The Forrester Wave™: Cognitive Search And Knowledge Discovery Solutions, Q2 2017

Cognitive Search Is Delivering The AI Version Of Enterprise Search

by Mike Gualtieri June 6, 2017

Why Read This Report

In our 23-criteria evaluation of cognitive search and knowledge discovery solution providers, we identified the nine most significant ones — Attivio, Coveo, Elastic.co, Hewlett Packard Enterprise (HPE), IBM, Lucidworks, Mindbreeze, Sinequa, and Squirro — and researched, analyzed, and scored them. This report shows how each provider measures up and helps application development and delivery (AD&D) professionals make the right choice.

Key Takeaways

Enterprise Search No Longer Does Search Justice

That's why we now call the category cognitive search and knowledge discovery. Forrester has observed a significant change in the technologies that search technology vendors use, such as natural language processing and machine learning, to dramatically improve the effectiveness of these solutions.

Relevancy And Completeness Matter Most

Search is about finding answers, content, and documents; adding useful context to apps; and augmenting human intelligence. The most important requirements are the relevancy and completeness of the returned results.

Cognitive Search Underpins AI Applications

Many enterprises use search to augment applications with relevant data from multiple application data sources. AD&D pros can use cognitive search solutions to enrich applications with highly relevant, contextual information.

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Cognitive Search Is Delivering The Al Version Of Enterprise Search



by Mike Gualtieri with Srividya Sridharan and Emily Miller June 6, 2017

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Brief: Cognitive Search Is Ready To Rev Up Your Enterprise's IQ

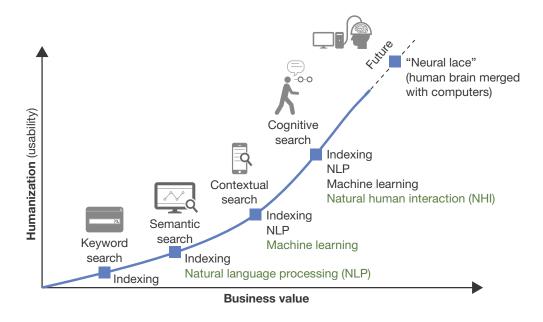
Deep Learning: An Al Revolution Started For Courageous Enterprises

Cognitive Search Delivers The Al Version Of Enterprise Search

Seek and you will find is not always true. More than half (54%) of global information workers are interrupted from their work a few times or more per month to spend time looking for or trying to get access to information, insights, and answers.¹ Do the math. That's a lot of inefficiency. But it's also a significant opportunity to dramatically increase employee productivity if search technology can return highly relevant results. Keyword-based enterprise search engines of the past are obsolete.² Cognitive search is the new generation of enterprise search that uses artificial intelligence (AI) to return results that are more relevant to the user or embedded in an application issuing the search query (see Figure 1).³ Forrester defines cognitive search and knowledge discovery as:

The new generation of enterprise search solutions that employ AI technologies such as natural language processing and machine learning to ingest, understand, organize, and query digital content from multiple data sources.⁴

FIGURE 1 Keyword Search Of The Past Has Evolved Into Cognitive Search



Cognitive Search Solutions Are Smarter, But They Must Also Scale

The value of search is always expressed in the relevancy and completeness of search results, but it must also have enterprises qualities. Cognitive search and knowledge discovery solutions should:

- > Understand any data that enterprises can throw at it. First and foremost, cognitive search solutions must connect to and ingest data from a wide variety of sources. Search is no longer just about unstructured text contained in documents and web pages. Cognitive search solutions can also ingest and process structured data contained in databases and even nontraditional enterprise data like images, video, audio, and machine data such as from internet-of-things (IoT) devices. A majority of the vendors evaluated in this Forrester Wave support more than 250 data types, and all of them have SDKs that customers can use to build custom data connectors.⁵
- > Scale to handle big data. It is not uncommon for a large enterprise to have a portfolio of hundreds or sometimes thousands of applications, potentially reaching over a petabyte of data stored on-premises or in the cloud. All these applications generate data that is potentially valuable for search applications. To handle this ever-increasing volume of data, these solutions employ distributed architectures.
- > Employ AI technologies. The distinguishing characteristic of cognitive search solutions is that they use natural language processing (NLP) and machine learning to understand and organize data, predict the intent of the search query, improve relevancy of results, and automatically tune the relevancy of results over time. AI is far from perfect, so all of these vendor solutions also provide tools that allow administrators to manually tune search results.
- Enable developers to build search applications. Search is not just about a text box on an enterprise portal. Enterprises are building search applications that embed search in customer 360 applications, pharma research tools, and many other business process applications. Virtual digital assistants such as Amazon Alexa, Google Now, and Siri would be useless without powerful search behind the scenes. Enterprises wishing to build similar applications for their customers will also benefit from cognitive search solutions. Vendors in this space provide SDKs, APIs, and in some cases visual design tools that allow developers to embed the power of the search engine in other applications.

Cognitive Search And Knowledge Discovery Evaluation Overview

To assess the state of the cognitive search market and see how the vendors compare, Forrester evaluated the strengths and weaknesses of the top vendors. After examining past research, user requirements, and vendor interviews and expert interviews, we developed a concise set of 23 evaluation criteria, which we grouped into three high-level buckets:



- > Current offering. We evaluated each product's technical architecture, breadth of data sources and human language support, and core cognitive search technology (such as NLP and machine learning). In addition, we assessed each product's administration and developer tools that help developers tune search results and build custom cognitive search applications. All evaluated products must have been publicly available by March 17, 2017.
- Strategy. We reviewed each vendor's strategy to assess its ability to compete and grow in the enterprise cognitive search market. Key criteria include Forrester's confidence in the vendor's ability to execute on its stated strategy and support current and future customers. We also assessed each vendor's product road map to evaluate how this will affect the vendor's future competitive position relative to the other vendors in this evaluation.
- **Market presence.** To determine each vendor's market presence, we evaluated the install base of paying customers, cognitive search-specific revenue, market awareness of the vendor's cognitive search solution, and partnerships with other technology and services firms.⁶

Evaluated Vendors And Inclusion Criteria

Forrester included nine vendors in the assessment: Attivio, Coveo, Elastic.co, HPE, IBM, Lucidworks, Mindbreeze, Sinequa, and Squirro. Each of these vendors has (see Figure 2):

- A comprehensive, differentiated cognitive search solution. The evaluated vendors must offer a solution designed for enterprises that can operate on large, diverse data sets; employ advanced analytics techniques like NLP to ingest, organize, and understand information; and provide tools for developers to create custom cognitive search applications. If a vendor offers a cognitive solution based in whole or in part on open source, the vendor must have value-added differentiation.⁷
- > A standalone cognitive search solution. We included only cognitive search solutions that are not technologically embedded in any particular application. Vendors should offer a focused, standalone product as defined by Forrester for the cognitive search category. For example, we did not include Microsoft and Oracle in this Forrester Wave because their search capabilities are embedded in other products and/or services.⁸
- > Install base and revenue history. Included vendors must have referenceable, large enterprise customers using the cognitive search solution and a proven, steady stream of revenue generated by customer adoption of the solution.
- Motivated client inquiries. Forrester clients often discuss the vendors and products through inquiries; alternatively, vendors may, in Forrester's judgment, warrant inclusion or exclusion in this evaluation because of market presence, lack of customer momentum, financial troubles, and/or absence of client interest.



FIGURE 2 Evaluated Vendors: Product Information And Selection Criteria

Vendor	Product evaluated	Product version evaluated
Attivio	Cognitive Search and Insight Platform	5
Coveo	Coveo Intelligent Search	
Elastic.co	Elasticsearch	
Hewlett Packard Enterprise (HPE)	HPE IDOL	11.3
IBM	Watson Explorer Advanced Edition, Watson Knowledge Studio	11.02
Lucidworks	Lucidworks Fusion	3
Mindbreeze	Mindbreeze InSpire	2017 Winter Release
Sinequa	Sinequa ES	10
Squirro	Cognitive Search	2.4.5

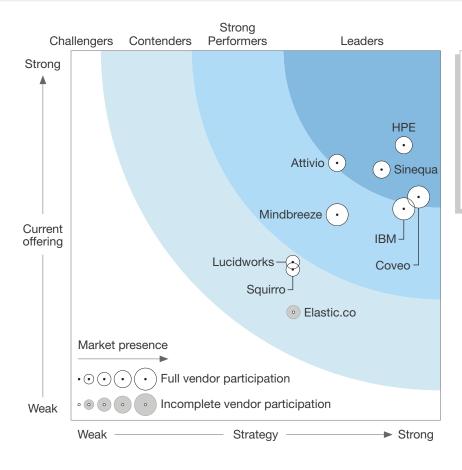
Vendor inclusion criteria

- **1. Comprehensive search, exploration, and knowledge discovery functionality.** Evaluated vendors provide a general tool that lets users search, explore, and discover new knowledge from structured and unstructured data residing in multiple sources such as file systems, databases, streams, APIs, and apps.
- **2. Big data.** The solution must be scalable to handle the data volume and variety of the world's largest enterprises and government agencies.
- **3. Self-service tools for users.** The solution must provide visual tools and/or user interfaces out of the box. Vendor solutions may also provide programming APIs or other tools to build custom solutions.
- **4. An original, cross-domain standalone solution.** The vendor must develop, market, sell, and implement its solution as a self-sufficient, general-purpose, big data search and knowledge discovery offering that does not need to be embedded in other applications. The products included aren't technologically or functionally focused upon particular functional or horizontal applications.
- **5.** Has sparked client inquiries and/or has technologies that put the vendor on Forrester's radar. Forrester clients often discuss the vendors and products through inquiries; alternatively, the vendor may, in Forrester's judgment, warrant inclusion or exclusion in this evaluation because of technology trends or market presence.
- **6. Consistent revenue history.** The vendor must have a proven stream of revenue generated by customer adoption of its solution.

Vendor Profiles

This evaluation of the cognitive search market is intended to be a starting point only. We encourage clients to view detailed product evaluations and adapt criteria weightings to fit their individual needs through the Forrester Wave Excel-based vendor comparison tool (see Figure 3).

FIGURE 3 Forrester Wave™: Cognitive Search And Knowledge Discovery Solutions, Q2 '17



FORRESTER RESEARCH
The Forrester Wave™
Go to Forrester.com
to download the
Forrester Wave tool for
more detailed product
evaluations, feature
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customizable rankings.

FIGURE 3 Forrester Wave™: Cognitive Search And Knowledge Discovery Solutions, Q2 '17 (Cont.)

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	Formeted timo	Attivi	o Con	Hen	et BN	Lució	Jworks Wind	integle Sine	Jua Squiro
Current Offering	50%	3.47	3.01	3.71	2.85	2.13	2.77	3.38	2.03
Architecture	20%	3.75	2.25	3.75	2.25	2.25	2.25	3.50	2.75
Data acquisition	20%	4.60	4.20	5.00	4.20	1.80	4.20	5.00	1.80
Search technology	40%	2.40	2.20	3.10	1.90	1.70	2.40	2.60	1.30
Application	20%	4.20	4.20	3.60	4.00	3.20	2.60	3.20	3.00
Strategy	50%	3.60	4.70	4.50	4.50	3.00	3.60	4.20	3.00
Acquisition and pricing	10%	3.00	5.00	3.00	3.00	3.00	3.00	3.00	3.00
The solution road map	30%	3.00	5.00	4.00	4.00	3.00	3.00	5.00	3.00
Ability to execute	30%	4.00	5.00	5.00	5.00	3.00	4.00	4.00	3.00
Implementation support	30%	4.00	4.00	5.00	5.00	3.00	4.00	4.00	3.00
Market Presence	0%	3.50	4.25	4.00	4.63	2.88	4.13	3.13	2.50
Vendor sizing	50%	3.00	3.50	4.00	4.25	2.75	3.25	2.25	1.00
ISV and services partners	50%	4.00	5.00	4.00	5.00	3.00	5.00	4.00	4.00

All scores are based on a scale of 0 (weak) to 5 (strong).

Leaders

> HPE IDOL can analyze whatever you throw at it. HPE doesn't think enterprise search should be limited to unstructured text. Its IDOL search platform supports intensive content analytics for speech, images, and video, too. IDOL's most recent enhancements include a question/answer capability that developers can use to build chatbots or virtual conversational assistants. The platform's comprehensive capabilities and customization can lead to complex implementations, but the company is working on streamlining installation for common use cases. Last year, HPE announced its intent to merge its software business segment, which includes IDOL, with UK-based Micro Focus; this merger is expected to close in the latter half of 2017. HPE customers include Dubai Police, Free State Of Saxony, Nottingham Trent University, and Von Ardenne.

- relevant to the person querying for them. Coveo's R&D focuses on using advanced analytics and machine learning to automatically learn the behaviors of individual users and return the results most relevant to them. Coveo also integrates deeply with Salesforce and can get customers up and running quickly in the cloud. The company has seen considerable success in providing context-relevant search for self-service product support for technology companies such as Adobe, Logitech, and Salesforce. Additional Coveo customers include Brocade Communications Systems, The Hershey Company, and TIBCO Software.
- Sinequa's comprehensive NLP is the path to cognitive understanding. Most search engine vendors start with indexing and then progress to content analytics. Not Sinequa. The company started with NLP because understanding both the search query and the content is the key to search relevancy and knowledge discovery. In addition to Sinequa's NLP and content analytics, the solution integrates with Apache Spark to leverage advanced analytics in the open source community. Sinequa focuses on high-value search applications that are embedded into critical business processes in industries such as pharma research, aircraft maintenance, and financial services. A Paris-based company, Sinequa opened an office in New York City two years ago and has successfully expanded in North America. Its customers include Airbus Group, AstraZeneca, Biogen, Engie, Mercer, and Nasdag.
- > Attivio builds comprehensive search applications. Attivio is designed to satisfy the world's most complex search applications, quickly. In addition to advanced analytics and machine learning necessary for a cognitive search platform, Attivio provides customers with solution templates such as knowledge management, anti-money laundering, customer 360, and more. A unique feature of Attivio is the ability of developers to use structured query language (SQL) to query the index. Attivio customers include Citi, Cisco Systems, HSBC, Sikorsky Aircraft, and Thermo Fisher Scientific.

Strong Performers

- IBM takes Watson Explorer to the hybrid cloud. The power of Watson Explorer is enhanced through its integration with IBM's Watson Developer Cloud for language, vision, speech, and data services. Now, Watson Explorer itself can be deployed exclusively in the cloud or in a hybrid deployment (both on-premises and in the cloud). Enterprises use Watson Explorer for a variety of use cases, including customer 360 search applications, claims processing, and enterprisewide search. IBM customers include Ceska Pojistovna, Korean Air, Mizuho Bank, and Toyota Financial Services.
- Mindbreeze is crowned king of search appliances. Last year, Google announced that it would discontinue its Google Search Appliance (GSA), leaving many enterprise customers feeling stranded and seeking alternatives. Mindbreeze is happily and vigorously taking up the slack with its InSpire search appliance. An Austrian company, Mindbreeze has had strong uptake in the European market since it launched the product in 2009. It has rapidly expanded into North America



and other markets by forging strong partnerships with system integrators who previously worked with GSA. But Mindbreeze is not simply a replacement for GSA; its strong enterprise features make it a competitor in the overall cognitive search market. Mindbreeze customers include Daimler AG, Lufthansa, ManpowerGroup, Public Storage, and T-Systems.

Contenders

- > Lucidworks is the open source choice. Lucidworks offers enterprise support for Apache Solr, the popular open source search platform. In 2014 Lucidworks released Fusion, a commercial product that builds on Solr to add enterprise search features, including more than 40 prebuilt connectors to applications (such as Salesforce, Slack, and Zendesk), an enhanced administration tool, and built-in machine learning capabilities to increase the relevancy of search results. Fusion works out of the box for most customers, but those with highly specialized needs (such as customer 360) can build specialized ingestion pipelines and user interfaces using the Solr and/or Fusion SDK. Lucidworks customers include Blue Cross Blue Shield, Red Hat, Reddit, Uber, and Wells Fargo.
- Squirro brings out-of-the-box search applications for business. Squirro is the new "swiss made software" kid on the search block. 10 Founded in 2013 and venture-backed, the Switzerland-based Squirro team is no stranger to search, having developed local.ch, a search site for all things Swiss. Squirro's unique positioning is to offer ready-to-run search applications for customer insights and service insights as well as a general-purpose cognitive search engine. Smartly, it leverages open source Elasticsearch as part of its platform, enabling it to focus on business search applications and enterprise features. Enterprises that need immediate customer 360 insights or service will appreciate Squirro's out-of-the-box readiness for fast implementation times. The company needs to support more general-purpose search capabilities, such as relevancy tuning tools and more data connectors, to be on par with the more mature vendors. Its customers include Brookson, Investec Asset Management, Swiss Re, and Wells Fargo.
- Elastic.co's key solution is for log analytics. Elastic.co is the company behind the vibrant open source projects Elasticsearch, Kibana, Beats, and Logstash. Elastic markets Elastic Stack as a product that can "reliably and securely take data from any source, in any format, and search, analyze, and visualize it in real time."¹¹ The company's market uptake has been largely by enterprises to analyze and search IT log files, but Elasticsearch is a general search technology that uses Apache Lucene to index data. While Elasticsearch lacks many enterprise features, such as relevancy tuning tools, enterprises or independent software vendors can use it to build a custom search engine or search applications. Elastic says that it is not in the enterprise search market, but many enterprise customers ask Forrester about Elasticsearch, so we have included Elastic as a nonparticipating vendor in this Forrester Wave. Its customers include eBay, Netflix, USAA, and Verizon Wireless.

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Supplemental Material

Online Resource

The online version of Figure 3 is an Excel-based vendor comparison tool that provides detailed product evaluations and customizable rankings.

Data Sources Used In This Forrester Wave

Forrester used a combination of four data sources to assess the strengths and weaknesses of each solution. We evaluated the vendors participating in this Forrester Wave, in part, using materials that they provided to us by May 2017.

> **Vendor surveys.** Forrester surveyed vendors on their capabilities as they relate to the evaluation criteria. Once we analyzed the completed vendor surveys, we conducted vendor calls where necessary to gather details of vendor qualifications.

- **Executive briefings.** An executive backed by a product team from each vendor presented and answered questions on the vendor's product strategy and market sizing.
- **Product demos.** We asked vendors to conduct demonstrations of their products' functionality. We used findings from these product demos to validate details of each vendor's product capabilities.
- > Customer reference calls. To validate product and vendor qualifications, Forrester also conducted reference calls with two of each vendor's current customers.

The Forrester Wave Methodology

We conduct primary research to develop a list of vendors that meet our criteria for evaluation in this market. From that initial pool of vendors, we narrow our final list. We choose these vendors based on 1) product fit, 2) customer success, and 3) Forrester client demand. We eliminate vendors that have limited customer references and products that don't fit the scope of our evaluation.

After examining past research, user need assessments, and vendor and expert interviews, we develop the initial evaluation criteria. To evaluate the vendors and their products against our set of criteria, we gather details of product qualifications through a combination of lab evaluations, questionnaires, demos, and/or discussions with client references. We send evaluations to the vendors for their review, and we adjust the evaluations to provide the most accurate view of vendor offerings and strategies.

We set default weightings to reflect our analysis of the needs of large user companies — and/or other scenarios as outlined in the Forrester Wave evaluation — and then score the vendors based on a clearly defined scale. We intend these default weightings to serve only as a starting point and encourage readers to adapt the weightings to fit their individual needs through the Excel-based tool. The final scores generate the graphical depiction of the market based on current offering, strategy, and market presence. Forrester intends to update vendor evaluations regularly as product capabilities and vendor strategies evolve. For more information on the methodology that every Forrester Wave follows, go to http://www.forrester.com/marketing/policies/forrester-wave-methodology.html.

Integrity Policy

We conduct all our research, including Forrester Wave evaluations, in accordance with our Integrity Policy. For more information, go to http://www.forrester.com/marketing/policies/integrity-policy.html.

Endnotes

- ¹ Fifty-four percent of global information workers said, "My work gets interrupted because I can't find or get access to information I need to complete my tasks" a few times a month or more often. Source: Forrester Data Global Business Technographics® Devices And Security Workforce Survey, 2016.
- ² See the Forrester report "Brief: Cognitive Search Is Ready To Rev Up Your Enterprise's IQ."
- ³ See the Forrester report "Artificial Intelligence: What's Possible For Enterprises In 2017."



- ⁴ Forrester formerly defined this category as: "Tools and technologies to support self-service extraction of information and new insights from large repositories of unstructured and structured data that resides in multiple sources such as file systems, databases, streams, APIs, other platforms, and applications." This Forrester Wave on cognitive search and knowledge discovery is a continuation of the category that is also commonly known also as enterprise search solutions. We have replaced "big data search" with "cognitive search" to emphasize that these solutions use AI technologies such as NLP and machine learning. See Forrester report "The Forrester WaveTM: Big Data Search And Knowledge Discovery Solutions, Q3 2015."
- ⁵ SDK: software development kit.
- ⁶ Some vendors in this evaluation also offer products in markets other than cognitive search. Our assessment for market awareness is based only on the market awareness of the vendors' cognitive search product, not the overall awareness of the vendor.
- ⁷ Vendors that provide Hadoop distributions often include or offer open source Solr search that can be used for search, but the solutions are not differentiated enough from the open source to be included in this Forrester Wave evaluation.
- 8 Microsoft embeds search as part of SharePoint and Office 365. Oracle embeds search in numerous applications, including its Big Data Discovery solution.
- ⁹ Source: Barb Darrow, "So Long Google Search Appliance," Fortune, February 4, 2016 (http://fortune.com/2016/02/04/google-ends-search-appliance/).
- ¹⁰ The "swiss made software" label represents Swiss values in software development. Founded in 2007, the organization has more than 400 members. Members are entitled to advertise their products and services with the "swiss made software" label; currently, more than 470 Swiss-made products and services are listed on their platform. The member companies are proud representatives of Swiss engineering and are committed to Switzerland as the place where they develop their software. Source: swiss made software (https://www.swissmadesoftware.org/).
- ¹¹ Source: Elastic.co (https://www.elastic.co/products).





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