

The Search Engine War: Can Google Sustain the Lead?

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Abstract: Google had revolutionized the search engine industry. However, in a regulatory filing with the U.S. Securities and Exchange Commission, Google acknowledged, in unequivocal terms, the growing threat to its leadership in the search engine business. This open admission of threats signaled the intensifying competition in the search engine market. At the time, analysts questioned whether Google would be able to maintain its technological lead over its rivals. Additionally, they debated whether Google was putting all its eggs in one basket and if the company needed to look beyond search engines toward a more diversified business model. This case, published in 2005, discussed the strategic challenges Google faced at that time.

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“We face formidable competition in every aspect of our business, and particularly from other companies that seek to connect people with information on the web and provide them with relevant advertising. Currently, we consider our primary competitors to be Microsoft and Yahoo.”

- A statement in Form S-1¹ filed by Google Inc.² with the Securities and Exchange Commission of United States, on 13 August 2004.

The Prevailing Market Scenario

In a regulatory filing with the Securities and Exchange Commission of United States, Google Inc. acknowledged in unequivocal terms the increased threats to its leadership in the search engine business. The search engine giant named some of the companies that it perceived had the potential to threaten its own survival. The company declared, “There has been a trend towards industry consolidation among our competitors, and so smaller competitors today may become larger competitors in the future. If our competitors are more successful than we are at generating traffic, our revenues may decline [1].”

The open disclosure of the impending threats rendered a disappointing picture of the company that had been ruling the fiercely competitive search engine market ever since it gained the top slot in June 2000 with a billion-page index [2]. Google blamed market competition and its own company size as impediments to its growth. While stating the risk factors, the company categorically named Yahoo and Microsoft as the potential threats as they also ran portals and sold internet based advertisements. In the said filing, Google also mentioned Inktomi, AltaVista and AllTheWeb search engines as potential competitors. Yahoo had become the strongest competitor after it acquired Overture Services and Inktomi. Microsoft, the indisputable leader in the proprietary software market had introduced a beta³ version of its new search engine that worked in close integration with its own proprietary Windows operating system.

Owing to the massive increase in the intensity of competition and the number of competitors, it had become increasingly difficult for Google to maintain a steady growth. The withdrawal of some advertisements from the search listings had also affected the revenue of Google. “We expect that in the future our revenue growth rate will decline and anticipate that there will be downward pressure on our operating margin”, the company observed in the same filing.

The intense competition in the search engine market prompted the search engines to differentiate themselves in terms of technology as well as service offerings [3]. While, Google focused entirely on its technology, others like Yahoo focused more on their portal services. A few others (like AOL, a marketing-led organization) continued marketing their brands while farming out their technology to other search providers.

The Growth of Search Engines

The Internet saw a colossal rise in traffic ever since the first commercial online service was started by Delphi Internet Services. It was in July 1992 that Delphi opened up an email connection. Delphi offered full Internet service in November 1992 [4]. Limitations on commercial use of Internet disappeared when the National Science Foundation⁴ ended its sponsorship of the Internet backbone. AOL, Prodigy and CompuServe were among the first businesses to go online.

The increased dependence on electronic commerce saw a spurt in startup businesses setting up their own websites and shifting to click-and-mortar business model. The perpetual proliferation of online data and the increased dependence on e-business fueled the growth of search engines that derived most of their revenues through advertisements. Two kinds of navigation tools were popular: directory systems and search engines. The directory systems (like the one maintained by Yahoo) were entirely managed by human supervisors. They were highly extensive as they covered a wide range of topics. However, they were too costly on company finances, time consuming to build and also slow in improvement. Automated search engines that used complex

¹ **Form S-1** was used by US companies to register their securities offerings.

² **Google Inc.** was the largest search-engine service provider on the Internet.

³ **Beta** version of any software is a preliminary test version tried and tested by users.

⁴ The **National Science Foundation (NSF)** was an independent agency of the U.S. Government, established by the National Science Foundation Act of 1950. (www.nsf.gov).

algorithms based on link analysis⁵, key word analysis⁶, page ranking⁷ etc. were faster and gave more precise and elaborate results to the users.

Statistics revealed that 85% of the websites were discovered through search engines [5]. Yahoo, for instance, accounted for 50% of traffic to many websites. Search engines remained the next most used feature on the Internet after email and users continued using them to locate specific product or service.

Google.com: The Technology Behind

Google was the largest and the most versatile search engine on the Internet. In 2003, Around 55 billion searches were conducted by the users of Google from around the world. And by the end of 2004, Google carried a database of more than 8 billion pages. The search engine had a robust workload and query-processing abilities. Realizing the importance of a fast, scalable search engine, Google employed linked PCs to quickly find the results of a query. This resulted in faster response times, greater scalability and lower costs.

PageRank⁸ and Hypertext-Matching Analysis⁹ were the two technologies pioneered and used by Google to provide fast and accurate results. Besides, it employed special software robots called Spiders that built a list of important key words found in the millions of websites on the Internet (refer *Exhibit 1*). This process of automated listing was called web crawling. The movement of spiders across the web began from a popular website from where it indexed important pages following links within the site. This resulted in a chain movement as spiders went crawling across more and more pages indexing more and more links and keywords in the process. Spiders screened through the contents of various pages and created key search words that enabled online search users to find pages they searched for [6].

Google's Revenue Model

About 95% of Google's revenue generated from advertisements, primarily through its two popular offerings, AdWord and AdSense [7]. AdWord was a self-serviceable advertisement program that could be activated online with a credit card. Advertisers paid for text-based advertisements that appeared alongside search results under a special heading "Sponsored Links". The advertiser's text was prominently placed in the search listings of Google through its complex listing algorithm. An important feature of these sponsored links was that the advertisers could control their expenditures and paid only when a user clicked on their advertisements. They could comfortably set a daily budget for their everyday expenditure. Once it reached the limit, the advertisements no longer appeared. It was in some way one-to-one marketing [8].

In 2003, Google introduced its AdSense program that offered websites of all sizes a way to easily generate revenue through placement of highly targeted advertisements adjacent to their content. Google's AdSense technology analyzed the text on any given page and delivered advertisements that were appropriate and relevant, thus increasing the usefulness of a page and the likelihood that those viewing it would click on the advertisements presented.

The Search Engine Industry

⁵ **Link Analysis** was the analysis of the number and quality of the incoming links that pointed to a particular website. If a website was not linked to any other site, search engines ranked it lower for a specific search category.

⁶ **Keyword Analysis** was the process of identifying the most effective keywords/phrases that provided websites a higher rank in the search list. It helped website owners to invite more number of visitors to their sites.

⁷ Refer the next footnote.

⁸ **Page Rank** was a sophisticated technology that measured the relative importance of a web page in a search listing by solving a single equation that comprised more than 500 million variables and 2 billion terms. Page Rank worked on a quantitative voting scheme and interpreted a link from Page A to Page B as a vote for Page B by Page A. The relative importance of the page was then gauged by the number of referrals it received from other pages.

Google used **Hypertext Matching Analysis**⁹ to analyze the content of a web page so as to ascertain its relevancy for a given search term. The size of the search term on the web page, the content of the neighboring pages and all outgoing links were generally considered to decide the degree of relevancy for the given search term.

There were over a thousand search engines providing varying search results to online users. While most of them derived their revenues through advertisements and paid listings, a good many served as secondary service offerings to major portals like Yahoo. Sergey Brin, the co-founder of Google remarked in an interview with Reuters, "There's a new level of competition and we need to take it seriously. We're definitely seeing much more attention going to search from Microsoft and Yahoo [9]." Yahoo and Microsoft with their competitive technologies and stronger financial resources served as the two major competitors and they consistently vied to displace Google from its dominant position.

Desktop Search¹⁰ was emerging as a new battle ground for search engine providers. Google, Microsoft, Yahoo, America Online, Ask Jeeves and almost all major search engines came up with their own proprietary desktop search tools.

On the basis of a user satisfaction survey, the Annual e-Business Report brought out in August 2004 by American Customer Satisfaction Index (ACSI)¹¹ placed Search Engines in the highest category with a customer satisfaction score of 80 (on a scale of 0-100) among the three popular e-businesses. The other two viz. News and Information Sites and Portals scored 75 and 71 points, respectively [10].

Yahoo: The Leading Competitor

Yahoo had an intrinsic advantage over Google. Yahoo possessed a lot of billing or registration information on many users and hence they could easily localize the results. The company had not paid much attention to search services during its initial days. It perceived searching as a secondary service and outsourced it to other parties like Open Text, Alta Vista, Inktomi and eventually, Google. Yahoo pioneered the online commercial directory concept when it first launched the service in 1994 [11]. The company realized the importance of search engines in the late 90s when search engines gained prominence and started affecting e-commerce to a level that almost a third of online ad revenues were generated through them. However, the lure of greater profits in the portal business made it switch towards crawler based listings in October 2002, by outsourcing the service to Google. The purchase of Inktomi for \$235 million in late 2002 and subsequently Overture in October 2003 (for \$ 1.6 billion) made Yahoo nab the largest and the oldest of the commercial paid search services. This gave Yahoo 100 billion new users and the capability to promote its own internal search engine through innovative advertising solutions that competed with Google's AdWords and AdSense programs. Yahoo could integrate its search results with other content allowing it to sell its clients bundles of advertisements and services across search, email, content channels and the e-tailing sub-portal Yahoo Shopping. In February 2004, Yahoo scrapped its relations with Google and began using its own search engine instead. The Cable News Network (CNN), the leading media giant, replaced Google for Yahoo in May 2004 to provide algorithmic and paid results to its users [12].

To challenge Google's free G-mail service that offered 1 GB storage space to its users apart from intra-mailbox search facilities, Yahoo began offering "virtually unlimited storage" to its paid e-mail users and upgraded its free email service to 250 MB from the initial 4 MB. RSS (Really Simple Syndication)¹² was a new technology that was aggressively embraced by Yahoo to gain competitive advantage. Yahoo also worked on its yellow pages directory and shopping search engine. The Content Acquisition Program (CAP) allowed sites to submit their URLs for inclusion in the Yahoo index. This ensured that undiscovered content was included and crawler refreshed them in the index every 48 hours. Tim Cadogan, the vice president of Yahoo Search commented, "It reflects our desire to invest heavily to get more content into our search engine experience [13]".

The MSN Challenge

Microsoft was Google's second-most important competitor. It introduced a beta version of a new desktop search engine and came out with plans to develop additional features that could integrate web search with its own proprietary Windows operating system. Third-party software developers found it easy to reuse Microsoft's software or build their own packages atop them. Microsoft attached tremendous importance to integrative and

¹⁰ **Desktop Search** allowed users to use offline search services and find files, emails, and email attachments etc. stored anywhere in the PC hard drive. It had an in-built crawler that indexed words and compiled them in a database.

¹¹ The **ACSI** is produced by the University of Michigan, in partnership with American Society and CFI Group. ACSI's e-business concerns are sponsored by Foresee Results, an online satisfaction measurement firm.

¹² **RSS** was a method of describing news or other web content that is available for "feeding" (distribution or syndication) from an online publisher to web users (www.whatis.com).

cohesive functioning of all its products. To augment its search services, it incorporated additional non-web sources to improve its search results. Microsoft Encyclopedia, for instance, supplied results to queries seeking factual information. On the lines of Google's "I'm Feeling Lucky"¹³ Microsoft provided a "Near Me" button on its search interface. "Near Me" traced the IP address of the user's computer and supplied localized search results based on it. This feature, however, was US specific. The company was also working on a technology that could allow people to search from a toolbar on their browser.

Other Players in the Fray

Ask Jeeves, a PG Wodehouse inspired business based in Emeryville, California, had its own search engine Teoma [15]. The technology provided smart search features that lent access to weather forecasts, stock quotes, news headlines etc. The search site offered various specialized search options apart from effective categorization facilities. It also offered the options to edit, to categorize and to annotate both saved searches and search history.

Vivisimo, a Pittsburg based company came up with a clustering technology, that could classify search results based on clustering and metasearch¹⁴ technology [16]. The company made active use of business intelligence and data mining techniques to explore its database and to bring out the veiled and hidden relationships therein. Despite a negligible share in the search engine market Vivisimo was able to achieve high quality results on any type of textual content with little or no customization. Raul Valdes Perez, the cofounder of Vivisimo commented, "If the Internet is a giant bookstore in which all the books are piled randomly on floor, then Vivisimo is like a super-fast librarian who can instantly arrange the titles on shelves in a way that makes sense."

Eurekster Inc., a startup launched in January 2004, specialized in providing highly personalized search results to users through its proprietary SearchParty¹⁵ technology [17]. Its search engine was capable of analyzing the search behavior of its users and supplied results based on their preferences and interests. Shaun Ryan, vice president of business development for Eurekster in New Zealand remarked, "At the moment, when you search on Google, everyone gets the same results for the same keywords. We try to personalize those results".

Factiva, a Dow Jones and Reuters company provided global content, including newswires from Dow Jones & Reuters and The Wall Street Journal. It offered a personalized single content solution with multiple language interfaces from archives of 9000 news sources. Thus, an engineering team got highly technical results while a marketing outfit got consumer friendly documents. Clair Hart, Factiva's chief executive mentioned, "People don't want to be spending time searching and looking for things. They want to be spending the time analyzing the information [18]".

Groxis Inc., founded in 2001, created Grokker, a knowledge mapping and information visualization tool that provided robust information collection, management and delivery solutions for individual users, e-businesses, research organizations and enterprises [19]. Grokker not only sorted search results into categories but also "mapped" the results in a holistic way, showing each category as a colorful circle. Within each circle, subcategories appeared as more could be clicked and zoomed in on. R J Pittman, the chief executive of the company remarked, "Search has to evolve. It can't just be Google sitting there with a stash of places they've crawled on the web. People are becoming more astute and demanding better results, and they're demanding a more powerful search experience. People like to get a landscape of information once they've found out there's one available [20]."

Amazon Bookstore also developed its own search engine A9.com that gave customized results to the users [21]. The search site had indexed book contents and offered plenty of other useful, advanced features. It was becoming a popular search site amongst researchers and serious information seekers.

The industry saw many other players who also offered compatible services on competitive pricings. There was a marked tendency amongst the smaller players to categorize their market on the basis of differentiated service or distinctive search technology. All this coupled up in making the industry vibrant and highly service sensitive.

Prospective Scenario – The Road Ahead

¹³ **I'm Feeling Lucky** took the Google users to the first webpage listed in the search listing for a given keyword.

¹⁴ **Metasearch** involved retrieval of consolidated search results by querying multiple web search engines.

¹⁵ **SearchParty** was a proprietary service offered by Eurekster wherein users could avail personalized search services by forming online communities.

The emergence of new players with newer technologies and innovative service offerings made it increasingly difficult for Google to maintain its stronghold in terms of market share as well as mindshare. Whether it was paid inclusion, paid search or contextual advertising, the online budgets followed an upward trend. Nate Elliot, an associate analyst at Jupiter Research¹⁶ expected the search engine business to hit revenue of \$4.3 billion by 2008 [22].

A survey in 2004 by market research firm Vividence, indicated that Google's search results were not distinctly superior to that of its rivals [23]. While searching for the leading cause of death for people in the age group of 25 to 34, Google gave 55 percent accurate results, the results of rival companies fluctuated between 52 to 54 percent. Peter Watkins, Vividence's chief executive, commented, "The search engines all return roughly the same results". Vividence further claimed that Google trailed behind its rivals in encouraging people to click on advertisements which were also the search engine's primary source of revenue.

Google had sustained its leadership in the search engine market through continuous innovations and incremental addition of newer, more user-friendly features (see *Exhibit 3* for various services offered by Google).

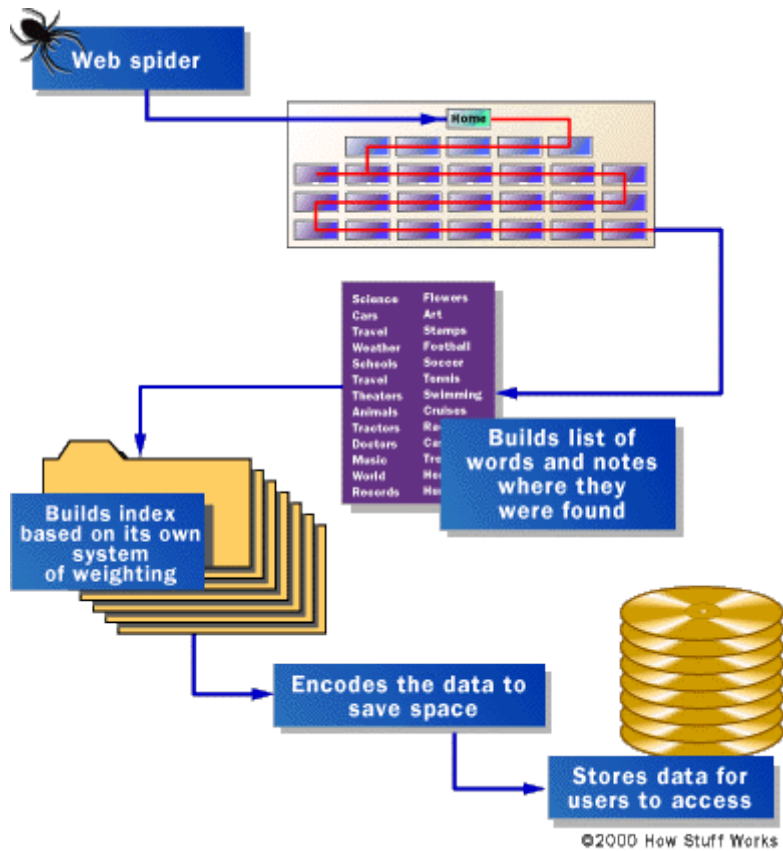
For instance, Google had plans to make search a platform-free service so that users could have access to information from anywhere and any device, regardless of the operating system. This posed a serious threat to Microsoft as it affected the crux of Microsoft's business policy: control of user experience through its proprietary desktop operating systems.

Google had always focused on its users. The company had pioneered innovations that not only reinforced its positioning in the market but also yielded alternative models of revenue. However, in spite of all advancements in its highly complex search technology, the company kept the search interface characteristically simple for users.

But as 2005 got underway, analysts wondered whether Google would be able to maintain its technological lead over its rivals. Was Google putting all its eggs in one basket? Did Google need to look beyond search engines and build a diversified business model?

¹⁶ **Jupiter Research** was involved in business research and analysis to help companies profit from the Internet and other emerging technologies.

Exhibit 1
The Working of a Search Engine Spider



Source: <http://computer.howstuffworks.com/search-engine.htm>

Exhibit 2
Overall Share of Visits to Top 25 Search Engines and Portals, April 2004

Name	Share
Search-Specific Visits	42.4%
Portal Visits	46.8%
Visits to Rest of the Sites	10.8%
Total	100.0%

Source: Search Engine Watch.com, <http://searchenginewatch.com/reports/article.php/3099931>

Exhibit 3
Some of the Major Online Services Offered by Google (Dec. 2004)

SERVICE OFFERINGS	BRIEF FEATURES
Google Alerts	A user could receive automatic email updates on the basis of registered search terms, information type and frequency.
Google Catalogs	This service offered users the convenience of searching online mail-order catalogs. It was a non-commercial offering as Google did not have any association with the vendors.
Google Directory	It was an integration of Google's sophisticated search technology with the Open Directory ¹⁷ pages.
Froogle	Froogle focused on product search through which users could search for products and locate stores in their neighborhood. One could also make product comparisons.
Google Groups	A group could open a homepage with Google and perform discussions online through announcement lists, mailing lists etc.
Google Image Search	One could search over 880 million images indexed for viewing.
Google Local	Provided search services for local stores and services through postal codes or names of towns or cities.
Google News Search	This service presented information from over 4500 news sources worldwide. The most relevant news was presented first.
Google Scholar	Enabled specific search for research papers, theses, books, abstracts, preprints, technical reports etc.
Google Wireless	Users could search the entire world wide web from their mobiles apart from 5 million pages of the "mobile web" created specifically for wireless devices.
Google Suggest	An advanced service from Google that automatically offered users a list of popularly used, related search terms by simply entering the first one or two keywords.
Google Toolbar	The web could be searched with Google from any site by typing keywords instead of URLs.
Google Translate Tools	One could search for web pages in a specific language or a country. Apart from it, the tool also offered translation services.

Source: <http://www.google.co.in/options/index.html>

Exhibit 4
Nielson/Net Ratings for SearchEngineWatch.com

Search Destination	Audience Reach ¹⁸
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¹⁷ The **Open Directory Project** was the largest, most comprehensive human-edited directory of the Web. It was constructed and maintained by a vast, global community of volunteer editors. (<http://dmoz.org/about.html>).

Google	41.6
Yahoo	31.5
Microsoft	27.4
AOL	13.6
Ask Jeeves	7.0
Overture	5.1
MyWay.com	4.4
Information.com	4.0
Lycos	3.7
WebSearch.com	3.7
InfoSpace Networks	3.1
Netscape Search	3.0
AltaVista.com	2.7
Microsoft.com	2.5
HighBeam.com	2.3

Source: <http://searchenginewatch.com/reports/article.php/2156451>

Exhibit 5
Search Engine Global Usage Share (in %), January 2003

Google	54.7
Yahoo	22.1
MSN Search	9.5
AOL Search	3.7
Terra Lycos	2.8
AltaVista	2.5
Ask Jeeves	1.5

Source: <http://www.link2city.com/search-engine.htm>

Exhibit 6
Most Popular Word Phrases (in %), April 2003

2 word phrases	29.22
1 word phrase	24.76
3 word phrases	24.33
4 word phrases	12.34
5 word phrases	5.43
6 word phrases	2.21
7 word phrases	.94

Source: <http://www.link2city.com/search-engine.htm>

¹⁸ **Audience Reach** was the percentage of US home and office internet users who used a particular search service at least once a month.

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