2024 Tech Provider Top Trends: Vertical Generative AI Models

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While general-purpose models perform well across a broad set of applications, they can be impractical for use cases that require domain-specific data. Product leaders should explore industry-focused models and use cases that can be adapted to specific user requirements using available resources.

Overview

Opportunities

- Model builders:
  - Model builders require less investment and computing resources since vertical GenAI models can be built from open-source models using smaller datasets.
  - Vertical GenAI model builders can capitalize on their deep domain expertise and access to domain-specific data sources to create models that address game-changing AI use cases.
- Model consumers/buyers:
  - Model consumers benefit from models that are pretrained for their specific industry use case and can be deployed faster with lower additional overhead, such as fine-tuning. These pretrained models are often more efficient from a computation perspective since they are narrowly focused and smaller.
  - Model consumers will be able to choose from a variety of different vertical models and vendors across marketplaces.
- Service providers:
  - Service providers can leverage the availability of vertical GenAI models to establish themselves as domain experts in specific sectors, such as healthcare, finance and manufacturing, by offering more customized AI solutions. They can also help clients navigate the complex landscape of options at their disposal — from general-purpose to multiple industry-specific models.
  - In highly regulated industries like healthcare and finance, service providers can help enterprises identify, validate and use vertical models that meet industry-specific compliance and security requirements.

Recommendations

- Product leaders focusing on model building:
  - Invest in a profound understanding of the industry verticals you plan to serve. Know the unique challenges, key use cases, regulatory and security requirements, and industry-specific nuances to build cost-effective, secure and sustainable GenAI models that will have a measurable impact on your customers' needs.
  - Ensure you have access to high-quality industry-specific datasets, along with robust data management and model training strategy and process in place. Be transparent with customers about the source of the training data.
- Product leaders focusing on leveraging or buying models:
  - Create a list of your key vertical use cases before starting your search for GenAI models. Determine if a general-purpose model (with fine-tuning) or vertical GenAI model will best address your need. Develop the selection criteria and questions to ask model builders, such as the provenance of the training data and model limitations, including accuracy and biases (see Use-Case Prisms for Generative AI: A Guide to Emerging Opportunities in Industries).
  - Understand the regulatory landscape for your industry and ensure that the use of GenAI models complies with relevant laws and standards.
- Product leaders operating as service providers:
  - Develop a deep understanding of the industry or domain you intend to serve with vertical GenAI models and the key use cases where GenAI can easily and quickly deliver the highest business value. This may require acquisitions, partnerships or the right amount of hiring. Domain expertise is critical for building credibility and tailoring your services and solutions to the unique needs of the customer and their use of AI.
  - Look for service opportunities to deliver the solution or use case by connecting the vertical GenAI model to internal enterprise data and embedding it into applications with privacy and security in mind.
  - Offer comprehensive ongoing support to ensure customers effectively use and get value from the vertical GenAI solution.

Strategic Planning Assumption

By 2027, over half of the generative AI models used by enterprises will be domain-specific (industry or business function), up from 1% today.

What You Need to Know

This research takes a focused look into vertical generative AI models, which is one of the 10 highlighted trends in 2024 Tech Provider Top Trends.

Generative AI (GenAI) models use neural networks to identify patterns from large datasets, and then generate new and original data or content. However, not all GenAI models are the same and they are already beginning to split into two distinct categories: horizontal and vertical (see Figure 1).

Horizontal GenAI models, such as OpenAI's GPT-4, are becoming increasingly ubiquitous, finding applications across various industries due to their generalized capabilities. On the other hand, domain/vertical AI models are designed to be more specialized and tailored to specific industries and business functions, offering significant and more immediate ROI.

Horizontal GenAI models are designed to be versatile and widely applicable, serving as a foundation for various industries. These solutions possess a broad scope and can be integrated into different domains, including customer service, content generation and general information retrieval. General-purpose models like GPT-4 demonstrate the potential of horizontal GenAI in generating humanlike responses, engaging in natural language conversations and providing valuable insights. Their versatility makes them readily available for businesses seeking AI solutions that can be quickly and broadly used across the organization.

In contrast, vertical GenAI solutions and models are tailored to specific industries, addressing their unique requirements and challenges. Vertical GenAI solutions offer advanced functionalities and specialized capabilities by leveraging domain-specific knowledge and expertise. Smaller, more industry-focused or business-focused models can often provide better results tailored to business needs. These solutions enabled by domain-specific models provide industry-specific insights, address specific privacy and security needs, optimize processes and enhance decision making, revolutionizing operations within medical, service, legal and marketing. Google, for example, offers a pretrained model called Med-PaLM 2 for use in healthcare. [1]

Figure 1: Comparison Between Horizontal GenAI Models and Vertical GenAI Models

Comparison Between Horizontal GenAI Models and Vertical GenAI Models

Horizontal GenAI	Vertical GenAI
Broad applicability - Can be applied across various industries and use cases	**Industry focus -** Built to meet needs and challenges of specific domains
Scalability - Can be deployed across different business units with varying needs	**Deep domain knowledge -** Uses industry expertise to address specific requirements and use cases
Cross-domain expertise - Developed and trained using data across multiple verticals and domains	**Better price/performance -** Lower costs to run since models are smaller requiring less resources
Tailoring required - Necessitates prompt engineering and fine-tuning to get optimal results	**Faster deployment -** Reduces the need for prompt engineering and fine-tuning since already optimized
Hallucinations - Lower accuracy and higher risk of hallucinations because of breadth of training data	**Accuracy -** Higher accuracy and reduced hallucinations because of more relevant, focused training data

Source: Gartner
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Profile: Vertical Generative AI Models

Description:

Vertical GenAI models are optimized for the needs of specific industries, business functions or tasks to improve performance and reduce the need for advanced prompt engineering for a narrower set of use cases, compared with general-purpose models. They are often smaller and can be built from scratch or fine-tuned from existing general-purpose models.

Vertical GenAI models have relevance for product leaders in three possible scenarios:

- **Model builders:** Product leaders who are experts specializing in designing, creating and optimizing AI models capable of generating content — such as text, images or multimedia — through advanced algorithms and data-driven techniques.

- **Model consumers/buyers:** Product leaders who leverage AI models in their product/service offerings to address specific business needs and help users make data-informed decisions.
- **Service providers:** Product leaders who use AI models to create and implement customized solutions, enabling them to offer innovative and personalized services in the context of a client's specific need.

Why Trending:

Vertical GenAI, often called domain-specific GenAI, is driven by different trends reshaping various industries and domains. Organizations are recognizing the limitations of one-size-fits-all AI models and are investing in developing or procuring AI systems designed exclusively for their industry. For instance, in healthcare, we see the emergence of AI tools for medical image analysis, drug discovery and patient diagnosis. In finance, AI is used for algorithmic trading, risk assessment and fraud detection. This trend is driven by the understanding that industry-specific AI can deliver more accurate and relevant results, ultimately improving decision making and outcomes.

This trend is further accelerated by the growing availability of industry-specific data and the advancement of AI techniques, enabling the development of more precise and effective GenAI model solutions. Additionally, the successes and notable applications of vertical GenAI in various sectors have spurred further interest, with tangible outcomes, such as improved patient care in healthcare, streamlined operations in manufacturing and more targeted customer engagement in marketing.

> **Vertical GenAI models enable the shift from playful to impactful, which will accelerate the adoption of GenAI.**

The evolving regulatory landscape and the need for compliance and transparency in highly regulated industries (like finance and healthcare) are driving the adoption of AI solutions designed to meet specific industry requirements. As a result, vertical GenAI is currently at the forefront of AI innovation, catering to the unique demands of various sectors and promising significant advancements in productivity, efficiency and decision making within those domains.

While general-purpose models perform well across a broad set of horizontal use cases, they may be impractical for many enterprise applications requiring domain-specific data and a lot of tuning. Vertical GenAI models can improve use-case alignment within the enterprise while delivering improved accuracy, more containerized security guardrails and better contextualized answers, thus reducing the need for advanced prompt engineering. Through more targeted training on more relevant data, these models have the potential to lower hallucination risks associated with very large models.

Compute costs and resources and overall enterprise sustainability goals are other reasons accelerating the vertical GenAI trend. General-purpose GenAI models can consume vast amounts of processor cycles and be costly to use. In contrast, smaller, more industry-focused or business-focused models can often provide better results tailored to business needs. While general-purpose large language models (LLMs) with trillions of parameters might sound powerful, they also consume compute cycles faster than the required chips can be manufactured or upscaled. This strain on server capacity leads to unrealistically long times to train models for particular business uses.

Vendors also have increasing options to build vertical GenAI models using open-source models as a base. For example, Meta's Llama 2 model is interesting because it can be used for small language models or specialized models. Llama 2 also offers three primary variations: 7 billion parameters, 13 billion parameters and 70 billion parameters. These are comparatively much smaller models than OpenAI's GPT-4 but perform well.

Signals showcasing this trend:

- **Large cloud providers —** The major LLM builders are already beginning to tailor their models for specific industry uses. For example, Google now offers two domain-specific models: Med-PaLM 2 [1] and Sec-PaLM. Med-PaLM 2 is an LLM designed to provide high-quality answers to medical questions. The vertical model also generates accurate, helpful, long-form answers to consumer health questions, as judged by panels of physicians and users. Sec-PaLM is a specialized version of PaLM 2 trained on security use cases, which can help more quickly analyze and explain the behavior of potentially malicious scripts and better detect which scripts are actually threats to people and organizations. In January 2023, Microsoft launched a tool and model called BioGPT, which is trained on millions of published biomedical research articles. BioGPT can be used to analyze biomedical research with the aim of answering biomedical questions and can be especially relevant in helping researchers gain new insights.

- **Industry vertical providers** — In early 2023, financial company Bloomberg released BloombergGPT, a vertical LLM trained on enormous amounts of financial data that can evaluate financial data quickly to help with risk assessments, gauge financial sentiment, and possibly even automate accounting and auditing activities. [2] The model has specifically been trained with financial data that reflects the distinctive vocabulary of the financial business.

- **Emerging providers** — Startups are also jumping to take advantage of the opportunity to offer vertical-specific models. Writer, for example, is a startup that offers a full-stack, GenAI platform for enterprises. The platform can support business operations, products, sales, human resources operations and marketing. The company offers a range of language models that cater to specific industries. Moreover, the vertical AI space is not limited to English-speaking models. In 2022, Narrativa launched its Narralegal model to support the analysis of Spanish legal text. [3] The model can help lawyers with various time-consuming tasks, including summarization, translation, semantic search and legal entity recognition.

Implications:

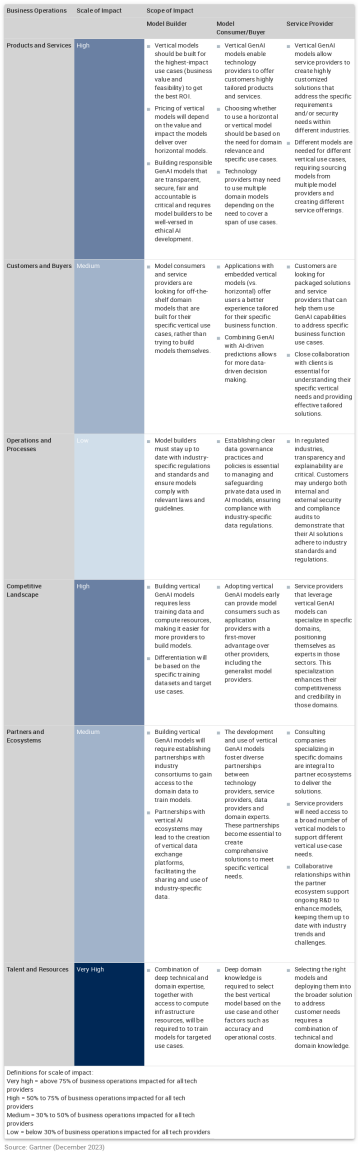
Vertical GenAI presents both opportunities and challenges for technology providers in the current, rapidly evolving landscape. It offers technology companies the potential for niche specialization and the development of tailored AI solutions for specific industries, which can lead to market differentiation and increased demand. Technology providers that can offer effective, domain-specific AI solutions stand to gain a competitive advantage and attract industry-specific clients seeking customized AI applications. However, this specialization comes with the responsibility of gaining deep domain knowledge and an understanding of the unique regulatory, ethical and security considerations within each sector.

Impact on Technology and Service Provider Business Operations:

One of the defining attributes of a top trend is its multifaceted impact on different parts of a technology and service provider's business operations. This is also the case for vertical GenAI models, whose impact is analyzed across six domains and summarized in Table 1.

Table 1: Impact of Vertical Generative AI Models on TSP Business Operations

(Enlarged table in Appendix)



Business Operations	Scale of Impact	Scope of Impact: Model Builder	Scope of Impact: Model Consumer/Buyer	Scope of Impact: Service Provider
Products and Services	High	▪ Vertical models should be built for the highest-impact use cases (business value and feasibility) to get the best ROI. ▪ Pricing of vertical models will depend on the value and impact the models deliver over horizontal models. ▪ Building responsible GenAI models that are transparent, secure, fair and accountable is critical and requires model builders to be well-versed in ethical AI development.	▪ Vertical GenAI models enable technology providers to offer customers highly tailored products and services. ▪ Choosing whether to use a horizontal or vertical model should be based on the need for domain relevance and specific use cases. ▪ Technology providers may need to use multiple domain models depending on the need to cover a span of use cases.	▪ Vertical GenAI models allow service providers to create highly customized solutions that address the specific requirements and/or security needs within different industries. ▪ Different models are needed for different vertical use cases, requiring sourcing models from multiple model providers and creating different service offerings.
Customers and Buyers	Medium	▪ Model consumers and service providers are looking for off-the-shelf domain models that are built for their specific vertical use cases, rather than trying to build models themselves.	▪ Applications with embedded vertical models (vs. horizontal) offer users a better experience tailored for their specific business function. ▪ Combining GenAI with AI-driven predictions allows for more data-driven decision making.	▪ Customers are looking for packaged solutions and service providers that can help them use GenAI capabilities to address specific business function use cases. ▪ Close collaboration with clients is essential for understanding their specific vertical needs and providing effective tailored solutions.
Operations and Processes	Low	▪ Model builders must stay up to date with industry-specific regulations and standards and ensure models comply with relevant laws and guidelines.	▪ Establishing clear data governance practices and policies is essential to managing and safeguarding private data used in AI models, ensuring compliance with industry-specific data regulations.	▪ In regulated industries, transparency and explainability are critical. Customers may undergo both internal and external security and compliance audits to demonstrate that their AI solutions adhere to industry standards and regulations.
Competitive Landscape	High	▪ Building vertical GenAI models requires less training data and compute resources, making it easier for more providers to build models. ▪ Differentiation will be based on the specific training datasets and target use cases.	▪ Adopting vertical GenAI models early can provide model consumers such as application providers with a first-mover advantage over other providers, including the generalist model providers.	▪ Service providers that leverage vertical GenAI models can specialize in specific domains, positioning themselves as experts in those sectors. This specialization enhances their competitiveness and credibility in those domains.
Partners and Ecosystems	Medium	▪ Building vertical GenAI models will require establishing partnerships with industry consortiums to gain access to the domain data to train models. ▪ Partnerships with vertical AI ecosystems may lead to the creation of vertical data exchange platforms, facilitating the sharing and use of industry-specific data.	▪ The development and use of vertical GenAI models foster diverse partnerships between technology providers, service providers, data providers and domain experts. These partnerships become essential to create comprehensive solutions to meet specific vertical needs.	▪ Consulting companies specializing in specific domains are integral to partner ecosystems to deliver the solutions. ▪ Service providers will need access to a broad number of vertical models to support different vertical use-case needs. ▪ Collaborative relationships within the partner ecosystem support ongoing R&D to enhance models, keeping them up to date with industry trends and challenges.
Talent and Resources	Very High	▪ Combination of deep technical and domain expertise, together with access to compute infrastructure resources, will be required to to train models for targeted use cases.	▪ Deep domain knowledge is required to select the best vertical model based on the use case and other factors such as accuracy and operational costs.	▪ Selecting the right models and deploying them into the broader solution to address customer needs requires a combination of technical and domain knowledge.

Definitions for scale of impact:
Very high = above 75% of business operations impacted for all tech providers
High = 50% to 75% of business operations impacted for all tech providers
Medium = 30% to 50% of business operations impacted for all tech providers
Low = below 30% of business operations impacted for all tech providers

Source: Gartner (December 2023)

Actions:

Vertical GenAI will drive the democratization of GenAI in enterprises for game-changing AI use cases. Product leaders who jump on this opportunity will have the first-mover advantage in differentiating against the mega model providers. But product leaders need to invest in research, domain expertise and data security to meet these requirements, as they develop and deploy AI solutions that are not one-size-fits-all but tailored to meet the demands of their target verticals. Furthermore, they must adapt to the rapid pace of technological advancements and industry-specific developments to remain relevant and competitive in the dynamic vertical GenAI market.

Evidence

[1] Med-PaLM, Google Research.

[2] Introducing BloombergGPT, Bloomberg's 50-Billion Parameter Large Language Model, Purpose-Built From Scratch for Finance, Bloomberg.

[3] Presenting Narralegal, the Largest Language Model for Legal Texts in Spanish, Narrativa.

Recommended by the Authors

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Hype Cycle for Generative AI, 2023

Accelerate Adoption of Generative AI by Offering an FMOps- or a Domain-Specific Partner Ecosystem

Emerging Tech: Primary Impact of Generative AI on Business Use Cases

Emerging Tech: Tech Innovators for AI-Generated Content

Emerging Tech: Generative AI Adoption Trends and Future Opportunities

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Competitive Landscape	High	■ Building vertical GenAI models requires less	■ Adopting vertical GenAI models early can provide	■ Service providers that leverage vertical GenAI

		training data and compute resources, making it easier for more providers to build models. ■ Differentiation will be based on the specific training datasets and target use cases.	model consumers such as application providers with a first-mover advantage over other providers, including the generalist model providers.	models can specialize in specific domains, positioning themselves as experts in those sectors. This specialization enhances their competitiveness and credibility in those domains.
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