

Lucidworks

Founded 2007 | HQ San Francisco, CA | 300 employees (approx.) | \$95M revenue (approx.)

Finding and delivering the right information at the right time within a business activity is surprisingly difficult to do, but Lucidworks has a lot of experience and deep technology to do just that.



The Company

Lucidworks was founded in 2007 and has raised \$200 million from investors since then. The company is headquartered in San Francisco and led by current CEO and former Chief Product Officer Will Hayes. It currently has around 300 employees, with offices in Seattle, Raleigh, London, Bangalore, and Hong Kong, and revenue around \$95 million. Lucidworks started out under the name Lucid Imagination and was the first major commercial proponent of open-source Apache/Lucene Solr enterprise search.



The Technology

Though rooted in, and still delivering, enterprise search, Lucidworks is one of the few search vendors that have moved beyond that core use case. Lucidworks is now leveraging its underlying search technology to build broader business applications, most notably for customer service, e-commerce, or product discovery and knowledge management. It is also one of the few enterprise search vendors

to truly embrace the potential role that machine learning (ML) and artificial intelligence (AI) can play in the enterprise.

At the technology level, every product from Lucidworks still runs on a backbone of Apache modules, most notably Solr (core search), Spark (big data analytics), and Zookeeper (server management). On top of this backbone, Lucidworks has built a series of core services to manage areas like security, conversational natural language processing (NLP), and alerts, scalability, and scheduling. Bundled together, this backbone and set of services make up the Lucidworks Fusion Server architecture. However, this report is specifically focused on the core services that provide ML capabilities that are bundled under the label Fusion AI.

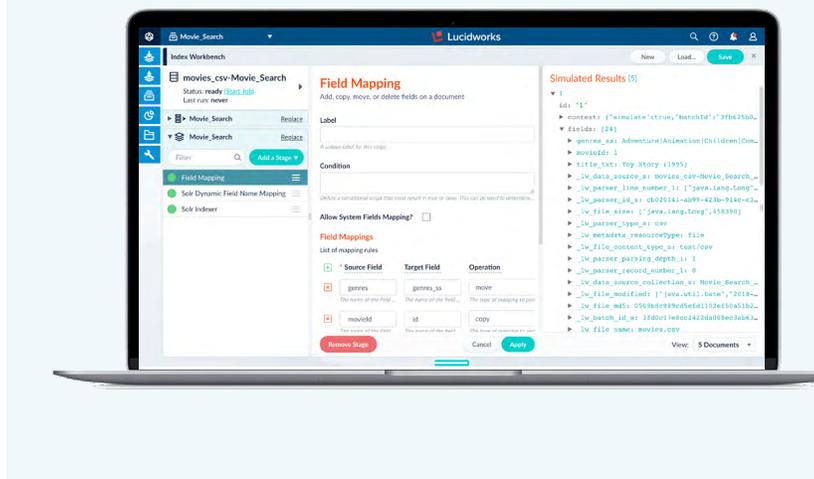
Most notably – and obvious in the Fusion AI bundling – are NLP capabilities, common in virtually all search engines. But Lucidworks is also providing semantic search that draws upon natural language understanding (NLU) frameworks in its system. So, what is different here is that though many search vendors utilize some form of ML, most typically through advanced NLP, few are being as ambitious as

Lucidworks is going beyond that and diving deeper into the use of deep learning and wider neural networks. There may only be a one-letter difference between the acronyms NLP and NLU, but there is a leap in complexity. NLP can in most cases recognize words, sentences, and language structures and turn them into machine-readable data. NLU takes this much further and aims to actually understand the meaning and intent contained in those sentences. Translate that into practical terms and you have an understanding of both your content/products and your customers' /users' questions, interactions, and needs.

The logic behind this type of semantic search capability has been around for years, but advances in AI, particularly vector-based deep learning models like Google BERT (bi-directional encoder representations from transformations), have accelerated its accuracy, depth, and speed. Lucidworks uses BERT and deep learning to power their "vector-based" system's own semantic capabilities. Important to note is that the use of ML/AI in Lucidworks is comprehensive across the lifecycle. ML is used both in the data ingestion stage and to classify at indexing, right through to predicting user intentions. So, what we have in Lucidworks is a well-established and highly scalable infrastructure, layered with advanced, end-to-end search and deep learning capabilities.

Where Lucidworks really comes into its own is in leveraging these AI capabilities at scale. Fusion Server and Fusion AI run in the cloud in a containerized, microservices, Kubernetes-orchestrated environment. This containerization framework means that the system can support and run across a wide range of compute and storage environments. That's important because most implementations of Lucidworks will be federated: in other words, run across a range of

Figure 1
Search UI Example



applications, databases, and storage networks to deliver a single, coordinated search result (see Figure 1). In addition to this scalability, Lucidworks supports over 60 different foreign languages via an add-on "Advanced Linguistics Package."

Lucidworks also deploys a set of pre-built applications that can be added on after Fusion is deployed. These include Predictive Merchandiser, which templatises product merchandising site zones and query pipelines for a smarter, more effective e-commerce experience. There's also Smart Answers, which deploys that deep learning, NLU methodology and applies it as a middleware layer for chatbot and virtual assistant optimization.

At a practical level, Lucidworks comes in three flavors:

- **Knowledge Management** – Employee and customer self-service, multilingual question answering, and federated search.
- **Customer Service** – Personalization and self-service call deflection via the use of chatbots, recommendations, and customer experience search.

→ **Product Discovery** – E-commerce search and personalization to guide shoppers around websites, provide recommendations, and implement analytics functionality.

Notably, in January 2021 Lucidworks announced a partnership with fellow open-source web content management veteran Acquia, to add e-commerce capabilities to Acquia's joint venture development with Commercetools.

Our Opinion

Enterprise search is a tough nut to crack. Everyone complains about it, but nobody wants to tackle the task of truly operationalizing it for maximum efficiency. The reason for this is in part the perception that enterprise search is a bundled functionality that comes with Microsoft, etc. and that it has never worked particularly well. So even though firms like Lucidworks can do a good job of improving complex enterprise search, it makes sense for the firm to focus efforts beyond search itself. The moves into e-commerce and customer

service and even knowledge management, where it can target profit centers within a business, make good sense for Lucidworks and could generate a lot of growth for the company. Finding and delivering the right information at the right time within a business activity is surprisingly difficult to do, but Lucidworks has a lot of experience and deep technology to do just that.

Advice to Buyers

Enterprise search technology is difficult to deploy and often even more difficult to maintain – any vendor that tells you otherwise should be avoided. Lucidworks has a lot of complexity under the covers and will require you to work with knowledgeable and most likely third-party experts to fully exploit its potential. But don't let that put you off. In our opinion, though Lucidworks can certainly still provide highly scalable enterprise search, its core capabilities make it an excellent foundation for building intelligent business applications that meet market needs and offer differentiation.

SOAR Analysis

Strengths

- Leveraging advanced deep learning models
- A long history in open-source search; the company "owns the code" for Solr

Aspirations

- Expand its presence in customer service
- Expand its application offerings

Opportunities

- Provide a platform to build intelligent knowledge management
- Provide a platform to build intelligent e-commerce product discovery

Results

- Exceptionally deep technology stack
- Large blue chip customer base

About Deep Analysis

Deep Analysis is an advisory firm that helps organizations understand and address the challenges of innovative and disruptive technologies in the enterprise software marketplace.

Its work is built on decades of experience in advising and consulting to global technology firms large and small, from SAP, Oracle, and HP to countless start-ups.

Led by Alan Pelz-Sharpe, the firm focuses on Information Management and the business application of Cloud, Artificial Intelligence, and Blockchain. Deep Analysis recently published the book "Practical Artificial Intelligence: An Enterprise Playbook," co-authored by Alan and Kashyap Kompella, outlining strategies for organizations to avoid pitfalls and successfully deploy AI.

Deep Analysis works with technology vendors to improve their understanding and provide actionable guidance on current and future market opportunities.

Yet, unlike traditional analyst firms, Deep Analysis takes a buyer-centric approach to its research and understands real-world buyer and market needs versus the "echo chamber" of the technology industry.

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