventures and biopharma, only a fraction of the total global biopharma companies have developed multiple partnerships, although the curve continues to flatten as more small biopharmas use AI for research purposes. The Pareto diagram below shows **that the top 15 biopharma companies (ranked by number of partnerships with Digital Health ventures) capture 50% of the partnerships with Digital Health ventures globally**. The top 25 biopharma (by number of partnerships) capture a total of 58% of the total partnerships since 2012, leaving the remaining 600+ biopharma companies with 42% of the total partnerships (less than 2 partnerships per biopharma).

Pareto Chart of Partnerships by Most Active biopharma



Flattening the Curve

Share of partnerships for the Top 25 Biopharmas, by year

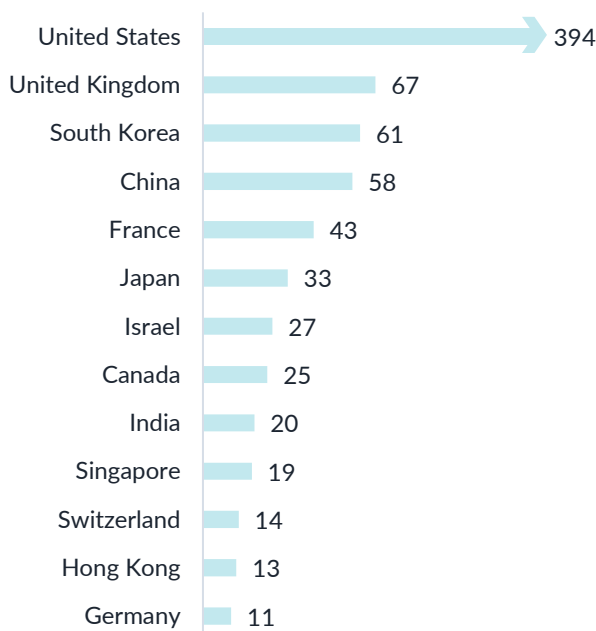


Digital Health has the potential to tap into the unique cultural aspects of health and healthcare to optimize outcomes for patients. Therefore, it is imperative that biopharma partners are also distributed globally to implement solutions for the entire patient population.

Partnership analysis reveals that **the greater proportion of biopharma partnerships (55%) have been developed with ventures founded in the United Kingdom or the United States.** For comparison, 40% of all private Digital Health ventures globally are headquartered in these two countries.

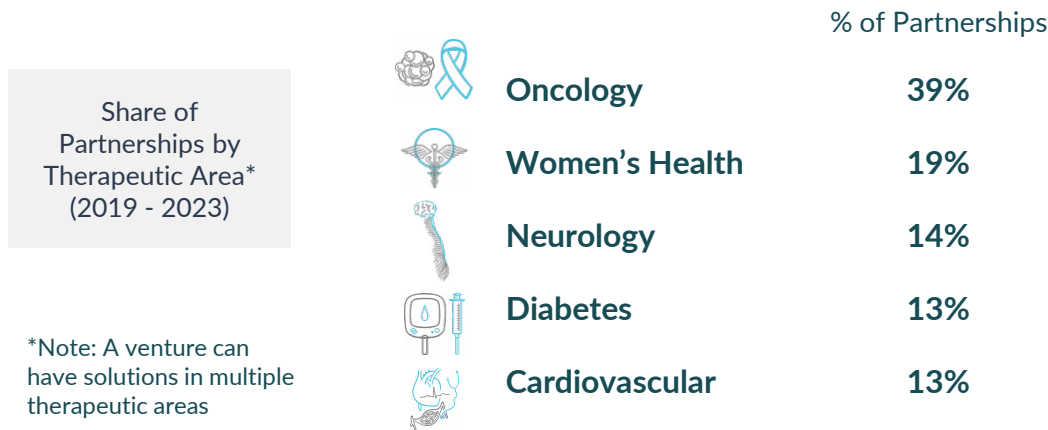
Overall, the geographic distribution of partnerships between Digital Health ventures and biopharma is likely to continue to evolve in the coming years, as Digital Health becomes more integrated into the healthcare systems across the globe.

of Pharma Partnerships in the past 5 years, by country of venture initial incorporation (countries with more than 10 partnerships are shown)



Number of Partnerships between Digital Health Ventures and Pharma

Partnership Distribution by Therapeutic Area

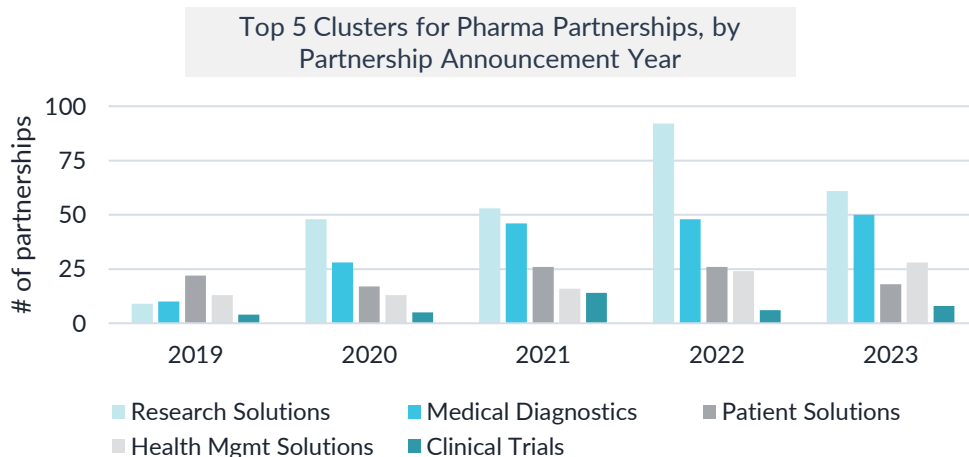


Looking across therapeutic areas, **30% of all partnerships between biopharma and Digital Health ventures are focused on ventures that offer solutions in Oncology.** Women's Health edges ahead of Neurology for the second-place spot for share of partnerships.

Partnership Distribution by Cluster

Since 2020, Research Solutions has emerged as the top Digital Health Cluster for partnerships with biopharma. Among the top 25 biopharma most active in partnering, **33% of the Digital Health partnerships since 2020 have focused on the Research Solutions cluster,** and 23% have been in Medical Diagnostics.

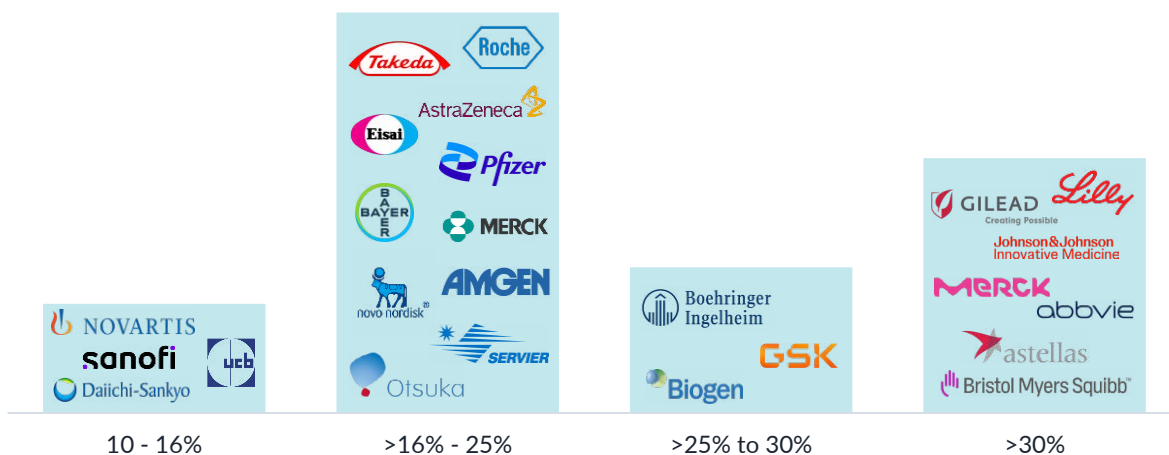
Ventures in Health Management Solutions have surged globally in partnership activity and represent the third highest Cluster by biopharma partnerships in 2023.



Boosting Drug Development with Digital Health in Research

Key benefits of leveraging Digital Health solutions for research include accelerated drug discovery by identifying new drug targets and designing new drugs more quickly and efficiently than traditional methods, and higher success rates for clinical trials by first using “in silico” techniques to simulate a clinical trial using a computer-generated patient population. For the top 25 biopharma, as the size of the portfolio increased, the share of ventures in Research Solutions stabilized at between 16% to 25% of the total portfolio size.

Share of Portfolio Ventures in Research Solutions



Share of Portfolio Ventures in Research Solutions in Top 25 Pharma

Patent Cliffs are on the Horizon for Pharmaceuticals

Analysis across the biopharma industry gives a long list of companies facing patent cliffs for drugs that make up more than 75% of the annual sales. These companies are likely facing pressure to improve research efficiency and find drugs to deliver to make up for the loss in sales.

Ventures in Research Solutions develop innovative products for drug discovery that can improve and accelerate research cycles. Therefore, we expect to see significant partnership activity by the companies facing patent cliffs. The following table shows all companies with more than \$4B of sales at risk between 2022 and 2027 from patent expiries and the number of relevant Digital Health partnerships. With seemingly little focus on Digital Health Research Solutions, Eisai, Organon and Viatrix have 3 or fewer Digital Health partnerships in this Cluster.

Top 10 by Share of Biopharma with Rx + OTC Sales at Risk due to Patent Expiring Between 2022 and 2027 (Sales > \$4M)

	Sales At Risk (2022 - 2027) from Patent Expiries, in \$M ¹ (as a % of WW Rx & OTC)	# Partnerships in Research Solutions (share of total portfolio)
1 Regeneron Pharmaceuticals	\$6,265M (91%)	6 (86%)
2 UCB	\$5,118M (90%)	4 (15%)
3 Astellas Pharma	\$9,383M (85%)	9 (45%)
4 Eisai	\$4,056M (82%)	3 (21%)
5 Merck KGaA	\$6,801M (81%)	20 (44%)
6 Bayer	\$19,042M (81%)	22 (22%)
7 Organon	\$4,731M (78%)	1 (33%)
8 Viatris	\$12,576M (78%)	0 (0/4)
9 Bristol Myers Squibb	\$34,881M (77%)	20 (49%)

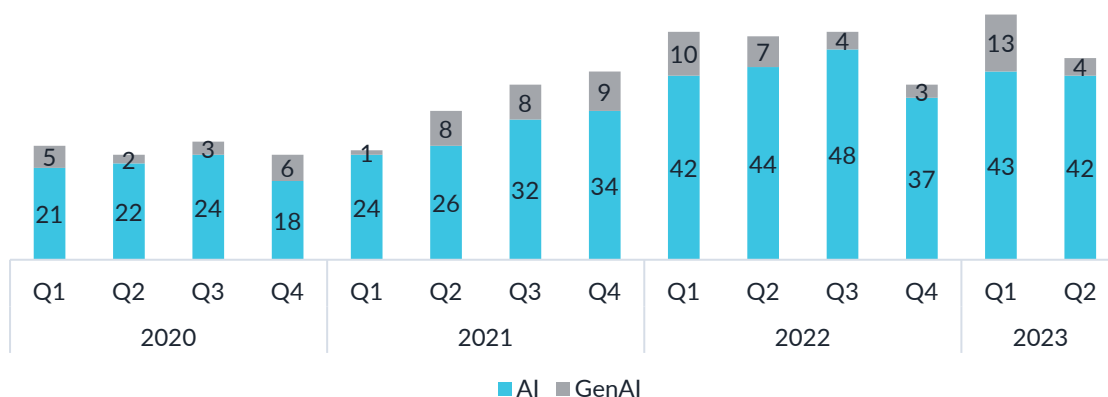
3) 2022 Sales and patent data from Evaluate Pharma

4) Moderna has not been included

Adoption of AI and GenAI will Benefit Pharma

Within the ecosystem of Digital Health ventures partnering with biopharma, **72% share of ventures are using AI or GenAI (a subset of AI) technology**. A total of more than 260 private ventures using AI or GenAI have announced partnerships with biopharma over the past 5 years. While AI is critical for understanding and learning from large data sets, GenAI systems can be implemented to help identify new drug targets and design new drugs, by simulating molecular interactions and predicting possible drug candidates.

Number of partnerships announced between biopharma and Digital Health ventures using AI





Proof Points Required for Partnering

As Digital Health ventures continue to mature, they are **producing evidence that their solutions are effective for the intended patient groups**. The September 2023 publication on Clinical Evidence by Galen Growth dives deep into the data and trends, revealing that the clusters with the highest share of ventures with established clinical strength are Medical Diagnostics, Remote Devices, Patient Solutions, Clinical Trials, and Research Solutions. Regulatory filings, clinical trials, and peer-reviewed publications are indicators of the difference between good intentions and proven benefits.

Looking across the top 25 biopharma companies and focusing on the top 5 clusters, **on average 75% of the relevant ventures in each portfolio have established clinical strength**.

Share of Portfolio Ventures with Established Clinical Strength
(in Medical Diagnostics, Remote Devices, Patient Solutions, Clinical Trials, and Research Solutions)

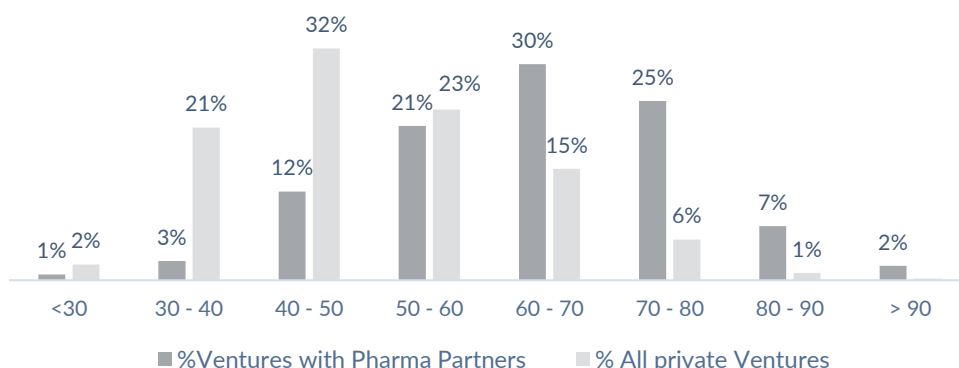


Partnering with the Optimal Ventures

Partnering with mature ventures has the advantage that the biopharma should be able to bring a product to market in less time and with less development effort. However, co-developing a solution together with a high-potential venture may be required to optimize the outcome for very targeted patient populations or focus areas.

85% of all ventures partnering with biopharma have a maturity score > 50, whereas the median maturity score for all ventures is 50.

Distribution of Venture Maturity for Ventures with and without Pharma partnerships



Spotlight:

Selected ventures from 4 global regions with 6 or more biopharma partnerships



[SwipeRx](#)

COUNTRY	PRIMARY CATEGORY	DESCRIPTION
Singapore	Pharmacy	SwipeRx, formerly mClinica Pharmacy Solutions, is a company dedicated to revolutionizing the pharmacy practice. With our tech-based solution, SwipeRx is the all-in-one app for pharmacy professionals to connect with each other, find accurate drug and health information and access free Continuing Professional Development modules.
LATEST FUNDING \$10M (Series B1)	EVIDENCE SIGNAL 45.9	
INC. DATE 7 / 2014	MATURITY SCORE 75.9	



[X-Chem](#)

COUNTRY	PRIMARY CATEGORY	DESCRIPTION
United States	Bioinformatics	X-Chem is the leader in small molecule discovery science, providing biopharma and biotech companies a complete, seamless solution for screening, hit validation and lead optimization. As pioneers of DNA-encoded chemical library (DEL) technology, the company leverages its market-leading DEL platform to discover novel small molecule leads against challenging, high-value therapeutic targets.
LATEST FUNDING \$2.7M (Grant)	EVIDENCE SIGNAL \$9.4	
INC. DATE 2010	MATURITY SCORE 55.5	

Spotlight:

Selected ventures from 4 global regions with 6 or more biopharma partnerships



Iktos

COUNTRY

France

PRIMARY CATEGORY

Drug Discovery

DESCRIPTION

We are Iktos. A company specializing in the development of proprietary AI technologies and software for ligand-based and structure-based de novo drug design focusing on multi-parametric optimization. Our de novo design algorithm is based on deep generative models with reinforcement learning. It designs novel and easy to make compounds, optimized to meet a given multi-objective blueprint, with unprecedented speed, performance, and diversity.

LATEST FUNDING

\$16M (Series A)

EVIDENCE SIGNAL

53.3

INC. DATE

10/ 2016

MATURITY SCORE

66.8



Cytoreason

COUNTRY

Israel

PRIMARY CATEGORY

Drug Discovery

DESCRIPTION

CytoReason is focused on turning human clinical data into clear biology in order to deliver data-driven target discovery and drug development. The company uses its access to proprietary and public data, combined with machine learning technologies, to create innovative biological models of diseases, tissues, and drugs. Using its molecular-level disease models, CytoReason turns human clinical data into biology, mapping what the cells, genes, and proteins are doing in disease, tissue, and treatment environments.

LATEST FUNDING

\$20M (Series A)

EVIDENCE SIGNAL

53.3

INC. DATE

9 / 2016

MATURITY SCORE

67.5

**KEY
INFORMATION**





KEY INFORMATION

SCOPE OF REPORT

This report covers HealthTech ventures with an incorporation date after 2002. The data is valid as of 22 November 2023.

Digital Health is defined as the intersection between healthcare and technology, and is also referred to as HealthTech. Digital Health does not include Biotech (protein research or pharmaceuticals), MedDev (devices that are mechanical and electronic in nature), neurostimulates, opioids and minimal-invasive instruments. We recommend reviewing our taxonomy on the next page for further details.

DATA SOURCING AND TRACKING

Galen Growth tracks a comprehensive inventory of key data points ranging from company demographics, funding and valuation to in-market capabilities on a continuously growing and curated list of HealthTech ventures drawn from global markets. Data is collated from primary research, public domain sources (press releases, news, public filings), proprietary analytics and from its unique network.

The information is:

- Disclosed and undisclosed by nature
- Continuously updated with the latest data
- Curated from both direct and indirect verified sources
- Augmented with our proprietary algorithms

Each HealthTech Alpha Index and Score is calculated using proprietary algorithms and data points drawn from our carefully curated HealthTech Alpha database. We recommend reviewing the Galen Growth Analytics section for further insights

KEY TERMS AND DEFINITIONS

BASE CURRENCY	USD
EARLY STAGE	All deals up to and including Pre-A & Series A stage
GROWTH STAGE	All deals at Series B & C stage
LATE STAGE	All deals at Series D & Beyond stage
EXIT	IPO, SPAC and M&A deals
HTA	HealthTech Alpha

IMPORTANT INFORMATION

This report is provided solely for informational purposes and was prepared in good faith on the basis of public information available at the time of publication without independent verification. Numbers will be updated from time to time to reflect information identified after the event.

Galen Growth does not guarantee or warrant the reliability or completeness of the data nor its usefulness in achieving any particular purpose.

Galen Growth shall not be liable for any loss, damage, cost or expense incurred by any reason because of any persons use or reliance on this report.

This report is a proprietary aggregation of publicly available and undisclosed data and shall not be forwarded or reproduced without the prior written consent of Galen Growth.

RESEARCH INQUIRIES

For more information about data, research and Galen Growth's proprietary algorithm contact: research@galengrowth.com for more information.

Galen Growth's Digital Health Taxonomy™

Health Management Solutions

- EHR / PHR
- Hospital
- Pharmacy
- Physician / Clinic
- Prescriptive Analytics

Health Services Search

- Healthcare Navigation
- Medical Concierge
- Medical Tourism
- Triage

Health InsurTech

- Health Claim Management
- Health Insurance
- Medical Payments

Medical Diagnostics

- Diagnosis Tools
- Medical Imaging
- Omics Related Diagnosis

Medical Education

- Consumer Education
- HCP Education
- Health Information Platform

Online Health Communities

- Other HCP Networks
- Patient Health Forums
- Physician Networks

Online Marketplace

- Consumer Marketplace
- On-demand Lab Tests
- Online Pharmacy
- Professional Marketplace

Patient Solutions

- Digital Therapeutics
- Disease Management
- Health / Symptom Checker
- Medication Management

Population Health Management

- Care Coordination
- Corporate Health
- Home Healthcare
- Integrated Solutions

Remote Devices

- Assistive Care
- Remote Diagnostic Devices
- Remote Monitoring Devices

Research Solutions

- Bioinformatics
- Drug Discovery
- Omics Related Research

Clinical Trials

- Decentralized Clinical Trials
- Clinical Trial Matching
- Data Collection Tools

Telemedicine

- Teleconsultation
- Telepathology
- Teleradiology
- Telesurgery

Veterinarian

- Animal Health Forums
- Animal Imaging
- Animal Monitoring
- Omics Related Veterinary
- Televeterinary

Wellness

- Omics Related Applications
- Smart Equipment
- Wearables
- Wellness Apps
- Wellness Information Platform

Safety & Security

- Cybersecurity
- Pharmacovigilance

Healthcare Logistics

- Transportation Management
- On-demand Delivery

Others

- Contamination Management
- HCP Job Board
- Healthcare Marketing
- Social Enterprise
- Software Provider

Galen Growth Analytics

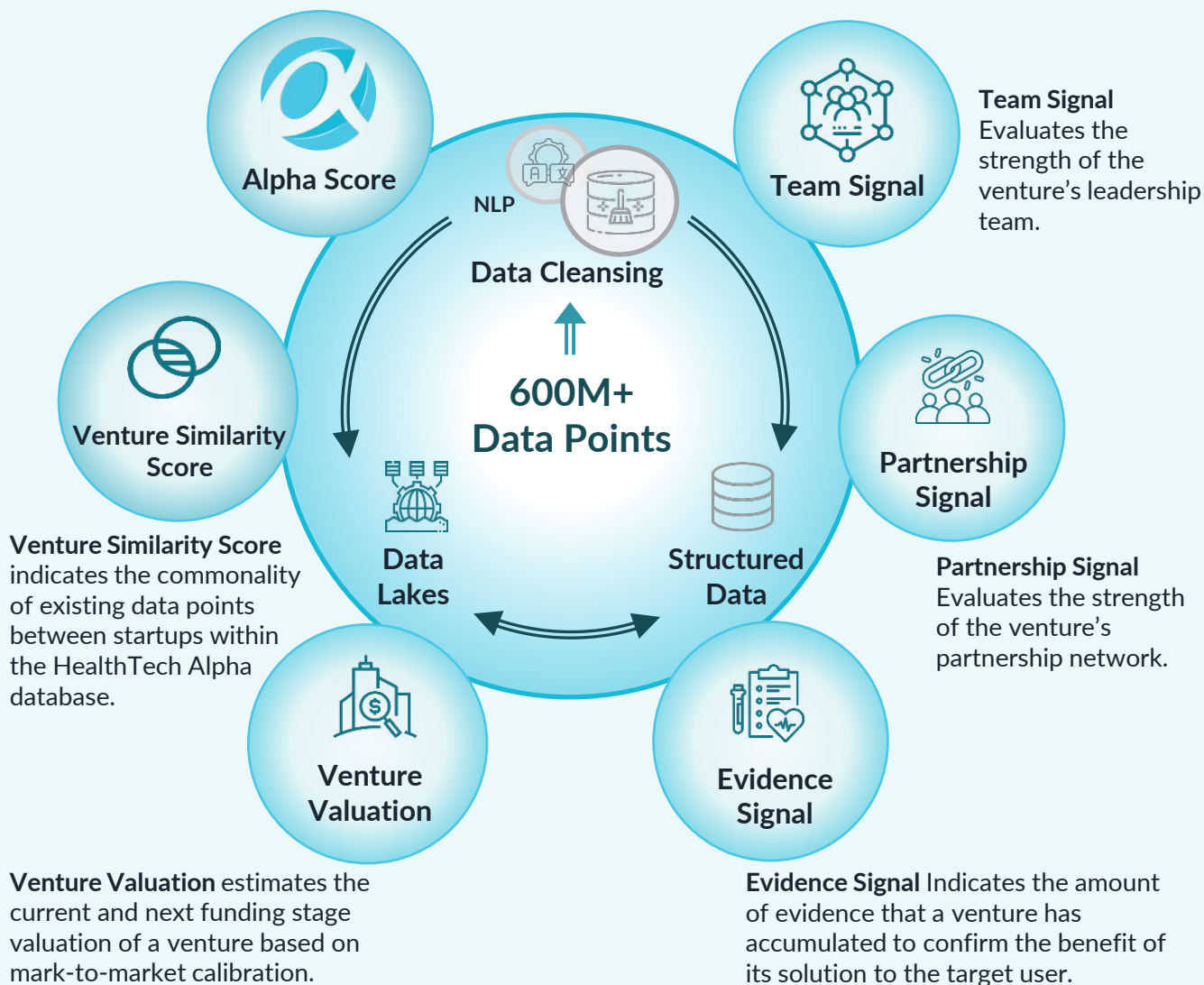
The **Alpha Score** is a 360° Venture Maturity assessment that aggregates four distinct and independent Alpha Indices

Momentum index: evaluates the present performance and fitness of the venture relative to its ecosystem peers.

Money index: quantifies the financial strength and wellbeing of the venture based on its financial history and investor quality.

Market index: evaluates the health of the sector category and sub-category in which a startup competes

Innovation index: evaluates the degree to which the venture is solving healthcare pain points





ABOUT GALEN GROWTH



Our Differentiators

Our unique combination of data, analytics, specialist team and Digital Health network, enables our clients to outperform their competition



Global HealthTech Ecosystem Coverage.

Our unmatched coverage of the world's most innovative Digital Health ventures means more innovation choice and better decisions.

Specialist Team with Decades of Experience

With decades of experience, our team of analysts, decision makers & industry experts extend your team with specialist insights and know how.

Our US, Asia and Europe offices serve our clients worldwide.



Tailored Innovation Solutions.

Whatever stage you are in your innovation journey, we have a world class solution to enable you to succeed. Every solution leverages our unrivalled Digital Health data.

[Talk to us](#)



HealthTech Alpha

The world's most trusted Digital Health private market data, intelligence and insights platform

The foundation of our work is our unmatched Digital Health dataset and search, powered by HealthTech Alpha. HealthTech Alpha monitors, aggregates and audits hundreds of millions of data points to efficiently give you the most profound understanding of Digital Health.

Whether you are determining a market entry strategy, fine-tuning Digital Health product development, looking to benchmark and differentiate against your competition or researching future Digital Health innovation, HealthTech Alpha has you covered. Get started with HealthTech Alpha and make better data-driven innovation decisions.

14,000+
STARTUPS

12,000+
INVESTORS

33,000+
PARTNERSHIPS

11,000+
CORPORATES

Find Best-Fit
Ventures

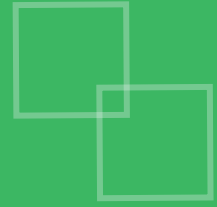
Due Diligence

Ecosystem
Insights

Competitive
Intelligence

[Create an account](#)

Let's Discuss How Galen Growth Can Deliver Your Strategic Healthcare Goals.



Contact Us Now.



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