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Produced by:

**KMWorld Magazine
Specialty Publishing Group**

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Connecting the Enterprise Through AI, Knowledge Graphs, and Data Fabrics



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By Marydee Ojala, Editor-in-Chief, *KMWorld*

The impact of AI on KM could be massive. Although organizations are no strangers to implementing various AI technologies into their KM activities, the popularization of generative AI has game-changing possibilities—except that this isn't really a game, it's serious. Plus, to truly connect people within an enterprise with knowledge they need relies not only on GenAI, but also on other forms of artificial/augmented intelligence, knowledge graphs, and data fabrics.

It's no secret that we now live and work in a data-driven world. Thus, organizations seek to leverage their information assets to gain strategic advantages and insights. Sounds simple, right? The problem is that data is all too often siloed across departments and systems, making a unified view of enterprise knowledge difficult. The emerging AI technologies, knowledge graphs, and data fabrics offer new ways to connect all this fragmented information and provide enhanced discovery, access, and understanding.

Some in the KM space bristle at considering information as an asset, but information assets are rapidly becoming essential to organizational success, and the appeal of maximizing their value is ever more apparent to top management. They see the potential but may not understand what is required to bring that potential to actionable reality. It's important that decision makers within an organization recognize that GenAI and large language models are not the only technologies allowing those information assets to bring more value to the organization, its employees, and its customers. Stressing the importance of knowledge graphs and data fabrics are also part of the new data-driven landscape.

Getting Comfortable With an Information Labyrinth

Navigating the labyrinth of finding all that information in this fast-paced data environment can be challenging. The struggle to find the relevant information and hard data affects management decisions, customer service, internal operations, and employee satisfaction. Pitfalls such as outdated information, non-informative filenames, strangely stored information, changes in terminology and metadata, and a host of other

potential barriers turn what our users think should be simple into something complicated, complex, and intimidating. How do we get people comfortable with this information labyrinth? What if this labyrinth could be transformed into a straight pathway?

That's what these newer technologies aim to do. Instead of bumping into dead ends in the labyrinth, they offer a more straightforward path to follow, a logical approach to extracting insights from the unstructured data populating knowledge hubs. Knowledge graphs can structure and link information to create a flexible web of relationships, while data fabrics can integrate these knowledge networks with existing systems and

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data sources to enable organization-wide knowledge sharing. By connecting the enterprise in these ways, knowledge workers can become more confident that they can grasp all aspects of the question they are trying to answer while spending much less time accomplishing their goals.

Taken together, AI technologies, knowledge graphs, and data fabrics allow enterprises to map both explicit and implicit connections among content, data, and users. This gives knowledge workers a 360-degree view of customers, products, workflows, and other key organizational assets. The result is the ability to uncover hidden insights, automate knowledge-intensive processes, and optimize decision making across the business.

A New Paradigm

For knowledge managers looking to evolve beyond traditional data management approaches, AI and knowledge graphs offer a new paradigm. This article explores the components, benefits, and real-world examples of intelligent enterprise knowledge networks. We discuss how leading organizations are using these technologies to connect siloed information, enhance discovery and collaboration, and ultimately work smarter.

Before getting too engrossed in the “what-ifs” of how these technologies could be used in individual situations, it's good to take a step back and remind ourselves of their definitions, differences, and overall potential applications, which is exactly what Daniel Fallman, CEO, Mindbreeze, offers. In his view, we can't generate insights without understanding the technologies involved.

He starts with large language models (LLMs), which are the foundation upon which GenAI products are built. LLMs are trained on publicly available, free data on the web—which is what you are using when you access OpenAI's ChatGPT—or on a different model that includes internal data but still has billions of parameters. It's those extremely large numbers of parameters, which

may also be referred to as tokens, that make the LLMs so powerful. They can synthesize disparate data sources, identify patterns and relationships, summarize content, and spark new ideas.

As Fallman points out, an adjacent technology is NLP (Natural Language Processing), which enables GenAI to be conversational and human-like in its interactions with actual humans. Other important technologies that feed into LLMs and GenAI include deep learning, neural networks, and transformers. Plus, it's not just text that's being generated. Image generation, even realistic 3D modeling, is growing in importance.

Risks and Rewards

However, Fallman warns, risks are involved. The problem with ChatGPT creating erroneous information, usually called hallucinating, has been widely reported, not just in specialized domains but also in the general press. Trusting the sources for the LLMs is critical to initiating an internal application using GenAI and LLMs. Beyond the obvious technical necessity for validating the credence of the sources, it's also a communications issue, making sure that those using these systems understand why they can trust the information provided and how it differs from an outside system, such as ChatGPT.

Other risks involve data privacy, plagiarism, compliance, and relying solely on AI. In most cases, the rewards of implementing new technologies outweighs the risks. Being aware of the risks and guarding against them decimating your project, or maybe even resulting in extremely negative reputational outcomes for your organization, is key.

The fact is that integrating LLMs with enterprise search engines facilitates collaboration and innovation, transforming customer engagement, market intelligence, and knowledge discovery. The number of business applications that can be improved by applying GenAI and LLMs borders on limitless. Personalizing the customer experience, providing customer service 24/7, recommending products, working in multiple languages, expediting research, creating documents, predicting customer and user behavior, and extracting data to refine business strategies are a few examples of how LLMs have the potential to revolutionize your business.

Knowledge Graphs Connect the Dots

While Fallman concentrates on LLMs to connect within the enterprise, Jans Aasman, CEO of Franz Inc., turns his attention to knowledge graphs to connect the dots. Both LLMs and knowledge graphs are significant technological contributors to surfacing knowledge that may not be immediately visible or completely comprehended by humans. Computers can process

vastly larger stores of data than can people, although having a human-in-the-loop to act as a reality check on what the computers present remains a critical component. No one wants to connect with incorrect or incomplete information.

Knowledge graphs are structured knowledge models that create a semantic layer unifying stores of rich factual knowledge with

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business-critical information. As Aasman states, knowledge graphs step in to alleviate the tendency of GenAI and LLMs to hallucinate. Knowledge graph technology provides a welcome complement to LLMs, enhancing the accuracy and reliability of AI-based applications. Not only do they rely on fact-based data, but they also help with potential privacy issues.

Aasman introduces us to other technologies, notably RAG (Retrieval Augmented Generation), which is an AI framework that can grab up-to-date or contextual information from external databases and provide it to an LLM, thus adding to the accuracy of search results. Integrating knowledge graphs with LLMs is ideal to advancing natural language processing and AI. Franz's Allegro-Graph integrates with LLMs but it also, in addition to utilizing RAG, includes vectorization capabilities, neural networks, virtualization, analytics, and streaming.

Given the wide range of technologies that can be part of knowledge graphs, it's no surprise that Aasman expands his discussion into Semantic Knowledge Graph Architecture. This is a standards-based architecture that empowers organizations to both explore and exploit data they have had in-house for a long time but couldn't fully take advantage of until knowledge graph technology allowed them to connect the dots, to see patterns they didn't previously know existed.

Semantic Knowledge Graphs

Samuel Chance, Principal Consultant at Cambridge Semantics, looks at knowledge graphs from a semantic perspective, by which he means not only connecting the dots—although he does say that “Nothing says connected like graphs”—but also data interoperability. Essential to interoperability are the semantic elements of taxonomies and ontologies. To harmonize meaning, look

at the well-established language models, such as the W3C Web Ontology Language (OWL). Chance also brings in the notion of data fabrics, explaining that it is knowledge graphs, by and large, that power data fabrics.

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of many different data integration projects. Additionally, data fabrics make use of metadata and machine learning to augment their data integration design and provide a holistic view of an organization's data. Closely related to data fabrics is data mesh. Both leverage knowledge graph technology.

To answer why we need knowledge graphs, Chance emphasizes the semantics of knowledge. For him, it's all about “the metadata model (ontology) used to specify entities, concepts, and salient relationships existing in the underlying enterprise data sources.” There is no schema involved in knowledge graphs, they are self-learning and rely on triples, which occur in machine-interpretable sentences. Knowledge graphs are particularly useful when people ask questions that were not anticipated.

Technology Moves On

As technology advances and improves, AI implementations, along with better algorithms and even robotics, will lead to better connections within the enterprise, particularly now that so much of our information and data has either been digitized or was born digital. All those tasks that were once upon a time done manually can now be delegated to machines, with the caveat that humans oversee the process to ensure that the end result is actually what was wanted and needed.

AI, knowledge graphs, and data fabrics work in tandem to connect people, information, and data across the enterprise not only to enhance the user experience, but also to enable timely access to accurate and reliable information. LLMs have revolutionized a number of industries. But it goes beyond that as the public, experimenting with GenAI chatbots, have found a plethora of uses. Now to harness that interest for the benefit of the enterprise is the next step. ■

AllegroGraph: LLMs and Knowledge Graphs for AI in the Enterprise

By Franz Inc.

In the rapidly evolving landscape of artificial intelligence (AI) and data analytics, the synergy between Knowledge Graphs and Large Language Models (LLMs) has emerged as a game-changer. Industry analysts have recognized the transformative power of Knowledge Graphs in delivering integrated, trusted, and real-time views of enterprise data. Knowledge Graphs excel at creating a semantic layer that unifies business data with knowledge bases, industry terms, and domain knowledge, resulting in what is often referred to as an Enterprise-wide Data Fabric.

Gartner, a leading authority in technology research, has aptly noted, “The semantic layer of the knowledge graph makes it more intuitive and easy to interpret, making the analysis easy for D&A leaders. It adds depth and meaning to the data usage and content graph, allowing AI/ML algorithms to use the information for analytics and other operational use cases.” This highlights the invaluable role that Knowledge Graphs play in bridging the gap between siloed data and actionable insights.

Knowledge Graphs – The Source of Truth

Large Language Models (LLMs) such as ChatGPT, BARD, and Claude 2 have been making significant strides in the field of natural language processing and artificial intelligence. These models, powered by deep learning algorithms, have the remarkable ability to generate human-like text and engage in natural language conversations. However, they do have their limitations. LLMs often fall short of delivering factual knowledge consistently, occasionally creating “hallucinations” by generating text that is untrue or misleading.

This is where Knowledge Graphs, such as AllegroGraph, step in as a perfect complementary technology. Knowledge Graphs provide structured knowledge models that explicitly store rich factual knowledge. By incorporating Retrieval Augmented Generation (RAG) via Knowledge Graphs with LLMs, we can enhance the accuracy and reliability of AI applications, ensuring that they are grounded in fact-based knowledge.

Leading industry analysts strongly recommend the integration of LLMs with Knowledge Graphs. According to Gartner, “Data and analytics leaders must leverage the power of large language models (LLMs) with the robustness of knowledge graphs for

fault-tolerant AI applications.” This synergy ensures that AI-driven insights and decisions are not only generated swiftly but are also underpinned by a foundation of accurate and trusted data.

AllegroGraph – AI Knowledge Graph Platform

AllegroGraph is designed to seamlessly integrate with LLMs, providing the most secure and scalable AI solution for enterprises. AllegroGraph offers a comprehensive solution platform, including Large Language Models (LLMs), Vector generation and storage, Graph Neural Networks, Graph Virtualization, GraphQL, Apache Spark graph analytics, and Kafka streaming graph pipelines. These capabilities exemplify Allegro-

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Graph’s leadership in empowering data analytics professionals to derive substantial business value from Knowledge Graphs.

A key advantage of adopting a Semantic Knowledge Graph Architecture is its ability to facilitate more flexible data operations while avoiding yet another silo such as those created by Labeled Property Graph products. AllegroGraph’s standards-based architecture empowers organizations to explore and exploit previously unknown connections within their data, resulting in richer analytics and enhanced AI capabilities. A Semantic Knowledge Graph enables an organization to harness the full potential of its data, thereby gaining a competitive edge in the modern business landscape while also avoiding vendor lock-in.

Future Proof Knowledge Graph Solutions

AllegroGraph’s Entity-Event Data Model, used in conjunction with AllegroGraph’s FedShard technology, places core entities such as customers, patients, students, or individuals of interest at the center of the knowledge ecosystem. Surrounding these entities are connections to knowledge represented as “events.” These events capture activities and occurrences in a temporal context, providing a comprehensive and contextual view of data.

AllegroGraph’s innovative approach to combining data and knowledge at scale addresses a critical challenge faced by AI applications and complex reasoning analytics. These applications often require information from both databases and knowledge bases containing domain information, taxonomies, and ontologies. However, many large-scale knowledge bases cannot be sharded due to their highly interconnected data. Franz’s patented FedShard technology offers a groundbreaking solution by uniquely combining data with knowledge bases, allowing for the scaling of applications across the enterprise.

Getting Started, Today

Franz Inc. not only offers cutting-edge technology but also provides a suite of services for building industrial-strength Entity-Event Knowledge Graphs. Franz’s Solution Services combine the best-in-class tools, products, knowledge, skills, and experience required to extract sophisticated decision insights and predictive analytics from highly complex, distributed data that cannot be uncovered with conventional database approaches.

Integration of Knowledge Graphs with LLMs represents a transformative approach to AI and data analytics. By combining the

semantic richness of Knowledge Graphs with the natural language processing capabilities of LLMs, organizations can unlock the full potential of their data, ensuring that AI-driven insights are grounded in facts.

Industry Recognition

The industry recognition of Franz’s technology excellence is underscored by AllegroGraph’s recent accolades. AllegroGraph was named a Trend Setting Product for 2023, and the company itself was acknowledged in the AI100, List of Top Artificial Intelligence Companies. This recognition highlights Franz Inc.’s commitment to pushing the boundaries of Knowledge Graph technology and its dedication to delivering innovative solutions that empower enterprises to thrive in the era of data-driven decision-making.

AllegroGraph, with its cutting-edge technology and innovative approaches, stands at the forefront of this revolution, offering a robust and scalable solution for enterprises seeking to harness the power of Knowledge Graphs and LLMs.

Contact [Franz Inc.](#) today to embark on your journey toward building a resilient and future-proofed solution that will drive your organization’s success in the data-driven era. ■