

# Top 9 Knowledge Graphs Use Cases

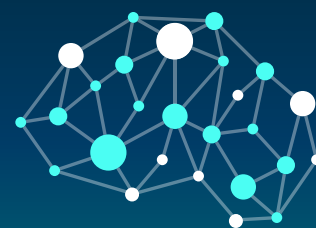
How modern organizations leverage knowledge graphs to drive insights and innovation

This guide is designed for business leaders and data professionals seeking to harness the power of connected data and gain strategic advantages with knowledge graphs.



## INTRODUCTION

# Unlock the full potential of knowledge graphs for your organization



## What is a knowledge graph?

A knowledge graph is a structured representation of data that captures relationships and connections between different entities, concepts, and information. It organizes data in an interconnected network that mirrors how humans naturally think about and connect information, powered by semantic technologies that enable machines to understand context and meaning.

Data—one of the most valuable assets in the digital age, the key differentiator that sets leading businesses apart from their competitors. What distinguishes successful organizations today is their ability to leverage data effectively and optimize decision-making with unique market insights. Yet, with the growing pool of unstructured data, managing vast datasets and extracting tangible value from them poses more challenges than it may seem. This is where **knowledge graphs** come into play. With their unique ability to connect disparate data points and create visual representations of data relationships across enterprise systems, knowledge graphs have become essential for modern data management and analytics.

Knowledge graphs essentially depict the relationships between data and their underlying connections, forming a picture of the relationships between datasets that enhances context, meaning, and usability. They offer a powerful approach to data management by integrating diverse data sources into a unified platform, giving a holistic overview of the enterprise knowledge base.

Such an in-depth understanding of the interrelationships between entities significantly enhances the research and discovery capabilities of modern technology and transforms how organizations understand and utilize their data assets. Their graph-based structure supports complex queries beyond simple keyword matching, making them particularly effective for natural language processing (NLP) and AI-driven discovery. The semantic understanding provided by knowledge graphs also enables systems to comprehend the context and meaning of data, facilitating more accurate and context-aware NLP applications.

How, then, do businesses utilize the power of knowledge graphs and apply practical use cases that drive results?

In today's report, we give you the top nine knowledge graph use cases that have been widely adopted by companies seeking to enhance data integration, search capabilities, and AI-driven insights. Regardless of your industry or business size, the benefits of knowledge graphs extend beyond traditional data management, enabling smarter decision-making, improved personalization, and more efficient automation.

# 1 Search Engine Enhancement

One of the most well-known knowledge graph applications is in search engines since with a network of information, knowledge graphs can significantly improve search results by providing users with much more comprehensive answers that not only address the question but also offer context and analysis based on structured data, semantic relationships, and real-world connections. For example, a retail business executive might use a knowledge graph to improve product search functionality on their e-commerce platform. Instead of simply showing a list of product names, the search engine would offer comprehensive results, including related product categories, customer reviews, recommended products, and even personalized suggestions based on the shopper's preferences.

**Purpose:** Enhance search engines by structuring information into interconnected entities, enabling more accurate, context-aware results for keyword, semantic, voice search, and personalized search results.

**Notable Industry Applications:** *Google Search, E-commerce Platforms (e.g., Amazon, eBay), Enterprise Search Solutions (e.g., IBM Watson Discovery)*

## Implementation Guide

### Step 1: Understanding User Intent and Context

Knowledge graphs help search engines go beyond keyword matching by understanding the relationships between entities. For example, when a user searches for "founder of Apple," the search engine recognizes that Apple refers to the tech company instead of the fruit, then immediately links it to Steve Jobs, Steve Wozniak, and Ronald Wayne using structured entity relationships.

### Step 2: Enabling Semantic Search and Better Query Interpretation

By leveraging entity relationships, search engines can interpret the meaning behind queries rather than just matching words: semantic search, in this case, allows engines to connect synonyms and related concepts, and even disambiguate words for a much clearer answer.

### Step 3: Providing Contextually-Aware Results

Knowledge graphs power rich snippets, knowledge panels, and direct answers, presenting users with precise, structured information instead of just links to scattered information. For example, searching an industry's "business outlook" returns a knowledge panel that offers a concise summary of the current economic outlook, including key statistics, industry trends, consumer behaviors, and possible forecasts.

**See It In Action:** Check out how search engine enhancement helps [improve the quality of search outputs](#) and deliver more [relevant, accurate prediction results](#).

## 2 Natural Language Processing

Another key use case for knowledge graphs is to improve the accuracy, relevancy, and reliability of natural language processing results. While traditional prompt-to-output systems rely heavily on the search engine's ability to retrieve relevant documents and information from unstructured texts, these systems often struggle with language ambiguity and complex queries, limiting them to direct answers rather than comprehensive, well-rounded information.

**Purpose:** Improve NLP models by adding structured data to resolve language ambiguity, enhance contextual understanding, and support more accurate and nuanced language generation

**Notable Industry Applications:** *Virtual Assistants (e.g., Alexa, Google Assistant), Chatbots, Real-Time Translation (e.g., Google Translate)*

### Implementation Guide

#### Step 1: Contextualizing Words and Phrases

Knowledge graphs provide essential background information by linking words to relevant entities, concepts, and categories. For instance, when a system encounters the word "bat," the knowledge graph can clarify whether it refers to a flying mammal or a piece of sports equipment based on the surrounding context of the sentence.

#### Step 2: Resolving Ambiguities and Improving Entity Recognition

By leveraging semantic relationships in knowledge graphs, NLP systems can improve their ability to recognize entities (like people, places, or organizations) and disambiguate multiple meanings of a word. This ensures that the system generates responses that are contextually relevant, such as recognizing "Apple" as a technology company or fruit, depending on the query.

#### Step 3: Enhancing Language Generation with Structured Knowledge

In NLP applications like chatbots and virtual assistants, knowledge graphs help improve the fluency and relevance of generated responses. They ensure that the responses aren't just based on rote data retrieval, but rather enriched with relevant background, relationships, and real-world context, leading to more natural and informative conversations.

**See It In Action:** Check out how integrating knowledge graph technology into natural language processing can enhance [customer retention](#), [analyze sales calls](#), and transform [support operations](#).

## 3 Healthcare and Medical Research

In healthcare and medical research, where data originates from highly diverse and often unstructured sources, knowledge graphs have emerged as powerful tools for organizing vast amounts of data, from clinical information to research findings. By structuring data into interconnected entities, knowledge graphs enable healthcare professionals and researchers to access comprehensive, context-rich insights, supporting decision-making, research discovery, and patient care. They provide an organized framework for understanding complex relationships between diseases, treatments, genes, medications, and clinical trials.

**Purpose:** Facilitate the integration of heterogeneous healthcare and biomedical data, enabling more accurate diagnosis, personalized treatment plans, and efficient research insights by organizing and relating data in a structured, context-aware manner.

**Notable Industry Applications:** *Electronic Health Records (EHR) Systems, Drug Discovery and Research, Clinical Decision Support Systems*

### Implementation Guide

#### Step 1: Integrating Heterogeneous Data Sources

Knowledge graphs allow for the integration of various data types such as patient records, genomic data, clinical trials, and medical literature. By linking these datasets, healthcare systems can offer a unified view that enhances decision-making.

#### Step 2: Identifying Relationships Between Entities

By mapping relationships between diseases, symptoms, treatments, and outcomes, knowledge graphs help identify patterns and correlations that are not immediately obvious. For example, they may reveal connections between genetic mutations and specific drug responses, improving personalized treatment strategies.

#### Step 3: Enhancing Research and Clinical Outcomes

Knowledge graphs enable researchers to analyze vast datasets to uncover new insights, such as identifying potential drug candidates, understanding disease mechanisms, or predicting patient outcomes. Clinicians can also use them to make more informed decisions based on comprehensive, contextually relevant information, leading to improved patient care and clinical results.

**See It In Action:** Check out how knowledge graphs can be integrated to streamline electronic health records, automate clinical documentation, or streamline hospital staffing.

# 4 Recommendation Systems

Recommendation systems are widely used in various industries to personalize user experiences and suggest relevant products, services, or content based on individual preferences, behaviors, and contextual information. Knowledge graphs enhance recommendation systems by adding a layer of structured, interconnected data that helps these systems understand relationships between users, items, and other contextual factors, enabling more accurate, relevant, and context-aware recommendations.

**Purpose:** Improve recommendation accuracy by structuring data into interconnected entities and enabling systems to generate personalized, context-driven suggestions based on user preferences, behaviors, and relationships between items.

**Notable Industry Applications:** *E-commerce Platforms (e.g., Shopify, Amazon), Content Streaming Services (e.g., Netflix, Spotify), Social Media Platforms (e.g., TikTok, YouTube)*

## Implementation Guide

### Step 1: Constructing User Profiles

Knowledge graphs help recommendation systems construct detailed user profiles and item descriptions by mapping relationships between users, their preferences, and products or content. For example, the graph might link users with their past purchases, ratings, and browsing behaviors, as well as with items that share similar attributes or are often purchased together.

### Step 2: Leveraging Semantic Relationships

By using entity relationships and contextual information, knowledge graphs enable recommendation systems to go beyond simple item similarity. They can incorporate complex connections, such as recommending movies based on a user's preferred genre, director, or even the actors they enjoy, therefore generating more accurate and varied suggestions.

### Step 3: Context-aware Recommendations

Contextual factors such as time, location, or current trends will also be taken into the evaluation process, making recommendations more relevant to the user's immediate needs. For instance, a recommendation system could suggest cozy indoor activities during the winter or holiday-related shows when the holiday season is right around the corner, ensuring suggestions are timely and contextually appropriate.

**See It In Action:** Explore how elevated recommendation systems, by integrating knowledge graphs, can enhance personalization and [optimize ticket pricing](#) for improved customer experiences and revenue growth.

# 5 Enterprise Knowledge Management

Enterprise Knowledge Management (EKM) is essential for organizations to capture, share, and utilize knowledge across various departments and teams. By leveraging knowledge graphs, businesses can structure vast amounts of information, enhancing collaboration and ensuring that valuable insights are easily accessible. Knowledge graphs also enable organizations to map the relationships between people, processes, and information, making it easier to find relevant data, promote innovation, and improve decision-making.

**Purpose:** Enhance enterprise knowledge management by structuring organizational data into interconnected entities, enabling efficient knowledge sharing, improving collaboration, and facilitating better decision-making across departments

**Notable Industry Applications:** *Customer Relationship Management (e.g., Salesforce, HubSpot), Enterprise Resource Planning Systems (e.g., SAP, Oracle), Knowledge Sharing and Collaboration Tools (e.g., Slack, Microsoft Teams)*

## Implementation Guide

### Step 1: Organizing Organizational Knowledge

Knowledge graphs help structure internal information, linking employees, departments, projects, and documents. This makes it easier for users to navigate the organizational knowledge base and find relevant resources based on relationships rather than just keywords. For example, an employee searching for project documents could easily find related files, expertise, and teams.

### Step 2: Facilitating Knowledge Discovery and Collaboration

By linking related concepts, tasks, and expertise, knowledge graphs enable employees to discover the right people or resources quickly. For example, knowledge graphs can connect subject matter experts to specific topics or projects, improving internal collaboration and reducing time spent searching for answers.

### Step 3: Improving Decision-Making and Innovation

With knowledge graphs, organizations can identify patterns and insights hidden within the data. By understanding the relationships between key entities, such as market trends, product feedback, and customer interactions, businesses can make more informed decisions and drive innovation. For instance, linking customer feedback to product development can uncover opportunities for improvement or new features.

**See It In Action:** Check out how knowledge graphs help transform [enterprise knowledge management](#) by integrating high quality chat assistants with comprehensive data pipelines.

# 6 Retrieval-Augmented Generation (RAG)

Retrieval-Augmented Generation (RAG) systems enhance the capabilities of large language models (LLMs) by integrating external knowledge sources, such as knowledge graphs, into the generation process. This integration enables the generation of responses that are not simply the product of learned patterns but are grounded in accurate, up-to-date, and contextually relevant information. For example, a RAG system can tap into a company's knowledge graph to retrieve not only what the user is looking for but also what they might be interested in along their search, and respond to the user query with much more precise, comprehensive, and relevant answers.

**Purpose:** Enhance RAG systems by structuring information into interconnected entities, allowing the system to retrieve contextually relevant data and generate more accurate, informative, and coherent responses.

**Notable Industry Applications:** LLMs (e.g., ChatGPT, Gemini), Customer Support Chatbots

## Implementation Guide

### Step 1: Leveraging External Knowledge Sources

Knowledge graphs allow RAG systems to access external structured knowledge, such as public research papers, product databases, or even open user discussions, to retrieve relevant information that enriches the generative model. For example, when responding to a customer query, the system can retrieve recent product updates and use that data to generate a relevant response.

### Step 2: Incorporating Structured Data into Generation

Once the relevant data is retrieved, knowledge graphs help integrate the information into the generation process by providing semantic relationships between entities. For example, when generating an answer about a historical figure, the system can use the graph to pull in biographical data, dates, and events, creating a more comprehensive and factually accurate response.

### Step 3: Improving Contextual Understanding and Personalization

By using the relationships between entities, knowledge graphs help the RAG model generate more personalized and contextually aware responses. In this case, chatbots can use user preferences or past interactions to tailor responses or even provide consistent accessibility support, ensuring that the information provided is relevant to the individual's needs and context.

**See It In Action:** Check out how knowledge graphs help improve the quality of RAG models, thereby enhancing [air traffic management](#) and optimizing [retail pricing strategies](#).

# 7 CRM (Customer-Relationship Management)

Customer Relationship Management (CRM) systems are essential for maintaining a company's interactions with existing and potential customers. By integrating knowledge graphs, CRMs can enhance customer experiences and improve business outcomes by structuring and organizing customer data into interconnected entities. This enables businesses to gain deeper insights into customer behaviors and preferences, which helps drive more personalized engagement and efficient decision-making.

**Purpose:** Enhance CRM systems by structuring customer-related data into interconnected entities, enabling businesses to understand relationships, predict customer needs, and improve personalized engagement.

**Notable Industry Applications:** *Customer Relationship Management Platforms (e.g., Salesforce, HubSpot, Zoho CRM), Marketing Automation Tools (e.g., Adobe Marketing Cloud)*

## Implementation Guide

### Step 1: Organizing Customer Data

Knowledge graphs help structure customer data, linking profiles to various touchpoints like past interactions, purchases, preferences, and feedback. This provides a unified view of each customer, making it easier for businesses to understand their needs and behaviors. For example, linking a customer's purchase history with their social media activity can offer insights into their preferences for future marketing strategies.

### Step 2: Identifying Relationship Patterns and Opportunities

By leveraging the relationships between customers, products, and interactions, knowledge graphs allow businesses to identify patterns, such as trends in purchasing behavior or shifts in customer preferences. This can help predict future needs and uncover opportunities for upselling or cross-selling. For instance, if a customer frequently purchases fitness equipment, the CRM could recommend related accessories or personalized workout plans.

### Step 3: Improving Personalization and Customer Engagement

Knowledge graphs enable more accurate segmentation and personalized communication by linking relevant customer data to tailored offers, content, or services. For example, CRM systems can use knowledge graphs to automatically deliver personalized email campaigns, customer support suggestions, or product recommendations, increasing engagement and improving customer satisfaction.

**See It In Action:** Discover how integrating knowledge graphs can enhance customer relationship management by [optimizing marketing campaigns](#).

## 8 Financial Services

Knowledge graphs play a crucial role in managing complex relationships between financial data, client profiles, financial products, and transactions. The reorganization of disparate data sources enables institutions to monitor risks both proactively and in real-time. This not only helps financial analysts make more informed and strategic financial decisions, but also enhances fraud detection, regulatory compliance, and personalized customer experiences by providing a comprehensive and interconnected view of financial ecosystems.

**Purpose:** Enhance financial services by structuring financial data into interconnected entities, enabling more accurate risk assessment, personalized client interactions, and informed decision-making.

**Notable Industry Applications:** *Banking Apps and Investment Platforms, Risk Management, Financial Analytics and Reporting Tools (e.g., Tableau, Bloomberg Terminal)*

## Implementation Guide

### Step 1: Structuring Financial Data and Relationships

Knowledge graphs organize financial data into interconnected entities, such as accounts, transactions, customers, financial products, and market data. This structured approach allows financial institutions to gain a holistic view of their clients and operations. For example, linking customers to their banking accounts, investments, and credit history enables a comprehensive profile that can guide decision-making.

### Step 2: Enhancing Risk Management and Compliance

By understanding the relationships between entities, knowledge graphs help identify potential risks or compliance issues. Financial institutions can better detect fraud patterns, monitor suspicious activities, and ensure compliance with regulatory requirements. For instance, a knowledge graph can connect transactions with external data sources, highlighting unusual patterns that may indicate fraud.

### Step 3: Enabling Personalized Financial Services

By linking customer data, financial products, and transaction histories, knowledge graphs enable banks and financial institutions to deliver more personalized services. Financial advisors can leverage the interrelations between different data points to suggest tailored investment strategies, loan options, or credit products based on a client's financial history and goals. Additionally, personalized financial planning tools can be developed, guiding clients towards better financial decisions.

**See It In Action:** Discover how integrating knowledge graphs can [detect hidden red flags](#) in company data, [assess investment thesis fit](#), and [monitor market sentiment](#).

# 9 Content Marketing

When it comes to content marketing, knowledge graphs can significantly enhance the quality, distribution, and audience engagement rate by turning raw data into digestible analysis and meaningful insights. With their capability to organize and interlink diverse data sources, marketers can better understand their targeted audience and optimize content based on improved search engine visibility. For example, content strategists can adjust the voice and tone of their marketing materials to resonate with the users on a deeper and more personal level, improving the users' overall browsing experiences on a consumer website and therefore increasing the effectiveness of advertising campaigns.

**Purpose:** Improve the quality of marketing content through structured data, semantic relationships, and contextual analysis, to increase SEO and optimize audience engagement, personalization, and content discoverability.

**Notable Industry Applications:** Marketing Automation Platforms (e.g., HubSpot), Content Management Systems (e.g., WordPress, WebFlow), SEO and SEM Tools (e.g., SEMrush, Ahrefs)

## Implementation Guide

### Step 1: Structuring Content and Consumer Data

Knowledge graphs can create comprehensive user profiles by combining data collected from different content types such as blogs, social media posts, news articles, videos, etc. This gives marketers a 360-view of their audience base so that they can optimize their content to cater to specific audience interests (i.e., connecting sports news to customer profiles with a strong interest in sports).

### Step 2: Optimizing Content for User Intent

Knowledge graphs aid in content optimization for search engines and user intent by correlating content with relevant keywords, trends, and complex concepts. Marketers no longer have to concentrate on keywords alone as they can now target relationships between topics, which improves their SEO activities and increases search visibility.

### Step 3: Personalizing Content and Increasing Engagement

A marketing team can apply knowledge graphs to target a user's previous actions, such as browsing history and past interests for tailored content production. In this case, users are better engaged, and interactions become more meaningful, allowing market experts to strengthen customer loyalty and advance conversion rates by linking content to appropriate customer journey touchpoints.

**See It In Action:** Explore how integrating knowledge graphs into marketing strategies can advance [campaign effectiveness](#) and [automate custom sustainability reporting](#).

NEXT STEPS

# Uncover hidden business insights with knowledge graphs now

Shakudo leverages the power of knowledge graphs to transform data management and decision-making across businesses. By integrating diverse data sources and structuring information into interconnected entities, Shakudo allows organizations to access comprehensive insights quickly and accurately. This enables faster, smarter decision-making with advanced search capabilities and personalized recommendations, all backed by real-time contextual analysis.

With scalable and flexible solutions, businesses can manage growing data complexities, uncover hidden patterns, and foster better collaboration across teams. As an operating layer on top of your cloud, Shakudo allows you to pick the best-of-breed data tools for your needs while providing a platform with a fully automated DevOps experience.

This combines the best of both worlds in data stack practices so you can focus on delivering business value with data.

Shakudo is the easiest, most secure, cost-effective, and scalable way to bring the most advanced data and AI tools to your data.

[Learn more about knowledge graphs on Shakudo >](#)

