The evolution of Artificial Intelligence (AI) has taken a significant leap with the rise of Generative AI (Gen AI). This growth is particularly evident in the healthcare industry. Predictions suggest a potential unlocking of a whopping USD 1 Trillion in improvements.\(^1\) In recent years, there has been a notable investment of over USD 1.7 Billion in Gen AI initiatives, especially in areas like AI-driven drug discovery.\(^2\)

Gen AI’s capability to process large volumes of unstructured data can drive innovation in clinical diagnostics, administrative processing, summaries and drug research. However, as Gen AI becomes more prevalent in healthcare and life sciences, there are rising concerns about risk, privacy and security. A 2023 KPMG report indicates that a significant 84 percent of businesses anticipate imminent AI model audits but are hamstrung by a resource drought.\(^3\)

As the influence of Gen AI grows, organizations must develop robust guidelines to ensure privacy and regulatory compliance. While Gen AI offers promising advancements in healthcare, its true impact will be realized through innovations in business models, especially in clinical decision-making and drug discovery.

### Overview

**What Makes Gen AI a Game-Changer?**

At the core of Gen AI are Large Language Models (LLMs). Their diverse training palette, encompassing books, articles and websites, empowers them beyond mere tasks. Unlike their predecessors, LLMs can sift, synthesize, craft and elucidate.

Take Sanofi’s brainchild, Plai, for instance. This LLM prodigy taps into a vast repository of over a billion in-house data points, serving employees distilled, actionable insights. From drug inventory red flags to strategic advisories, Plai is re-shaping workplace dynamics. The ROI is clear – even with a mere fraction of Sanofi’s workforce using Plai daily.
Gen AI Use Cases in Healthcare

Gen AI adoption is expected to be higher in healthcare and life sciences than any other industry, with a projected compound annual growth rate of 85 percent through 2027. Gen AI is poised to revolutionize diagnostics and drug discovery. Given the vast reservoirs of unstructured data within healthcare and life sciences, encompassing documents and images, the sector presents an ideal landscape for Gen AI integration. Coupled with structured data and various technological solutions, Gen AI can usher in large-scale transformation in the sector.

1. Payers: Revolutionizing Administrative Efficiency

Gen AI can address payer organizations’ key challenges – reducing administrative and medical costs while enhancing personalized experiences for members and consumers. Gen AI, with its adept summarization and inference capabilities, can automate critical areas of operations such as provider management, medical management, claims processing, and appeals and grievances.
• **Clinical Summarization:** Gen AI’s prowess in collating clinical data from diverse sources ensures enhanced clinical decision support, elevating care metrics and payment accuracy.

We are already witnessing innovative solution providers integrating Machine Learning (ML) models and Gen AI, enabling healthcare companies to swiftly navigate medical histories and lab results to accurately generate medical summaries.

• **Prior Authorization:** Gen AI can automatically validate medical and clinical conditions in the documents against established guidelines, eligibility criteria and medical necessity.

• **Experience Transformation:** Call center representatives, armed with Gen AI, can provide tailored services by aggregating information from varied sources, ensuring claims resolutions, prior authorization guidance and much more.

• **Care Management and Coordination:** Through Gen AI, content can be customized to heighten personalization, drawing data from varied sources, clinical profiles, demographics and socio-economic indicators. This facilitates precise member education and engagement through the utilization of resources such as videos and timely notifications.

• **Claims Management and Follow-ups:** Gen AI can transform how claims are managed by automating paper-based systems, embedding payment integrity solutions and orchestrating correspondence such as Explanation of Benefits (EOBs) and denials. Additionally, it can oversee documentation processes and communication in appeals and grievances.

Gen AI can power applications such as conversational AI to curate personalized communications tailored to individual member health needs and preferences.

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2. **Providers: Streamlining Clinical Operations**

**Healthcare Providers** (HCPs) often grapple with cumbersome administrative tasks that divert their attention from patient care. GPT-4 shows promise in clinical operations, with a study published in JAMA revealing it diagnosed 39 percent of complex cases correctly. With WHO predicting a shortage of 10 million health workers by 2030, Gen AI can offer vital efficiencies.

Over 60 percent of US healthcare professionals report burnout, with staff shortages and paperwork being the major factors. Gen AI can alleviate these pressures, enhancing employee retention. Examples include Serena’s AI-driven mental health chatbot.
**Patient Engagement:** Gen AI can enhance chatbots and digital platforms for scheduling, billing and outbound communications.

**Medical Coding and Billing:** LLMs can be trained on medical ontologies, codes and medical literature, enabling autonomous medical coding and billing from patient charts, discharge summaries and other documents.

**Clinical Operations and Chart Abstraction:** Gen AI can extract information from clinical charts for accurate coding, assist doctors with diagnostics and auto-transcribe conversations. It can integrate data into Electronic Health Records (EHR) / Electronic Medical Records (EMR) for comprehensive patient records, treatment summaries and care continuity.

**Prior Authorization and Pre-certification:** Gen AI can enable automated extraction from patient data for evaluating prior authorization and verifying medical necessity based on documentation and guidelines.

**Appeals and Letters:** Gen AI can craft appeal documents for denied claims and produce template-based letters for stakeholders.

**Value-based Care:** Gen AI can develop value-based contracts using outcome data. It can create personalized patient communications.

**Clinical Decisioning:** Gen AI can analyze medical literature, patient diagnoses and risks to develop effective treatment plans.

Gen AI could facilitate real-time patient monitoring, providing personalized insights that foster healthier behaviors and pre-empt medical issues. Additionally, it could improve imaging precision and promote preventive care by delivering customized prompts via mobile devices and wearables.
Gen AI Use Cases in Pharma and Life Sciences

Life sciences organizations aim for a patient-centric approach in drug development but face challenges with long R&D cycles and manual operations in clinical, regulatory and commercial sectors. They grapple with unstructured data, such as images and documents, making data management crucial across drug discovery, trials and compliance. AI, predicted to see a USD 50 Billion yearly investment from the pharmaceutical industry within a decade, is now accelerating research.8

For instance, AI-designed proteins are revolutionizing drug development, with companies like Profluent pivoting from natural language processing to protein design. Exscientia uses generative AI for patient tissue analysis to improve outcomes. Meta's ESMFold predicts structures of numerous proteins, highlighting AI's expanding role in this sector.

Figure 3: Gen AI Impact across the Life Sciences Value Chain

8Morgan Stanley
• **Research and Development / Medical Affairs:** Gen AI adeptly structures and synthesizes information from pivotal sources like clinicaltrials.gov and diverse databases, catering to Medical Science Liaisons (MSL), researchers and scientists.

• **Drug Discovery:** Gen AI’s potential to analyze intricate data, from molecular configurations to clinical trial outcomes, enables it to suggest prospective drug candidates, refine chemical structures and anticipate their pharmacodynamics, catalyzing the drug discovery process.

• **Clinical Trials and Real-world Evidence:** Gen AI promises automation of the clinical trial continuum, from patient enlistment to regulatory report formulation, with capabilities ranging from patient profile analyses to collating real-world data.

• **Pharmacovigilance:** Gen AI can help automate case intake and processing across multiple channels and data formats. It can help with adverse event narrative and reporting, a highly manual process.

• **Medical Imaging and Data Analysis:** Demonstrating profound efficacy in medical image analyses, Gen AI models can synthesize images, augment image fidelity, demarcate organs or anomalies, and bolster disease diagnosis and groundbreaking research.

• **HCP Engagement:** Empowered by Gen AI, HCPs can swiftly access tailored content pertinent to their inquiries. Furthermore, Gen AI-driven chatbots can craft bespoke content in manifold formats.

• **Competitive Intelligence:** Gen AI can synthesize and summarize information from internal and external sources, accessing data across formats to generate insights for clinical, commercial and regulatory areas.

• **Patient Data Generation:** Gen AI models can generate synthetic patient data that preserves important statistical properties while ensuring privacy and data confidentiality. This enables the creation of large-scale, diverse datasets that can be used for research, training machine learning models and simulating different scenarios without compromising patient privacy.

• **Disease Prediction and Personalized Medicine:** Gen AI models can analyze patient data, including EHRs, genetic data and lifestyle information to predict disease outcomes. This can be harmonized with thorough medical literature, enabling an optimal treatment path.

Integrating Gen AI during pre-clinical and clinical phases could fast-track the accessibility of therapeutic solutions. This is particularly salient for rare ailments previously sidelined due to developmental challenges or economic constraints. Furthermore, Gen AI’s adeptness in patient data analysis paves the way for treatment personalization, tailoring medications to the distinctive requirements of individual patients.
The transformative potential of Gen AI is immense. However, harnessing its full capacity requires a structured approach. Enter the EDGE Framework – a holistic strategy that aims to streamline Gen AI implementation across diverse business units.

**Figure 4: The EDGE Framework**

The EDGE Framework: A Strategic Blueprint for Gen AI Use Case Prioritization

The transformative potential of Gen AI is immense. However, harnessing its full capacity requires a structured approach. Enter the EDGE Framework – a holistic strategy that aims to streamline Gen AI implementation across diverse business units.

<table>
<thead>
<tr>
<th>Deployment: Complexity of Implementation</th>
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<tbody>
<tr>
<td>High</td>
</tr>
<tr>
<td>CHASE</td>
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<tr>
<td>Use cases that have high potential in the medium to long-term. Strategic investment areas</td>
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| Low                                    |
| CHASE                                   |
| Use cases with high ROI in the short to medium-term. Low risk |

<table>
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<tr>
<th>Governance: Risk &amp; Compliance</th>
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<tbody>
<tr>
<td>Low</td>
</tr>
<tr>
<td>DROP</td>
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<tr>
<td>No applicable areas. Deterministic / Rule-based. Highest level of accuracy required</td>
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</table>

| High                                    |
| BE OBSERVANT                             |
| Cases where applicability is limited or domain-specific. Gen AI advancements can lead to significant opportunity |

<table>
<thead>
<tr>
<th>B(E)nfits: Resource Skill (Costly workforce), Revenue Impact</th>
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<tr>
<td>Low</td>
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<tr>
<td>Niche and costly resources increasing overall TCO</td>
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| High                                    |
| Niche and costly resources increasing overall TCO |
| Investment will lead to higher ROI |
| Impacts higher revenue growth |

- Plug and Play options
- Availability of already trained models
- Ease of custom model training

- Unstructured documentation
- Clinical content creation
- Clinical understanding and contextualization
- Inquiries and conversations
- Content research from open sources

- Synthesis
- Summarization
- Require very high accuracy
- Regulatory compliance and guidelines
- High Data integrity for clinical data
- Intellectual property and patent protections

- Plug and Play options
- Availability of already trained models
- Ease of custom model training

- Niche and costly resources increasing overall TCO
- Investment will lead to higher ROI
- Impacts higher revenue growth

Figure 4: The EDGE Framework
The EDGE framework includes four key elements:

**Explore:**
- **Objective:** Recognize areas where Gen AI’s capabilities augment operations – generation, creation, inquiry and inference.
- **Focus:** Identifying latent potential within organizational processes, areas and functions that can benefit from Gen AI.

**Deployment:**
- **Objective:** Acknowledge the escalating complexity – from deploying as-is vendor model integration and fine-tuning using organizational data to building LLMs.
- **Focus:** Preparing the organization for varying degrees of technology and infrastructure demands as Gen AI’s implementation grows in complexity.

**Governance:**
- **Objective:** Foresee and mitigate risks associated with compliance, bias, privacy and intellectual property.
- **Focus:** Establishing a robust governance structure, recognizing the amplifying risk across the spectrum – from simple information curation to fully automated decision-making.

**B(E) nefits:**
- **Objective:** Ensure a tangible ROI.
- **Focus:** Allocating resources effectively, encompassing personnel training, technology adoption, and fostering a culture of innovation.

Using the framework, the use cases can be categorized into the following quadrants:

- **Implement:** Ideal for use cases that exhibit low risk, high Gen AI applicability, and minimal technological and modeling sophistication but offer high ROI. Generally, administrative and operational use cases fall in this quadrant.

- **Be Observant:** Entails use cases with inherent high-risk elements, such as clinical decision-making or strong regulations, but promising high ROI. As LLMs mature and industry-specific models develop, the risk impact will decrease, and the applicability of these use cases will increase.

- **Chase:** Pertains to use cases with high Gen AI applicability but demand complex implementation. The use cases should be closely monitored as LLM complexity will reduce, and organizations can customize gradually.

- **Drop:** Applies to use cases that are deterministic and require 100 percent accurate information. If a use case doesn’t offer flexibility for probabilistic outcomes, it’s best left unexplored with Gen AI.

The EDGE framework isn’t a one-size-fits-all solution. Its implementation varies based on an organization’s current standing in the AI realm. Some enterprises might initiate their journey by integrating simple LLM Application Programming Interfaces (APIs) to experiment and familiarize themselves with potential use cases. As they gain confidence, they can transition to enterprise-grade LLMs, enabling a more customized and optimized Gen AI deployment.
Recommendations for Gen AI Implementation in Healthcare & Life Sciences

The unfolding AI revolution demands a strategic approach to capitalize on the immense opportunity. The following actions can be taken to define a company’s broader AI roadmap:

1. Set a clear strategy and define goals:
   • Form a cross-functional team, including members from diverse sectors like technology, business, risk and legal.
   • Align initiatives with the broader goals of the organization.
   • Start small. Begin with pilot projects with a wide application to better understand Gen AI’s potential.

2. Assess technology and data infrastructure:
   • Ensure your infrastructure is contemporary. Consider scalability, computational prowess, storage and integration capabilities.
   • Choose the right LLM models tailored for your use cases, balancing risk and security.
   • Stay updated. LLMs are evolving, especially in domain specificity and risk mitigation. Adapt and evolve accordingly.

3. Establish trust:
   • Transparency is vital. Understand risks like bias, privacy infringement and intellectual property and ensure compliance.
   
   **Best practices to follow include:**
   • Opt for models that have compliance and security controls built-in.
   • Employ human experts to verify and assure model accuracy.
   • Use statistical techniques to assess model output quality.
   • For privacy, ensure data encryption and deploy anonymization strategies.
   • Generate synthetic data for secure testing.
   • Lastly, don’t become solely AI-dependent. Human expertise should be the final decision-maker.

4. Invest in augmenting capabilities:
   • Technological shifts need talent alignment. Partner with tech enterprises and ensure the team is adept in AI prompt engineering and data management.
   • Recognize that Gen AI will instigate new operational norms. Staff will need to upgrade skills, and the transition will necessitate effective change management.

5. Partner and collaborate:
   • In a fragmented sector, it’s pivotal to merge datasets. This can be a game-changer in driving personalized care and health management at the community level.
   • Build strategic partnerships across the spectrum: LLM tech providers, tech service entities and consultants.
Final Reflection: Riding the Gen AI Wave

The potential of Gen AI is vast, from streamlining tedious admin tasks to forging unparalleled patient experiences. And Gen AI is just a piece of the puzzle. With the confluence of hyperautomation, virtual care and emerging tech, the transformation becomes multi-faceted.

But with great power comes great responsibility. To truly harness Gen AI’s prowess, organizations must adopt cautiously, govern rigorously and collaborate extensively. It’s about laying a sturdy foundation now, ensuring that as Gen AI matures, the organization is primed to leverage it to its fullest, heralding a new era in healthcare and life sciences.

To delve deeper into the EDGE framework and make Generative AI an integral part of your healthcare and life sciences strategy, talk to our experts.

Contributors

Praveen Kumar
Director, Digital Transformation, Healthcare & Life Sciences

Ankit Vadhera
Director, Digital Transformation, Healthcare & Life Sciences

Jyoti Kalra
Senior Consultant, Digital Transformation, Healthcare & Life Sciences

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