Market Research of Commercial Recommendation Engines for Online and Offline Retail

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ABSTRACT

In the era of big data and predictive analytics, recommendation systems or recommendation engines that recommend merchandise or service offerings based on individual preferences have had a revolutionary impact on retail businesses by making "personalization" a reality. As recommendable engines enable retailers to develop an unprecedented 360 degree understanding of their consumers at an individual level, retailers that are early adopters of recommendation engine technologies have gained competitive advantages with sales increase, targeted marketing and customer loyalty. This thesis aims to conduct a comprehensive research of the market for commercial recommendation engines in both online retail and offline retail. The market research covers industry situation overview, market size, industry trend, competitive landscape, major vendors of recommendation engines and their differentiated technologies. This thesis also investigates into the unaddressed customer needs based on the voice of recommendation engine customers and proposes corresponding solutions. As recommendation engines have been widely accepted and proven effective in online retail, this thesis explores how recommendation engines, in combination with other big data technologies, can be used to transform the brick and mortar offline retail.

KEYWORDS

Recommendation algorithms, recommendation engines, recommendation systems, onmi-channel personalization technology, data management platforms, online retail, offline retail, digital advertising, e-marketing, social log-in, point of sales, mobile payments, geo-location targeting, digital wallet, natural language processing, data aggregation, data warehouse, and data normalization

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CHAPTER 1 INTRODUCTION

Recommendation systems have been one of the most important innovations in the retail business. Recommendation systems, which consist of computational algorithms that can learn from a customer's preference and automatically generate personalized product or service recommendations based on specific knowledge of the customer. Knowledge of the customer is built upon a variety of data sources across different platforms and channels such as first-party customer behavioral data from retailers' e-commerce website and mobile apps, in-store transaction history at the point of sales, and third-party data such as social media impressions, Internet cookies and search engine activities.

Applications of recommendation systems have transcended customers' shopping experience. Studies have shown that recommendation systems bring in anything between 10% - 30% of additional revenue for a company.[1] Early adopters of recommendation engine technologies such as Amazon and Netflix have outperformed their competitors by leveraging the unparalleled customer insights generated by their proprietary recommendation systems. Wide adoption of recommendation systems in online retail are facilitated by low up-front costs whereby third-party providers of recommendation systems agree to a software-as-a-service model by charging these retailers a monthly service fee.

Besides personalized product recommendations, recommendation engines also empower targeted marketing at an individual level across virtually all marketing channels. Retailers can tailor their advertising messages and promotional offers based on individual customer preferences. Personalized marketing and product recommendations have proven to be particularly effective for multi-channel retailers and are most evident in retailers' loyalty programs.

As recommendation system transcend shopping experience and transform the way how retailers think of retail, this thesis provides a comprehensive market research on the market of recommendation systems in both online and offline retail. Chapter 2 investigates into the industry competitive landscape of online recommendation systems. Chapter 3 provides a detailed business and technology analysis of major vendors of recommendation engines in online retail. Chapter 4 examines the unaddressed needs of users of recommendation engine. Chapter 5 proposes potential solutions that correspond to unfulfilled customer needs. Chapter 6 explores how online recommendation engines, along with other new technologies, bring value to brick and mortar stores and change the future of offline retail. Chapter 7 synthesizes all the different pieces of market research and concludes the key takeaways for retailers that seek to benefit from recommendation systems.

CHAPTER 2 COMPETITIVE LANDSCAPE OF COMMERCIALISABLE RECOMMENDATION ENGINES FOR ONLINE RETAIL

INDUSTRY PLAYERS

Globally, there are at least hundreds of companies providing recommendation engine services to businesses, mostly to online retailers. In the US, 44 recommendation engine providers have built a solid customer base[2]. Among the 44 companies, the market leaders of recommendation engines in 2013 include: RichRelevance, Baynote, Monetate, and Certona. This paper provides an in-depth analysis of each of these four players in the *Competitor Analysis* section.

TOTAL ADDRESSABLE MARKET

Online Retail: According to *eMarketer*, worldwide online sales surpassed US$1 trillion for the first time in 2012, an increase of 21% from 2011. This $1 trillion sales figure includes online retail sales, travel sales ($119 billion) and digital downloads. Of the US$1 trillion sales figure in 2012, US online sales contributed $343 billion and Amazon alone accounted $51.7 billion, or 5.1% of total worldwide online sales. Worldwide online sales are projected to reach US$1.298 trillion in 2013[3].

Digital advertising: Digital advertising market in the U.S. reached $37.3 billion in 2012, accounting for 24% of all advertising spending in the US. Google alone accounted for 41.3% of total US digital advertising revenues in 2012. Digital advertising spending is projected to rise 16.6% in 2013 and experience double digit growth in 2014.

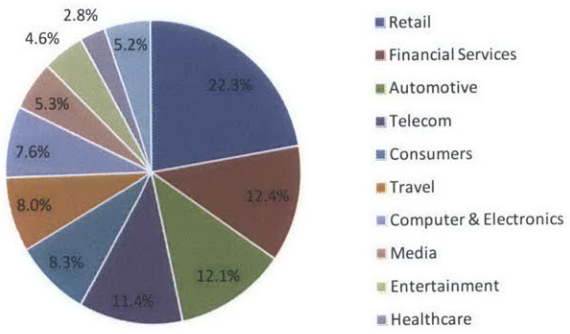


Figure 1 US $43 Billion Digital Advertising Spending by Industry

MARKET PENETRATION AND BARRIERS OF DEPLOYMENT

Currently, there is no industry statistics on the total market size for recommendation engines. According to a professional market research conducted by *Econsultancy* on behalf of leading recommendation engine provider Monetate, 94% of companies agree that personalization is critical to current and future success. While personalization is very much on the agenda for many marketers (with many already reaping the benefits), most are slow in implementation. 56% of companies are not personalizing the web experience for visitors, while only 4% say that customer experiences are 'very' personalized. Only 15% of all companies surveyed agree that they are "definitely" getting good return on investment (ROI) from personalization[4].

The two largest barriers to adopting personalization are technology-based (47% attribute to IT roadblocks and 46% attribute to legacy technology), and disparate data is another major problem to implementation of recommendation engines. 57% of the companies surveyed don't use CRM for personalization. According to supply-side respondents (i.e. i.e. those working for agencies and vendors), lack of knowledge (54%) and inability to translate data into action (51%) are the two most apparent barriers to personalization, whereas legacy technology and IT roadblocks are not seen as being as problematic as their client-side counterparts suggest.[5]

In terms of market penetration of recommendation engines among Forrester's *2013 US Top 500 Internet retailers*, 76.4% use product recommendations, but only 47% offer site personalization based on individual shoppers' known interests and attributes. 38.8% of the 500 sites claim that they use both product recommendation and site personalization technologies[6].

Recommendation Type	Web-only Retailers	Retail Chains	Catalog/ Call Centers	Consumer Brand Manufacturers
Site Personalization	40.5%	53.2%	72.3%	37.9%
Product Recommendation	74.4%	79.7%	81.5%	68.2%
Both	33.3%	45.6%	46.9%	28.8%

Table 1: Penetration of Recommendation Engine Technologies among US Top 500 Internet Retailers

BUSINESS MODELS FOR RECOMMENDER SYSTEMS

Brokerage: Recommender systems can serve as brokers by bringing shoppers and retailers together, facilitating transactions and charging a commission fee for each transaction enabled by the recommender system. The fee

can be based on indicators such as improvement of a site's conversion rate. Comparing the performance of a site with and without the recommendation system, providers of recommendation engine can determine a percentage to be charged for each facilitated transactions.

Web advertising model: A recommendation engine that provides interface and content personalization to end customers is likely to profit from a web advertising model. TripAdvisor is a good example. Due to its pay-per-click targeted placement of links to travel products and services, TripAdvisor extends the reach of many travel business vendors to consumers who are researching a trip to a particular destination on TripAdvisor.

Contractor model: A recommendation engine provider can work as a contractor for a retailer to build a highly customized recommendation engine. The drawback of such contractor model is that there will be minimal recurring revenues for the recommendation engine provider in the future.

Software-as-a-Service (SaaS): SaaS model is predominantly used by recommendation engine providers because it is best received by the target customers, who are not technologists but marketing or business professionals. In an online retailer website, the retailer will pay a percentage of the incremental revenue derived from recommendations. Because vendors of recommendation systems count on their clients' success for revenue, vendors are motivated to provide excellent customer service. This takes the form of initial deployment, training, and then quarterly optimization reviews. Dominant market players RichRelevance, Certona, Baynote, and Monetate all adopt the SaaS model.

RECOMMENDATION TYPES AND STRUCTURE

Recommendation types can be either in consumer terms (i.e. *"consumers who viewed this bought that")* or in terms of technical capacities (i.e. *"can the algorithms associate users with items").* Broadly speaking, clients are aware of eight types of recommendations[7]:

- Rules driven: choice of recommendations is entirely dependent upon a rule. For example, top-selling items in this category. There is no algorithm involved.
- Rules modified: an algorithm selects recommendations, but rules constrain the recommendations that are shown (i.e. *"always show recommendations from same category as item being viewed".*
- Recommendations for Facebook, Twitter and other social media: a visitor is matched with people with similar behavior, who are recommended as friends
- Recommendations based on ratings or reviews submitted by users: users ratings that indicate likes and dislikes become criteria for selecting recommendations

- Ad-word based: the ad the user has clicked on is factored into the recommendation (i.e. *"people like you who arrived by clicking on a Google ad for…usually ended up buying one of these…")*
- Internet search term based: what the user has searched for is factored into the recommendation
- Syndicated recommendations: recommending items from another retailer's catalog
- Collaborative recommendations: a merchant recommends products that match the customer's interest at other retailers, based on cross-matching activities on both sides (i.e. *"people who bought a digital camera also bought Adobe Photo at adobe.com")*

Recommendation Types	Avail	Baynote	Certona	Adobe	RichRelevance
Rules driven	☺	☺	☺	☺	☺
Rules modified	☺	☺	☺	☺	☺
Recommendations for social media (i.e. Facebook)		☺			
Recommendations based on ratings submitted by users	☺	☺	☺	☺	☺
Ad-word based	☺	☺	☺		☺
Internet search term based	☺	☺	☺		☺
Syndicated recommendations	☺		☺		☺
Collaborative recommendations	☺		☺		☺

Recommendation Structure	Avail	Baynote	Certona	Adobe	RichRelevance
Item-item	☺	☺	☺	☺	☺
Many items-many items	☺	☺	☺		☺
User-user	☺	☺	☺		☺
Item(s)-user(s)	☺	☺	☺		☺
Heuristics based on behavioral data	☺	☺	☺		☺

DEPLOYMENT OF COMMERCIAL RECOMMENDATION SYSTEMS

The initial deployment of recommender system can take place within days or weeks. First, the client and the vendors work to establish a strategy for recommendations based on business goals. Then, they determine where and in what form to apply recommendations. Recommendation engine vendors guide clients in selecting recommendation types, establishing rules to control the recommendation engine (i.e. prioritize heart-shape items before Valentine's Day), specifying where on the page what type and number of recommendations will appear,

and specifying the default for recommendation if the selected algorithm is unable to recommend items. Next, the clients will provide information about the content items through a data feed or crawl. This information is usually updated daily or weekly by FTP. The vendor will add snippet of listener code and the client's IT staffs will add them on each web page and email. Finally, the web page coding defines where on the page the recommendation appears. Recommendation engine vendors usually supply examples of the web page coding.

INTEGRATIONS OF RECOMMENDATION ENGINES

There are two key metrics of measuring easiness of integration. One is the amount of time it takes for the recommendation engines to be fully usable. RichRelevance has raised the bar of integration for large enterprise customers. RichRelevance's largest retailer integrations are completed within 4 to 6 weeks (or some even as fast as 2 to 3 weeks, depending on individual variables). The other metric is the variety of integration methods offered by recommendation engine providers. To facilitate easy integrations, many recommendation engine providers use a range of open, industry standard algorithms with which any commercial analytics person will be familiar. Coupled with an open, component based architecture, this ensures retailers that they can integrate the application into all of its customers' point easily and that the application meet retailers' corporate style requirements and fit the local cultural preferences of respective country and customer base. However, it is worth mentioning that the easiness of integration largely depends on the clients' data collection mechanisms.

	Avail	Baynote	Certona	RichRelevance
Integration Methods	• JavaScript • Web Services API • File-based uploads	• REST • XML • Batch file upload or direct JavaScript injection onto page	• Web Services • Client-side JavaScript • JSON	• JavaScript • JSON • HTML • Web Services API • REST

Table 2 Integration Methods of Leading Recommendation Engine Vendors[8]

INDUSTRY TREND AND OBSERVATIONS

- Personalization is the fastest growing technology invested by retailers and is online retailers' next battle ground beyond "*wisdom of the crowd*" type of recommendations.

According to the *Internet Retailers's New Top Tech 2014*, among the 28 categories of technology and services invested by top 1000 online retailers, personalization is the fastest-growing technology category with a customer base that grew 68% from 201 in 2012 to 337 in 2013[9].

Web consumers are used to concepts such as "*users who purchased X also purchased Y.*" Where Internet retailers are investing now is in more specialized technology that helps them to better target their customers, extend their reach to more mobile, social and marketplace shoppers, and analyze buyer behavior.

There are three criteria that are increasingly important in personalization. First, compared to just targeting or segmenting people by groups or parameters, great product and content personalization are made with a technology that can identify customers at the individual level, by their past and current behaviors and explicit feedback, and then make recommendations based on that data. The second element is intelligent algorithm. Many companies claim to have patented or "out-of-the-box" algorithms, but a great recommendation engine provider should learn a retail business and help define and leverage the combination of algorithms that works the best for each of the retailer's patrons.

- Marketers evaluate recommender systems not on their algorithms but on how well the vendor's expertise and interfaces will support achieving business goals.

Purchase decisions of commercial recommender systems are made by marketing team professionals. The IT team does not come into the picture until much later, often not until the marketing has made decision. The focus of the sales conversation is business benefits and support for sales and marketing people. Business people want to minimize upfront investments, hear how the solution will improve revenues and how quickly they can achieve results. Moreover, marketing executives demand solutions tailored to their industries (i.e. investment services, magazines, and travel). Therefore, none of the established vendors focus on pitching the superiority of their algorithms on their company websites, brochures or sales demo videos. The key sales messages emphasize on the impact the recommendation engine has cast on respective existing customers and their customer diversity.

- Three decreasing cost trends enable recommendation engines to scale economically and effectively:
  Lower data storage cost: $500 buys a large volume of space on Amazon's cloud. It's the equivalent of what would have cost hundreds of thousands of dollars ten years ago. In short, big data has become cheap storage.
  Lower cost of software: The software that enables companies to manage a large amount of data used to, and still does, run into the millions of dollars. However, thanks to the open source software, programs such as Hadoop

and Druid are monetarily free. Although it takes time to develop, the overall cost of ownership has decreased. This abstraction has enabled smaller teams to tackle much bigger opportunities, like recommendation engines.
Lower cost of data: Customers, in part driven by smart phone usage, release large volumes of data. So not only is more data generated in more places, but it's more available to more people in more places.

- Deploying personalized recommendation in omni-channel retail

  Omni-channel retail is a new buzz word in personalized recommendation. It describes an integrated sales experience that melds the advantages of physical stores with the information-rich experience of online shopping. The goal is the bridge the gap between online and offline retail experiences. Omni-channel personalization lets retailers personalize the customer experience across multiple channels such as physical stores, web, social media, smart phones, and emails.

  Best practices of omni-channel retailing include: (1) embrace all interactions (i.e. customers clicking on a link in an email campaign or contributing a product review), (2) personalization has to be real-time and dynamic, and (3) personalization recommendations should be reviewed and re-modeled frequently to address shoppers' changing behavior and intent.

  Recommendation solution providers are increasingly incorporating social networks and location (i.e. geosocial networking) information into recommendations. Many businesses are missing out potential interactions they can have with customers because they have not integrated social networks or social media platforms in various channels where recommendation engine can be deployed. Geosocial networking is a type of social networking in which geographic services and capabilities such as geocoding and geotagging are used to enable additional social dynamics. User-submitted location data or geolocation techniques can allow social networks to connect and coordinate users with local people or events that match their interests. Geolocation on web-based social network services can be IP-based or use hotspot trilateration. For mobile social networks, texted location information or mobile phone tracking can enable location-based services to enrich social networking[10].

  Geosocial networking allows users to interact relative to their current locations. Web mapping services with geocoding data for places (streets, buildings, and parks) can be used with geotagged information (meetups, concert events, nightclubs or restaurant reviews) to match users with a place, event or local group to socialize in or enable a group of users to decide on a meeting activity. Popular geosocial applications like Yelp, Gowalla, Facebook Places and Foursquare allow users to share their locations as well as recommendations for a locations or venues.

In disaster scenarios, geosocial networking can allow users to coordinate around collaboratively filtered geotag information on hazards and disaster aid activities to develop a collective situational awareness through an assembly of individual perspectives. This type of geosocial networking is known as collaborative mapping. Furthermore, geolocated messages could assist automated tools to detect and track potential dangers for the general public such as an emerging epidemic. Additionally, geosocial networking has political applications, as it can be used to organize, track, and communicate events and protests. For example people can use mobile phones and Twitter to quickly organize a protest event before authorities can stop it.

CHAPTER 3 COMPETITOR ANALYSIS

BAYNOTE

Baynote Overview

Baynote was founded in 2004. It is headquartered in San Jose, California, with offices in the UK and Germany. Using Baynote's patented approach, retailers are able to understand buyer intent "in the moment" across the shopping experience to deliver compelling offers, content and product recommendations that increase engagement, conversion and average order value. Baynote quickly integrates with existing websites, onsite search, chat or email systems to increase ROI without deep IT involvement or expensive system upgrades. According to CapitalIQ, Baynote has about $7.1 million of annual revenue and approximately 55 employees.

Baynote's Technology Differentiations

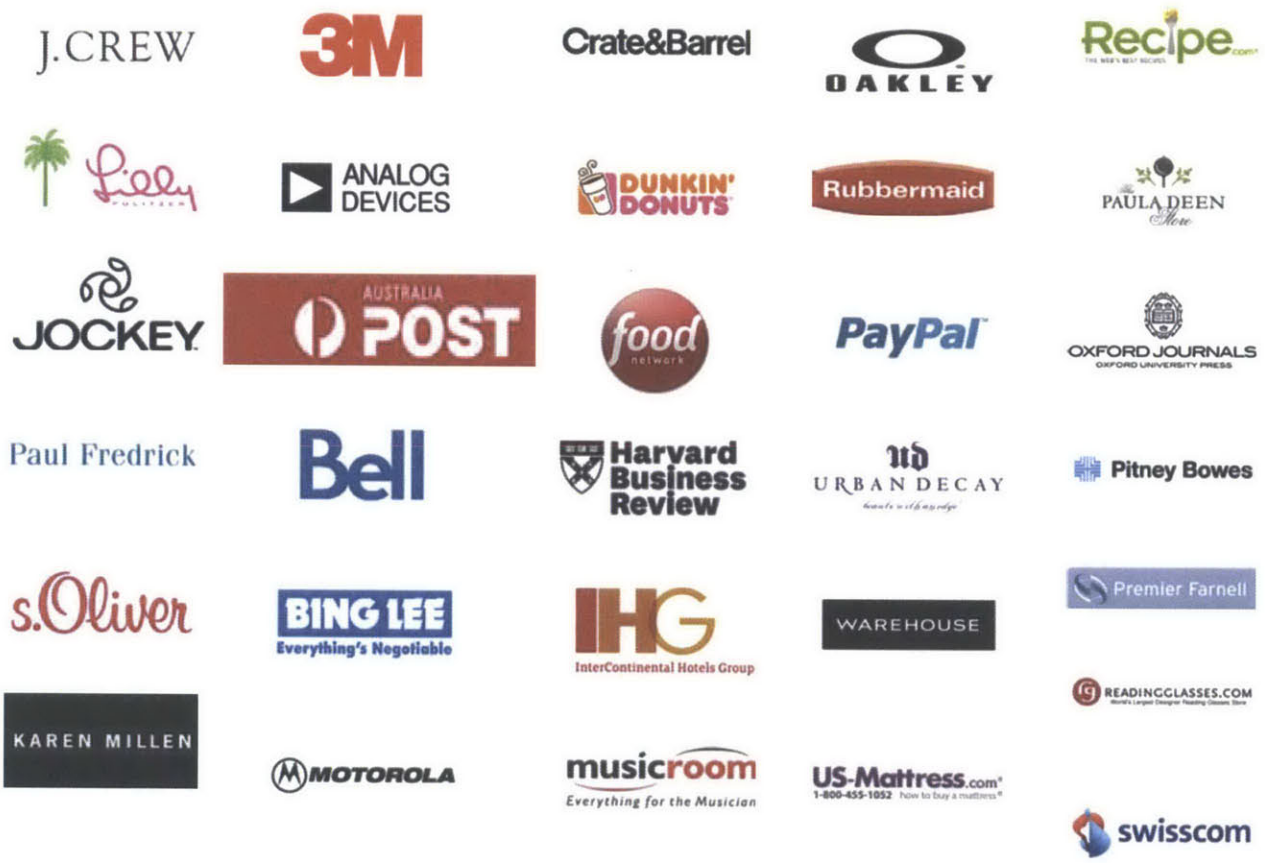
The key strengths and differentiators of Baynote are its target market and supported applications, *UseRank*'s impressive engagement-measuring heuristics, and the ability to preview the impact of changes to rules controlling recommendations.

Baynote's *UseRank*®, a patented technology, combines three concepts – engagement, context and like-minded peers in a patented mathematical modeling technique called "neuro prediction". The core of *UseRank*, an expertise or knowledge index, does an exceptionally job in tracking the behavior of website visitors. *UseRank* considers time spent on a page, scrolling behavior, number of page visits, click paths, when a shopper left a page and what on-page actions they took. By observing engagement patterns, Baynote tracks the affinities that develop between a search term and product or content. Finally, Baynote identifies other users who share interest in the same context and form a group of like-minded peers.

The invention *UseRank* produces useful, timely, cross-application, expertise-based search and navigation results. *UseRank's* inventors have discovered a set of unique approaches to enterprise search that is different from all existing information retrieval (IR) based solutions, such as Verity, Autonomy, FAST, Endeca, and Google Appliance. The invention provides a technique that can work standalone or embed itself in other applications via a plug-n-play interface with minimum effort. The result is a huge improvement in search usefulness, relevancy, search federation across applications and cost savings. Based on the *UseRank* technology, Baynote has also invented an intent-centric approach to personalized recommendations.

Baynote's Customers

In its eight years in business, Baynote has accumulated more than 300 customers, 12 of which are fortune 500 customers. The company serves consumer brands, footwear and apparel, housewares and hard goods, specialty retail, technology, telecom, and other industries. There are 55 million personalized recommendations served daily and 642,000 personalized recommendations served per second. Baynote generates 36 million email recommendations daily.



Baynote's Products

Products	Function and Impact
Product Recommendation	Shoppers typically convert to purchase on average, 353% more frequently than shoppers who do not engage with recommendations
Content Recommendation	Baynote increases the number of content pages viewed and time spent on page by 60%
Onsite Search	Baynote UseRank®, a patented technology, combines three concepts – engagement, context and like-minded peers in a patented mathematical modeling technique called neuro prediction. Baynote uses engagement patterns, context and like-minded peer groupings to inform our Personalized Onsite Search results
Landing Pages	Baynote landing pages match the visitor's current intent with engaging and relevant content, offers, and products to reduce bounce and increase conversion.

Email Recommendations	68% increase in user engagement with their promotional emails for one Baynote customer
Mobile Recommendations	Products and content dynamically adapts to the shopper's location

Baynote's Patents

Patents	Summary
Division of application No.11/319,928 filed on Dec 27, 2005 Patent number: US7702690 B2 Date of Patent: Apr 13, 2010 Patent number: US 7702690 B2 Date of Patent: Apr 20, 2010 Patent number: US 7580930 B2 Date of Patent: Aug 25, 2009 Patent number: US 7693836 B2 Date of Patent: Aug 25, 2009 Patent number: US 7856446 B2 Date of Patent: Dec 21, 2010	The inventors have discovered a set of unique approaches to enterprise search that is different from all existing IR (information retrieval) based solutions, such as Verity, Autonomy, FAST, Endeca, and Google Appliance. The inventors carefully analyzed the characteristics of enterprises in contrast to the Web search environment, and applied a set of methodologies in related disciplines from technology development, academic research, and social behavior. The invention provides a technique that can work standalone or embed itself in other applications via a plug-n-play interface with minimum effort. The result is a huge improvement in search usefulness, relevancy, search federation across applications, and cost savings. The preferred embodiment of the invention also leverages traditional search technologies. The invention comprises a set of complementary techniques that dramatically improve enterprise search and navigation results. The core of the invention is an expertise or knowledge index, called *UseRank* that tracks the behavior of website visitors. The expertise-index is designed to focus on the four key discoveries of enterprise attributes: Subject Authority, Work Patterns, Content Freshness, and Group Know-how. The invention produces useful, timely, cross-application, expertise-based search and navigation results. In contrast, traditional Information Retrieval technologies such as inverted index, NLP, or taxonomy tackle the same problem with an opposite set of attributes than what the enterprise needs: Content Population, Word Patterns, Content Existence, and Statistical Trends. Overall, the invention emcompasses *Baynote Search*--a enhancement over existing IR searches, *Baynote Guide* --a set of community-driven navigations, and *Baynote Insights*--aggregated views of visitor interests and trends and content gaps.
Patent number: US 8095523 B2 Date of Patent: Dec 6, 2011	*Method and Apparatus for Context-Based Content Recommendation* Starting with the people in and around enterprises, the expertise and work patterns stored in people's brains as exhibited in their daily behavior is detected and captured. A behavioral based knowledge index is thus created that is used to produce expert-guided, personalized information. The idea is to start by understanding the current user's context, i.e.: What is their intent? What are they looking for? Based on this understanding, then find the appropriate peer group representing other users who are most like the current user in the context of this identified interest. From there, find the content that that peer group identifies as most relevant to the current context. The approach taken in the invention is context-centric or, put another way, intent-centric. The techniques used to achieve this approach are based on the *UseRank* technology and affinity engine.
Patent number: US 8298087 B1 Date of Patent: Oct 20, 2012	*Recommendation engine for electronic game shopping channel* A recommendation service is provided for recommending computer video game titles to players. The recommendation service offers suggestions for game titles to purchase or rent based on playing usage related parameters for each particular player. A profile is created based on several factors that represents the player's affinity to each factor. Communication and use of player usage data may be strictly conditioned on a player's knowledge and consent

Pending Patent Application number: 20130091001 Date of Filing: Apr 11, 2013	*Behavior-Based Online Deal Transactions* A system and method are provided for offering product deals to users based on the online behavior and other information of groups of users. This information associated with multiple users within groups and individuals having common interests in products to be purchased online and information associated with a finite set of data elements in the computer application are analyzed to determine a configuration of the data elements such that user access to relevant information and shopping deals is improved. In some embodiments, deals are offered to "swarms" of individuals with common interest and are made active upon acceptance of the deal by a minimum number of buyers. Deals may be automatically generated based on parameters defined by a vendor
Pending Patent Application number: 20120102304 Date of Filing: Apr 26, 2012	*Behavior-Based Data Configuration System and Method* A system and method are provided for configuring data elements in a computer application such as menu items, links to purchase products, options, links to information, and user commands based on the behavior of users in the application. Information associated with the behavior of multiple users and information associated with a finite set of data elements in the computer application are analyzed to determine a configuration of the data elements such that user access to relevant information is improved.

Baynote's Capital Raise History

Investor	Funding Date	Transaction Size
Chesapeake Emerging Opportunities Club, LLC	Jan 2007	$10.75mm
Chess Ventures LLC	Jan 2007, Mar 2005	$10.75mm
Hummer Winblad Venture Partners	Jan 2011, Jan 2007, Mar 2005	$13.30mm
JK&B Capital	Jan 2011, Jan 2007, Mar 2005	$13.30mm
SingTel Ventures (Pte) Ltd.	Jan 2011	$13.30mm
Steamboat Ventures, LLC	Jan-10-2011, Jan-19-2007	$13.30mm

RICHRELEVANCE

RichRelevance Overview

RichRelevance is one of the largest's companies in the world in personalized recommendation engines and a global leader in omni-channel personalization. It empowers retailers and brands to deliver the best content, offers and promotions to shoppers whether they're online, on the go, or in store. RichRelevance drives more than one billion decisions every day, and has delivered over $10 billion in attributable sales to its clients. Recently, the company opened its cloud-based platform to allow clients to easily merge disparate data sources

and build real-time applications tailored to their specific business needs. RichRelevance is headquartered in San Francisco and serves clients in 40 countries from 10 offices around the globe. The company was recognized as a "Best Place to Work" and "Top Workplace" in the Bay Area in 2013.

RichRelevance's Technology Differentiations

- An Infrastructure that enables fast speed and large capacity

  Successful companies with growing number of customers have growing amounts of data to analyze and process, and scaling a database is not an overnight job. It is difficult to plan and implement an upgrade that provisions for future traffic and usage without over-provisioning. RichRelevance has seven geographically diverse data centers around the world equipped with load-balanced tier-1 servers using solid state drives. This system provides the highest possible throughput with the lowest latency. This approach enables large spikes in traffic to be handled without affecting performance. Moreover, the system is also architected in such a way that requests are directed to the nearest geographical data center. This distributed architecture protects against downtime, differentiating RichRelevance from other recommendation engine vendors who depend on centralized infrastructure or just one data center.

  RichRelevance consistently delivers personalization actions in 65 ms or less. The IT team at an $800M online merchant reported that page load times for a top-three competitor (built on a single data center) were on average 450% slower (400 to 500 ms) than RichRelevance's average of 40 to 80 ms—one of the key reasons this merchant switched to RichRelevance.

- A Distributed Computing Solution for Scalability Issue

  To find a solution to the scalability problem, RichRelevance found that many ccommerciallly distributed database solutions either had scalability limits or increased price for every node added. It has adopted Apache Hadoop open-source project as a solution for distributed processing and data storage. RichRelevance has turned to Hadoop because it had all the advantages of a distributed database solution. Hadoop is much easier to scale than a traditional database. RichRelevance team also found Hadoop performed well in heterogeneous environments including a mix of differently powered servers. Besides distributed processing, the team also used Hadoop cluster for storage. Unlike a database, the Hadoop cluster allows data spaces to grow very easily and offers built-in redundancy.

- Competition among 100+ independent recommendation algorithms to produce the appropriate recommendation. The enRICH Personalization Engine is the only one that facilitates competition among 100+ independent recommendation algorithms, of which each addresses different kind of user behavior and catalog data to select the best strategy for each unique placement. On the contrary, most recommendation systems

leverage one highly complex algorithm for use across the entire customer base. The enRICH Personalization Engine performs thousands of multivariate experiments to decide, in real time, which algorithm best matches a particular customer's needs at a specific place and time. On many pages, several recommendation placements enable us to display a combination of high-performing messages, based on the best-performing algorithms.

- Swift integration ranging from two to six weeks

  RichRelevance's largest retailer integrations are completed and deployed within 4 to 6 weeks (or even as fast as 2 to 3 weeks, depending on individual variables). Currently, no other enterprise e-commerce provider—let alone personalized recommendations provider—can make the claim.

- Frequent re-modeling up to 12 times per day

  The enRICH Personalization Engine rebuilds product recommendations up to 12 times a day, based on complex mathematical models—adjusting for subtle changes in shopping behavior, inventory, pricing and more. The result is sustained relevance without retailers needing to manually manipulate content.

- Multi-strategy generation of product recommendations

  This is a patented technology for dynamically generating recommendations for users. The techniques include using multiple recommendation strategies, such as by aggregating recommendation results from multiple different recommendation strategies. Such recommendation strategies may have various forms, and may be based at least in part on data regarding prior interactions of numerous users with numerous items. In addition, information about current selections of a particular user may be gathered based at least in part on providing a graphical user interface (GUI) for display to the user that includes selectable information about numerous recommended items, and dynamically updating the displayed GUI with newly generated recommendations of items as the user names selections of particular displayed recommended items.

- A patented method for providing targeted content

  An arrangement for providing targeted content includes data repositories storing information from which targeted content may be selected. The data repositories store at least one contextual relationship graph. The arrangement also includes an input/output interface through which a request for targeted content is made. The arrangement further includes a controller that receives the request for targeted content and selects targeted content using the contextual relationship graph. The controller further provides the selected targeted content through the input/output interface.

- Demand-driven, collaborative systems and processes for collecting structured information

A demand driven process of collecting and collaborating around reviews including the steps of: receiving a request for a review from a requestor, associating one or more potential responders with the request for a review, providing the request for a review to one or more potential responders, receiving and organizing one or more reviews from the responders, providing access to the organized reviews to the requestor and to the responders, and updating the accessible organized reviews as additional reviews are received, all electronically. An arrangement for the same includes user computers for receiving requests for a review, network communication devices for transmitting the requests to potential responders, memory for storing electronic reviews and a controller for organizing, updating, and providing access to the electronic reviews.

- An extensible platform

  RichRelevance provides third-party developers with access to the data and technology necessary to create new applications that leverage consumer behavior. This introduces infinite possibilities for retailers and brands to access data inputs such as mobile and social that require user-based filtering, and the display of product catalog or ad inventories.

RichRelevance's Customers

RichRelevance drives more than one billion decisions every day, and has delivered over $8 billion in attributable sales to its clients. More than 160 international companies use RichRelevance. RichRelevance provides a 3%-15%increase in revenue for its customers, and one recent client — a top-five Internet retailer property saw over 11% revenue lift.

RichRelevance's Products

Its solutions for retailers comprise enRICH, a personalization engine; RichRecs, a personalized product recommendation solution; RichPromo, a customizable campaign management platform; RichContent that enables retailers, consumer brands, media, and hospitality sites to deliver personalized experiences; and RichAds, a personalized monetization solution. The company also provides personalization strategies for retailers. Its solutions for advertisers include Shopping Media, a retail advertising platform that supports brand-based and performance-based campaigns; and targeting solutions.

Products	Function and Impact
RichRecs	Influences customers at each stage of buying cycle, from on-site recommendations to offsite activities including emails, mobile and retargeting Intelligent cross-sell products drive more value for customers in electronics, office supply, and fashion retail verticals Utilize free multivariate testing (MVT) tools to measure your site performance—test different placements, layouts and merchandising strategies with live shoppers *Consistently drive 3 – 11% lift in revenue per session with the world's most advanced and reliable personalization engine*
RichContent	Leverages real time consumer behavior analysis to display the most relevant videos, articles, white papers, and/or slideshows dynamically to consumers, creating a unique site experience for each individual. Changes site content in real time based on existing customer segments, as well as individual shoppers' behavior and context on the site such as: how the consumer arrived on the site, browsing history, geo-location, social activity (Likes, Pins, etc.) and time of day Employs multiple algorithms to support numerous recommendation types, each with a unique value proposition that corresponds to a specific consumption behavior, ensuring site visitors receive the right information at the right time in fewer clicks. This allows brands, media and retailers to build millions of customized experiences at scale, without any manual intervention. As consumers interact with recommended content, the enRICH Engine's built-in feedback loops inform the system about the performance of key content and recommendation types. The Engine then rebuilds its models every other hour—adjusting to accommodate the subtlest changes in consumer behavior
RichPromote	Automates the online promotions workflow, enabling your e-commerce team to run marketing and category specific campaigns that ensure the most relevant promotions are being shown to each shopper *57% lift in click-through rate and 113% lift in attributable sales driven by promotion*
RichAds	Utilizes advanced retail targeting to deliver relevant brand messages on major retail sites—filling a gap for retailers, advertisers and consumers. *Retailers gain a new channel to monetize 100% of site traffic—not just the 3% who convert—adding to the bottom line through the introduction of brand advertising that enhances, instead of detracts from, their shoppers' experience*

RichRelevance's Patents

Patents	**Summary**
Patent number: US 8364528 B2	*System and process for improving product recommendations for use in providing personalized advertisements to retail customers*

Date of Patent: Jan 29, 2013	A system and process for improving product recommendations for a first user includes receiving a request for one or more product recommendations for a first user, each product recommendation being associated with any one of a plurality of retailers, receiving a plurality of recommendation sets from one or more automated product recommendation systems, wherein the plurality of recommendation sets are generated using different selection models and using ensemble learning to select one or more most relevant product recommendation sets from the plurality of product recommendation sets.
Patent number: US 8250139 B2 Date of Patent: Aug 21, 2012 Patent number: US 8108463 B2 Date of Patent: Jan 31, 2012	*Demand-driven, collaborative systems and processes for collecting structured information* A demand driven process of collecting structured product and service information including the steps of: receiving a request for information from a requestor about a specific product or service, or attribute or class thereof, associating one or more potential responders with the request for information, providing the request to the potential responders, receiving and organizing one or more responses, and providing the organized responses to the requestor, all electronically. An arrangement for the same includes user computers for receiving requests for information, network communication devices for transmitting the requests to potential responders, memory for storing electronic responses and a controller for organizing, updating, and providing access to the electronic responses.
Patent number: US 8244564 B2 Date of Patent: Aug 14, 2012	*Multi-strategy generation of product recommendations* Techniques are described for dynamically generating recommendations for users, such as for products and other items. In at least some situations, the techniques include using multiple recommendation strategies, such as by aggregating recommendation results from multiple different recommendation strategies. Such recommendation strategies may have various forms, and may be based at least in part on data regarding prior interactions of numerous users with numerous items. In addition, information about current selections of a particular user may be gathered based at least in part on providing a GUI ("graphical user interface") for display to the user that includes selectable information about numerous recommended items, and dynamically updating the displayed GUI with newly generated recommendations of items as the user makes selections of particular displayed recommended items (e.g., newly generated recommendations that are similar to the selected items in one or more manners, or are otherwise related to the selected items).
Patent number: US 8209214 B2 Date of Patent: Jun 26, 2012 Patent number: US 8156138 B2 Date of Patent: Apr 10, 2012	*System and method for providing targeted content* An arrangement for providing targeted content includes data repositories storing information from which targeted content may be selected. The data repositories store at least one contextual relationship graph. The arrangement also includes an input/output interface through which a request for targeted content is made. The arrangement further includes a controller that receives the request for targeted content and selects targeted content using the contextual relationship graph. The controller further provides the selected targeted content through the input/output interface. An arrangement for determining the relative strength of a classification for a group of words includes memory for storing a contextual relationship graph for a given classification and a processor that receives the contextual relationship graph and a plurality of words to be analyzed by the processor, identifies occurrences of the relationships identified in the contextual relationship graph and determines the relative strength of classification based on the identified occurrences.
Patent number: US 8108329 B2 Date of Patent: Jan 31, 2012	*System and process for boosting recommendations for use in providing personalized advertisements to retail customers* A system and process for incorporating recommendation boosting in an automated recommendation system includes receiving recommendation boost

	instructions, receiving a request for one or more recommendations, receiving a set of recommendations from one or more automated recommendation systems, with each recommendation system utilizing selection models or user models and modifying the set of product recommendations according to the recommendation boost instructions.
Patent number: US 8109642 B2 Date of Patent: Sep 13, 2011	*System and process for receiving boosting recommendations for use in providing personalized advertisements to retail customers* A system and process for incorporating recommendation boosting in an automated recommendation system includes presenting a user with a visual electronic interface adapted to receive recommendation boost instructions regarding a boost subject, receiving recommendation boost instructions via the visual electronic interface, wherein the recommendation boost instructions indicate how strongly the boost subject should be recommended or suppressed from being recommended, receiving a set of recommendations from one or more automated product recommendation systems, wherein each recommendation system utilizes one or more selection models or user models and modifying the set of recommendations according to the recommendation boost instructions.
Pending patent Application number: 20130198007 Date of Patent: Aug 1, 2013	*System and process for improving product recommendations for use in providing personalized advertisements to retail customers* A system and process for improving product recommendations for a first user includes receiving a request for one or more product recommendations for a first user, each product recommendation being associated with any one of a plurality of retailers, receiving a plurality of recommendation sets from one or more automated product recommendation systems, wherein the plurality of recommendation sets are generated using different selection models and using ensemble learning to select one or more most relevant product recommendation sets from the plurality of product recommendation sets.
Pending patent Application number: 20120310771 Date of Patent: Dec 6, 2012	*Generation of product recommendations using a dynamically selected strategy* Techniques are described for dynamically generating recommendations for users, such as for products and other items. In at least some situations, the techniques include using multiple recommendation strategies, such as by aggregating recommendation results from multiple different recommendation strategies. Such recommendation strategies may have various forms, and may be based at least in part on data regarding prior interactions of numerous users with numerous items. In addition, information about current selections of a particular user may be gathered based at least in part on providing a GUI ("graphical user interface") for display to the user that includes selectable information about numerous recommended items, and dynamically updating the displayed GUI with newly generated recommendations of items as the user makes selections of particular displayed recommended items (e.g., newly generated recommendations that are similar to the selected items in one or more manners, or are otherwise related to the selected items).
Pending patent Application number: 20120316970 Date of Patent: Dec 13, 2012	*System and method for providing targeted content* An arrangement for providing targeted content includes data repositories storing information from which targeted content may be selected. The data repositories store at least one contextual relationship graph. The arrangement also includes an input/output interface through which a request for targeted content is made. The arrangement further includes a controller that receives the request for targeted content and selects targeted content using the contextual relationship graph. The controller further provides the selected targeted content through the input/output interface. An arrangement for determining the relative strength of a classification for a group of words includes memory for storing a contextual relationship graph for a given classification and a processor that receives the contextual relationship graph and a plurality of words to be analyzed by the

	processor, identifies occurrences of the relationships identified in the contextual relationship graph and determines the relative strength of classification based on the identified occurrences.

RichRelevance's Capital Raise History

Investor	Funding Date	Transaction Size
CrossLink Capital, Inc.	May 2012	$28mm
Draper Fisher Jurvetson	May 2012, Aug 2008, Dec 2007	$28mm
Draper Richards, L.P.	Aug 2008, Dec 2007	$12.5mm
Felicis Ventures	Aug 2008, Jun 2007	$12.5mm
Gray Ventures Inc.	May 2012	$28mm
Greylock Partners	May 2012, Aug 2008, Apr 2008	$28mm
Hercules Technology Growth Capital, Inc. (NYSE:HTGC)	Jun 2011	$5mm
J.F. Shea Venture Capital	May 2012	$28mm
RTP Ventures	May 2012	$28mm
ruNet Holdings Limited	Aug 2012	$5mm
Tugboat Ventures	May 2012, Aug 2008, Apr 2008	$28mm

CERTONA

CERTONA
Personalize Anytime Anywhere™

Certona Overview

Certona Corporation provides personalization and revenue optimization solutions for online and multi-channel retailers. The company offers Resonance personalization platform, an SaaS solution that personalizes the customer lifecycle from acquisition to engagement, conversion, and retention. Its platform delivers targeted and optimized recommendations to each visitor automatically based on individual's real-time behavioral profile and purchase patterns through various channels, including Website experience, e-mail, mobile, in-store, call center, and social networks. Resonance® SaaS platform contributed the generation of over $23 billion online in 2012 and its clients include the #1 retailers in Apparel, Specialty, Office Supplies, Luggage, Skincare and many other categories.

The company also provides *Resonance Insight*, a reporting and merchandising management console, which provides access to reports to track performance of recommendations, business rules, strategies, box locations, and various metrics to measure success. Certona Corporation was founded in 2004 and is based in Del Mar, California.

Certona's Technology Differentiations

- A patented technology that predicts the relative occurrence or presence of an event or item based on sampled data

  Certona has a patented technology that predicts the relative occurrence or presence of an event or item based on sample data consisting of samples which contain and samples which do not contain the event or item. The samples also consist of any number of descriptive attributes, which may be continuous variables, binary variables, or categorical variables. Given the sampled data, the system automatically creates statistically optimal segments from which a functional input/output relationship can be derived. These segments can either be used directly in the form of a lookup table or in some cases as input data to a secondary modeling system such as a linear regression module, a neural network, or other predictive system.

- A patented technology for fault tolerance and maintaining service response under unanticipated load conditions. Certona has a patented method for allocating servers across a large number of applications and for providing a predictable and consistent service response under conditions where the use of the service and associated loads is driven by unknown factors. The invention provides fault tolerance within an application through multiple resources per application and fault tolerance across applications by limiting the overlap in resources between applications. The computational load on the service may include both individual processing time due to the complexity of a single request and the number of requests. Complexity may be unpredictable because the service is self-provisioned and may allow service users to create an arbitrary sequence of compound processing steps. The number of requests may vary due to a variety of events, including daily, seasonal, or holidays, or factors driven more directly by the user of the service, such as sales, advertising, or promotions. The invention throttles server loads to provide managed degradation of application processing. The system has application in personalization, behavioral targeting, Internet retailing, personalized search, email segmentation and ad targeting, to name but a few applications.

- A patented technology for key word pruning

  Certona has a patented technology for profiling a subject's search engine keywords and results based on relevancy feedback. Because this system is based on the search behavior of the user, the profiling is language independent and balances the specificity of search terms against the profiled interests of the user. The system can also score keywords on their search effectiveness and eliminate ineffective keywords from the keyword index. The system can also synthesize new keyword combinations to assist the user in refining the search or acquiring related content. The system has application in text mining, personalization, behavioral search, search engine optimization, and content acquisition, to name but a few applications.

- A pending patent for generating automated self-optimizing targeted emails

  Certona has a patent pending technology for generating targeted e-mails based on individual subject behavior and interests, as determined by an application's website browsing behavior, online and offline purchases, ratings, and other implicit and explicit indications of subject preferences and interests. The subject's behavior data is collected directly from the subject's client browser or from the application's own information and used to generate profiles of the subjects that will be sent e-mails and the objects that will be recommended. Targeted content is generated by matching subject and object profiles in combination with any subject segmentation filters that the application provides. The e-mail targeting is optimized by measuring subject response to targeted e-mails and adjusting recommendation strategies used to generate subsequent recommendations. The system has application in personalization, behavioral targeting, Internet retailing, affiliate marketing, and online advertising, to name but a few applications.

- A pending patent for combining and optimizing business strategies

  Certona has a patent pending technology for tracking subject behavior and making object recommendations to drive the subject to a desired outcome. The system consists of several components: a data collection module that captures subject behavior and provides behavioral context for the recommendations; a profiling module that extracts characteristics of subjects and objects from the behavior data; and a recommendation module, which uses the profiles and the behavior context to generate personalized content, including product recommendations, content recommendations, and advertisements. The recommendation module consists of several sub-modules: a behavioral recommendation module, which matches profiles or uses other unconstrained methods for matching objects to subjects; a business rule module, which filters and modifies recommendations by applying application-specific business logic to defined attributes of the objects; and a promotion engine, which modifies the scores from the recommendation module to bias the recommendations towards certain objects based on additional business goals, such as exposing new objects, selling out old products, or satisfying promotional business agreements with partners.

  The system continuously samples and assesses the performance of a variety of candidate recommendation strategies and optimizes the selection of the rules and profiling methods to maximize or minimize the value of some objective function that characterizes the system. The system has application to Internet retailing, behavioral targeting, recommendation systems, personalization, business rules, and business optimization.

- A pending patent for recommending repeated transactions

  Certona has a computer implemented web-based system and computer implemented web-based method for recording, repeated transactions of objects or groups of objects by subjects, utilizing the duration between

transactions to predict the next transaction time of an object by a subject, and recommending the object to the subject based on the predicted next transaction time. The system can also classify object according to their replenishment behavior and make product recommendations based on the class of objects a subject shows interest in. Objects include movies, books, songs, commercial products, news articles, advertisements or any other type of content or physical item. The system has application in personalization, behavioral targeting, Internet retailing, and interactive radio, to name but a few application.

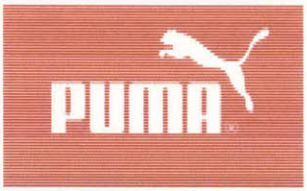
- Recommendation based on each individual's real-time behavioral profile and purchase patterns
  Certona's clients gain a competitive advantage from the power of *Resonance* real-time individualized profiling and targeting which delivers a unique customer experience to each individual. Combined with a comprehensive merchandising system, *Resonance* allows for scalable automation and optimal personalization while giving merchandisers control and flexibility in defining the consumer and brand experience.
  Mobile devices and recommendation software

  Certona's recommendation engine enables retailers to reach customers via email or mobile messaging to remind them of abandoned shopping carts, let them know about new store promotions or even send back in stock reminders.

- Call Center Optimization
  Certona's personalization engine allows retailers to capture customers who phone their call center operators with orders. By giving every call center employee a complete profile of the customer, retailers have far more power to let them know about great companion products that are ideal for the upsell.

- Business insight reporting capability
  Certona is one of the few providers in the industry with a comprehensive suite of robust reporting capabilities for their multi-channel personalized recommendations. Certona's reporting and merchandising console *Resonance Insight* enables clients to have a multitude of reports to track performance of recommendations, business rules, strategies, box locations, and several different metrics in order to measure success. Resonance Insight gives the user the ability to propose and test strategies as well as identify opportunities to reduce abandonment and maximize purchase intent with optimal recommendations, business and merchandising strategies. The user-friendly interface offers filtering options and easy export of reports in PDF and Excel format.

Certona's Customers



Certona's Products

Products	Function and Impact
Certona Web Recommendation *Resonance* Personalization Platform	Resonance automates a company's ability to provide targeted, individualized content and product recommendations in real-time across all of their customer touch points from web, email, mobile, video, contact center, point-of-sale, and beyond. Top line revenue: *increase AOV by 5%, increase conversion up to 150%, and increase item per order by up to 50%.* Bottom line profit: increase profits by promoting the right merchandise, optimize inventory based on availability rules, and reduce admin costs with an automated SaaS solution.
Certona Email	Leverage real-time web site behavior, purchase history and catalog product profiles into retailers' email communications Easily integrates with clients' existing email service provider and is ready to deploy quickly if a retailer already uses Resonance platform Certona Remarketing for Email enables digital marketers to identify those most likely to convert and re-engage them with targeted, personalized content and offer. Certona simplifies the process to recover lost sales after visitors abandon shopping carts and browsed pages by providing timely follow up to stay engaged with customers and incentivize them to convert
Certona Mobile & Tablet	Certona works with all of the top mobile commerce platforms to implement solutions that fit well with your mobile sites and apps. Certona is able to deliver a quick path for a retailer's customers to easily engage with the brand and find and purchase products from any mobile device, including the iPhone, Android and Blackberry devices, and tablets.
Certona Content & Creative	Certona Content & Creative enables personalization for content (like blogs, articles, user generated) and on all of the creative assets (navigation, images, videos, ads, promotions)
Certona Contact Center	Certona Contact Center leverages the power of *Resonance* behavioral profiling and individualized customer targeting to deliver personalized recommendations for customers calling into a contact center

Certona's Patents

Pending Patents	Summary
Application number: 20130173524 Filing date: Jul 4, 2013	*Extracting predictive segments from sampled data* A system and method is disclosed which predicts the relative occurrence or presence of an event or item based on sample data consisting of samples which contain and samples which do not contain the event or item. The samples also consist of any number of descriptive attributes, which may be continuous variables, binary variables, or categorical variables. Given the sampled data, the system automatically creates statistically optimal segments from which a functional input/output relationship can be derived. These segments can either

	be used directly in the form of a lookup table or in some cases as input data to a secondary modeling system such as a linear regression module, a neural network, or other predictive system.
Application number: 20130173809 Filing date: Jul 4, 2013	*Fault tolerance and maintaining service response under unanticipated load conditions* A system and method is disclosed for allocating servers across a large number of applications and for providing a predictable and consistent service response under conditions where the use of the service and associated loads is driven by unknown factors. The invention provides fault tolerance within an application through multiple resources per application and fault tolerance across applications by limiting the overlap in resources between applications. The computational load on the service may include both individual processing time due to the complexity of a single request and the number of requests. Complexity may be unpredictable because the service is self-provisioned and may allow service users to create an arbitrary sequence of compound processing steps. The number of requests may vary due to a variety of events, including daily, seasonal, or holidays, or factors driven more directly by the user of the service, such as sales, advertising, or promotions. The invention throttles server loads to provide managed degradation of application processing. The system has application in personalization, behavioral targeting, Internet retailing, personalized search, email segmentation and ad targeting, to name but a few applications.
Application number: 20130173583 Filing date: Jul 4, 2013	*Keyword index pruning* A system and method is disclosed for profiling a subject's search engine keywords and results based on relevancy feedback. Because the system is based on the search behavior of the user, the profiling is language independent and balances the specificity of search terms against the profiled interests of the user. The system can also score keywords on their search effectiveness and eliminate ineffective keywords from the keyword index. The system can also synthesize new keyword combinations to assist the user in refining the search or acquiring related content. The system has application in text mining, personalization, behavioral search, search engine optimization, and content acquisition, to name but a few applications.
Application number: 20130173419 Filing date: Jul 4, 2013	*Recommending repeated transactions* A computer implemented web-based system and computer implemented web-based method is disclosed for recording, repeated transactions of objects or groups of objects by subjects, utilizing the duration between transactions to predict the next transaction time of an object by a subject, and recommending the object to the subject based on the predicted next transaction time. The system can also classify object according to their replenishment behavior and make product recommendations based on the class of objects a subject shows interest in. Objects include movies, books, songs, commercial products, news articles, advertisements or any other type of content or physical item. The system has application in personalization, behavioral targeting, Internet retailing, and interactive radio, to name but a few applications.
Application number: 20090248496 Filing date: Oct 1, 2009	*System and method for collecting and targeting visitor behavior* A system and method is disclosed for collecting website visitor activity for profiling visitor interests and dynamically modifying the content of the website to better match the visitor's profile. The visitor activity data is collected directly from the visitor's client browser or from the website's own web log information. The collected data consists of the page identifier, page links, and the previous page identifier. Similarly, the modified page content can be sent directly to the client browser or can be sent back to the website server for integration with the other page content. The collected data is stored in a database. Based on the amount of information collected on the visitor and the various items that are presented on the website, the visitors and items are profiled so that a visitor's response to other items can be predicted and recommended to the visitor. The recommendations can be requested and displayed directly by and to the client browser or the website server can make the request and subsequently display the matching

	content. The system has application in personalization, behavioral targeting, Internet retailing, social networking, affiliate marketing, and online advertising, to name but a few applications.
Application number: 20090248495 Filing date: Oct 1, 2009	*System and method for combining and optimizing business strategies* A system and method is disclosed for tracking subject behavior and making object recommendations to drive the subject to a desired outcome. The system consists of several components: a data collection module that captures subject behavior and provides behavioral context for the recommendations; a profiling module that extracts characteristics of subjects and objects from the behavior data; and a recommendation module, which uses the profiles and the behavior context to generate personalized content, including product recommendations, content recommendations, and advertisements. The recommendation module consists of several sub-modules: a behavioral recommendation module, which matches profiles or uses other unconstrained methods for matching objects to subjects; a business rule module, which filters and modifies recommendations by applying application-specific business logic to defined attributes of the objects; and a promotion engine, which modifies the scores from the recommendation module to bias the recommendations towards certain objects based on additional business goals, such as exposing new objects, selling out old products, or satisfying promotional business agreements with partners. The system continuously samples and assesses the performance of a variety of candidate recommendation strategies and optimizes the selection of the rules and profiling methods to maximize or minimize the value of some objective function that characterizes the system. The system has application to Internet retailing, behavioral targeting, recommendation systems, personalization, business rules, and business optimization.
Application number: 20090248494 Filing date: Oct 1, 2009	*System and method for collecting and targeting visitor behavior* A system and method is disclosed for collecting website visitor activity for profiling visitor interests and dynamically modifying the content of the website to better match the visitor's profile. The visitor activity data is collected directly from the visitor's client browser or from the website's own web log information. The collected data consists of the page identifier, page links, and the previous page identifier. Similarly, the modified page content can be sent directly to the client browser or can be sent back to the website server for integration with the other page content. The collected data is stored in a database. Based on the amount of information collected on the visitor and the various items that are presented on the website, the visitors and items are profiled so that a visitor's response to other items can be predicted and recommended to the visitor. The recommendations can be requested and displayed directly by and to the client browser or the website server can make the request and subsequently display the matching content. The system has application in personalization, behavioral targeting, Internet retailing, social networking, affiliate marketing, and online advertising, to name but a few applications.
Application number: 20090248523 Filing date: Oct 1, 2009	*System and method for generating automated self-optimizing targeted e-mails* A system and method is disclosed for generating targeted e-mails based on individual subject behavior and interests, as determined by an application's website browsing behavior, online and offline purchases, ratings, and other implicit and explicit indications of subject preferences and interests. The subject's behavior data is collected directly from the subject's client browser or from the application's own information and used to generate profiles of the subjects that will be sent e-mails and the objects that will be recommended. Targeted content is generated by matching subject and object profiles in combination with any subject segmentation filters that the application provides. The e-mail targeting is optimized by measuring subject response to targeted e-mails and adjusting recommendation strategies used to generate subsequent recommendations. The system has application in personalization, behavioral targeting, Internet retailing, affiliate marketing, and online advertising, to name but a few applications.

Application number: 20090248682 Filing date: Oct 1, 2009	*System and method for personalized search* A system and method is disclosed for profiling a subject's search engine keywords and results based on relevancy feedback. Because the system is based on the search behavior of the user, the profiling is language independent and balances the specificity of search terms against the profiled interests of the user. The system can also synthesize new keyword combinations to assist the user in refining the search or acquiring related content. The system has application in text mining, personalization, behavioral search, search engine optimization, and content acquisition, to name but a few applications.
Application number: 20090248497 Filing date: Oct 1, 2009	*System and method for quantifying and detecting non-normative behavior* A system and method is disclosed for monitoring human interactions, including transactions and communications, profiling the subject and objects in those interactions, and comparing subject profiles to profiles of subjects with known characteristics to determine whether the test subject is normal or abnormal subjects. The behavior data can be collected electronically in a virtual environment, such as a website, through video surveillance, card access, phone records, purchase histories, or any other consistent identified record of behavior. The invention has application in detecting various types of unusual and malicious activity, including spam, viruses, terrorism, identity theft, and money laundering, to name but a few applications.
Application number: 20090287713 Filing date: Oct 1, 2009	*Systems and methods for measuring online public relation and social media metrics using link scanning technology* A method for measuring Public Relations (PR) outputs and social media efforts on a webpage is described. The method can comprise generating a list of website addresses, deploying link scanning on the web page, the link scanning configured to include the list of website addresses, and reporting the results of the link scanning to a reporting server.

Certona's Capital Raise History

Investor	Funding Date	Transaction Size
ABS Ventures	Jun 2008	$7mm
Express Ventures	June 2008	$7mm

MONETATE

Monetate Overview

Monetate helps marketers understand their customers' situations, behaviors, and preferences, and act on those insights with in-the-moment, relevant experiences, targeted to the right customer at the right time. Monetate owns and operates an SaaS platform for Website A/B testing, multivariate testing, targeting, and personalization. Its products include TestLab that provides Website A/B testing and multivariate testing; LiveTarget that offers Website targeting; Merchandiser that provides product recommendations, badging, and visual search; and

LiveAudience, a segmentation product that enables marketers to integrate customer and visitor profile and audience segment data from BlueKai with Monetate's user and real-time target attributes, such as referral and inbound marketing channel, location, weather, device, and in-session behavioral data. Monetate serves consumer packaged goods, education, financial services/insurance, healthcare, media and publishing, retail, telecommunications, and travel and hospitality industries. The company was founded in 2008 and is based in Conshohocken, Pennsylvania. It has delivered campaigns that have influenced over $60bn in revenue. On its website, the company also claims that its clients on average grew 39% faster than their competitors.

Monetate's Technology Differentiations

- Monetate Acceleration Cloud

  The Monetate Acceleration Cloud sits above—rather than replaces—clients' existing technology, helping clients synchronize data, coordinate programs, and deliver winning experiences to their customers, across any screen, any channel, and in every phase of the relationship. Other companies take a "suite" approach by purchasing—and attempting to integrate—a range of different technologies that share little more than a username and password. Monetate says "No" to the Frankencloud and its disconnected data and uncoordinated programs. The Monetate Acceleration Cloud is developed by a single team and shares a common DNA that enables a single marketer to change anything, anywhere, anytime—all within seconds.

- Client's marketers' control over recommendations:

  Monetate enables marketers to define customer segments, create actions, and run unlimited experiences using an intuitive, sentence-based campaign interface that never requires code.

- Shadow CRM

  ShadowCRM intelligently organizes clients' data, making it available for easy, instant segment creation and real-time action. ShadowCRM data never expires. The longer it runs, the smarter the client gets, and the more satisfying experiences the client can deliver. Monetate builds a perpetual, high-resolution picture of every customer, consisting of:

  - Past and present behaviors
  - Circumstances such as demographics and weather; and
  - Custom and proprietary information.

- Performance analytics

  Monetate has marketing tools that enable marketers to see the dollars and cents behind every campaign with the benefit of:

  - Performance visualizations
  - Raw data access
  - Analytics integration
  - Incremental and projected annual revenue
  - Statistical significance for all KPIs
  - Support for custom metrics
  - A powerful, sentence-based report builder
  - Post-campaign segmentation

Monetate's Customers

Monetate's Products

Key Products	Function and Impact
Prediction	• Automatically discover over- and under-performing customer segments, and take action to deliver winning experiences to them that convert
Personalization	• Recommend the right products to every customer. Pair algorithms, collaborative filters, business rules, and manually-controlled approaches with key audience segments
Monetate Merchandiser	• Create a perpetual, high-resolution snapshot of every customer with more than 100 points of organized data, instantly available to put into action.

	• Target and personalize from past and present behaviors, custom inputs, first- and third-party data, and so much more • Customer Segmentation: i.e. Select visitors who previously purchased within the past 30 days, with an Average Order Value greater than $100, and name them "High-Value Customers" for future campaigns. • Visual search: product catalog integration easily combined with targeting and testing
Audience	• Integrate third-party data sources to drive smarter, more relevant experiences to new and returning visitors • Know the "unknown customer" • Combine 1st- and 3rd-party insights • Target up to 20,000 segments
Performance Analytics	• Evaluate marketing programs and discover new customer segments with powerful performance analytics that include visualizations, the ability to define your own goals
Testing	• Answer 4 simple questions—Who, What, When, and Why—to create unlimited splits, each with its own Control Group. Test anything, anywhere, anytime to understand exactly what clicks with every customer.

Product Packages

Features	LiveTarget	Live Audience	Live Product	Merchan-diser	TestLab	Email	Display
Express Tag	☺	☺	☺	☺	☺		
ShadowCRM	☺		☺	☺		☺	☺
Sentence-based Campaign Builder	☺	☺	☺	☺	☺	☺	☺
Targeting	☺						
Behavioral	☺					☺	☺
Location	☺					☺	☺
Weather	☺					☺	
Technographics	☺					☺	☺
Referrer	☺						
Client-determined Segmentation	☺					☺	☺
Product Interaction	☺					☺	
Demographics	☺					☺	☺
Add'l Demographics		☺					
In-Market Auto		☺					
In-Market CPG		☺					
In-Market Education		☺					
In-Market Financial Services		☺					
In-Market Local Goods		☺					
In-Market Other Vehicles		☺					
In-Market Retail		☺					

Features	LiveTarget	Live Audience	Live Product	Merchan-diser	TestLab	Email	Display
In-Market Travel		☺					
Interest/Affinity Shown		☺					

Past purchase from a third party		☺				
Predictors		☺				
Geography		☺				
Custom Categories		☺				
Open-time Personalization					☺	
Segment ROI Calculator						☺
DSP Integration						☺
Automated Segment Discovery			☺			☺
Segment and Behavior Correlation			☺			☺
Visual Search				☺		
Recommendations				☺	☺	☺
Badging				☺		
A/B/n Testing					☺	☺	☺
Multivariate Testing					☺		
Performance Analytics	☺			☺	☺	☺	☺
PageMap	☺			☺	☺		
ActionBuilder	☺				☺		
ContentBuilder	☺			☺	☺	☺	☺
Multipage Campaigns	☺			☺	☺	☺	☺
Full Service Available	☺			☺	☺	☺	☺
Self Service Available	☺			☺	☺	☺	☺

Monetate's Patents

A comprehensive patent search does not reveal any patents filed by Monetate.

Monetate's Capital Raise History

Investor	Funding Date	Transaction Size
First Round Capital	Jul 2011, Nov 2010	$15mm
FLOODGATE	Jul 2011, Nov 2010	$15mm
OpenView Venture Partners	Jul 2011	$15mm

CHAPTER 4 UNADDRESSED CUSTOMER NEEDS OF RECOMMENDATION ENGINES

BETTER DATA IS NEEDED MORE THAN BETTER ALGORITHMS

Customers who are at the forefront of recommendation and personalization technologies mostly involve digital marketers of large retailers and strategy specialists of professional marketing firms. A study conducted by the Chief Marketing Officer Council points out that most of the marketers are still missing the mark on how to leverage and utilize data, and because of this they are unable to realize the full potential of personalization tools, services and solutions[11].

Figure 2 Challenges Related to the Use of "Big Data" Collected by US Marketers

Source: February 2012 joint survey of US marketers by Columbia Business School and the New York American Marketing Association

To master personalization, a company must master its data. Most of the marketers have realized that weak algorithms with more data beat more sophisticated algorithms with less data. Data collection, cleansing and integration remain the main obstacles to personalization for companies that opt for manual or even semi-automated management of their systems.

AUTOMATIC DATA COLLECTION

This is one of the most important questions that merchandisers ask personalization engine vendors, because one of the biggest stumbling blocks is that there does not exist enough data to provide meaningful recommendations. In this case, regardless of the sophistication of an algorithm or the number of Ph.D.s on the team, sparse data sets will yield poor recommendations, not only creating a poor customer experience but also doing little to boost sales. In order to address this issue, for instance, Aggregate Knowledge drops third-party cookies onto its network of sites and gathers vast quantities of data throughout the Web that inform recommendations (i.e., data from The Washington Post Web site can inform product recommendations on Overstock.com).

COLLECT CUSTOMER DATA FROM DISPARATE SOURCES ACROSS MULTI-PLATFORMS

After extensive customer interviews and investigations based on merchandisers' feedback, the most frequent comment is "we don't have that information on our customers" or "unfortunately, we can't get that information out of that system in a way we can easily use it."

The disparate sources of customer data are a major pain point common regardless of customer size or industry. Besides easily accessible on-premise data such as CRM data and online registrations, marketers complain about their lack of ability to obtain and fully integrate customer data across channels and platforms such as mobile devices, emails, offline activities (i.e. in-store transactions and call center data), and third-party data sources (i.e. customer search engine history, social media data, advertising videos, and geo-location data).

Therefore, the customer data across these various sources constitute the "big data" for marketers. Currently, there is considerable demand from merchandisers wanting to see a "unified picture" of its individual customers based on data collected and analyzed across these customer data sources.

UNDERSTANDING AUDIENCE DOWN TO THE INDIVIDUAL LEVEL

Not only do marketers want to identify and craft specific audience segments for better audience targeting, the marketers now demand that the new recommendation and personalization technologies identify and depict members of these segments down to the individual level, a trend that more and more digital advertisers are after.

Marketers want to craft personalized content and messages that truly resonate with customers using customer persona. It's worth noting that recommendation engine vendors that can explicitly present and analyze customer persona to the merchandisers have a definitive advantage in sales as compared to those vendors who describe recommendation engine as a "black box" that does recommendations automatically.

According to Mark Howard, SVP of digital advertising strategy at Forbes, one of the biggest discoveries he's had as he got more involved in the programmatic side of the business was the realization that it's not about the marketers looking to target audience; it's really about targeting individuals at scale.

CENTER MARKETING AND TARGETING STRATEGIES ON CUSTOMER DATA ANALYTICS

Retailers are increasingly looking for ways to connect first-party customer data with online strategies. These strategies involve identifying new customers, revealing new marketing opportunities, retaining and improving sales to existing customers, measuring and justifying effectiveness of marketing campaigns, as well as driving more profitable advertising. However, having strategy alone can be an incredibly frustrating existence without the access to data and the ability to execute.

For example, ZestFinance, the credit scoring company, utilizes customer data across a range of sources to weigh factors that typical credit score models miss. The company offers its analytics services to lenders in order for lenders to "better assess the credit risk of potential borrowers." Separately, ZestFinance provides loans to people with low scores but a high likelihood of making their payments. The ZestFinance model prompted Quentin Hardy to post "*Big Data for the Poor*" on the NY Times blog site.

Separately, customer data from a variety of sources can help marketers better understand how different media contribute to its campaign performance, exposing both inefficiencies and new prospects. By funneling data on impressions, clicks, conversions, social actions and more into attribution and media-mix models, marketers can learn how effectively each channel drives towards their desired objective, leading to better informed budget allocations.

> *"We want to look at marketing mix optimization and the analytics associated with trying to understand the channels and vehicles that are being used with it. Specifically, we are looking to understand things like customer retention and the future value of customers that we are acquiring. We want to understand how much the existing customer can get us in a future year so we can get an estimate of how many customers we need to acquire, or if we need to get existing customers to spend more."*
> eMarketer's Interview with Jim Davis, Director of Web and Customer Analytics, Unban Outfitter

GIVE CONTROL BACK TO MERCHANDISERS AND MARKETERS

Product recommendation engines should not be viewed as a "black box". The merchandiser or marketer needs maximal flexibility to set rules, judge results and implement changes to the recommendations. First of all, users of recommendation engines want to avoid IT or recommendation engine vendor's involvement after the initial installation. Marketers want to be able to make adjustments to the automated recommendations as easily, frequently, and intuitively as possible, ideally a rapid code-free deployment. Second, marketers want to understand how the conversion happens, demand a simple way to test their recommendations against a control group, and have ample data against which they can assess automated recommendations.

Most importantly, marketers want to gain value-added insights to its target audience at a level of depth that is impossible prior to the "big data" innovation. Marketers do not just want to be fed with a lengthy, automatically generated, standard customer analytics report. They want to see answers to specific questions they raise regarding its audience and test their hypothesis on selected customers.

A UNITARY STREAM OF DATA AND A SINGLE SOURCE OF INSIGHTS

Based on a number of customer interviews, most of the marketers and merchandisers interested in personalization technologies claim that they lack of a convenient and unitary stream of data, or even better a single source of insight. This is primary because data has too many forms from too many different sources, structures, taxonomies. In order to best leverage recommendation engines and personalization technologies for more tactical initiatives, marketers to have a centralized solution where data can be efficiently aggregated, stored, cleansed, and standardized for downstream analysis by advanced recommendation algorithms.

CHAPTER 5 ADDRESSING CUSTOMER NEEDS

Based on a number of customer interviews with professional digital marketers who are at the fore front of personalization, the users of recommendation engine are not concerned about the data science (i.e. recommendation algorithms) used to optimize product or content recommendations. What is important yet missing for them is data intelligence such as customer insights and marketing performance analytics that enables them to find out answers to questions such as:

- "Which audiences deliver the highest ROI?"
- "Who exactly are these converters from personalization experience online? I would like to know the customer persona (i.e. profession, age, hobby, and income) based on actual converters. What are the converters' targeting profiles? What products or services are they interested in?"
- "Did the ads reach the right customer at the right point in the purchase process?"
- "How do audiences behave differently on specific channels (online, social, mobile, and offline)? Which channels are most effective driving conversions from different customer segments?"
- "How does cost-per-conversion compare across TV, mobile, search, display, etc? How did each campaign impact other marketing touch points?"
- "Based on real-time customer intelligence, how can I adjust marketing campaigns to improve customer life time value?"

In order to address the questions above, marketers need technologies to activate data that have been historically under looked, hidden, untouched or inaccessible. Furthermore, data comes in many different forms from a wide variety of sources. Instead of fetching and analyzing data from different sources, marketers would like to have a one-stop view of data intelligence that fetches and analyzes data from all sources. Such user needs give rise to increasingly popular data management platforms ("DMP"), which provides marketers with centralized control of all of their audience and campaign data, helping them manage and analyze this data to craft, target and optimize marketing campaigns that reach more of the right people and drive higher ROI for their media spend.

THE EMERGENCE OF A CENTRALIZED DATA MANAGEMENT PLATFORM ("DMP")

As today's marketers find themselves flooded with data, struggling to utilize the variety of seemingly unrelated data streams, DMP provides a centralized data aggregation, integration and management platform that serves the following un-met or under-served customer needs:

Enterprise Customer Needs	DMP Solution and Benefits
Centralized Data Storage/Warehousing	• Stores and makes important data available at one location • Serves as a "bank" for data
Holistic Data Aggregation and Normalization	• Automates data aggregation across multiple digital properties at a central repository • Ingests and normalizes a wide array of data streams
Integration of First-and-Third-Party Data	• Expands the size of foundational dataset • Creates more target audience by integrating first-party data with third-party audience intelligence such as such as purchase intent, behavioral, demographic and site or media conversion information
360 Degree Customer Analytics	• Crafts a unified view of an individual customer based on intelligence across various data sources and platforms • Provides actionable insights to customer behavior and persona; enables marketers to evaluate audience based on their own terms • Optimizes inventory management upon real-time customer buying decisions and shopping patterns
Customer Segmentation and Targeting	• Enables customer segmentations and use that data for targeting across channel marketing campaigns to drive better ROI from online, video and mobile sales funnels
Data Activation	• Activates under-utilized data that has not been mined or used in the past due to a lack of automated data aggregation mechanism from disparate data sources
Cross Channel Marketing and Attribution	• Enables marketers to see how different channels (i.e. display, video, search, etc.) attribute to marketing ROI and design "data-driven" marketing strategies

Besides vertical integration that combines multiple marketing data sets to drive targeting efficiencies, industry executives (marketers and agencies) want DMPs to go beyond display advertising targeting and accomplish horizontal integration across channels, including social, mobile, display and search to create a comprehensive cross-channel view and access of the audience.

In summary, not only is DMP a centralized repository for various sources and forms of customer data, DMP also organizes and standardizes data. It gives merchandisers the ability to identify trends and insights about both audiences and their marketing tactics used to reach those audiences. And after that is done, DMP can be used to optimize any number of marketing or advertising programs such as search, email, display, mobile or any other channel that integrates directly to the DMP. According to a DMP market research conducted by eMarketer in 2014, nine out of ten executives believe that DMP will play a central role in the digital advertising ecosystem.

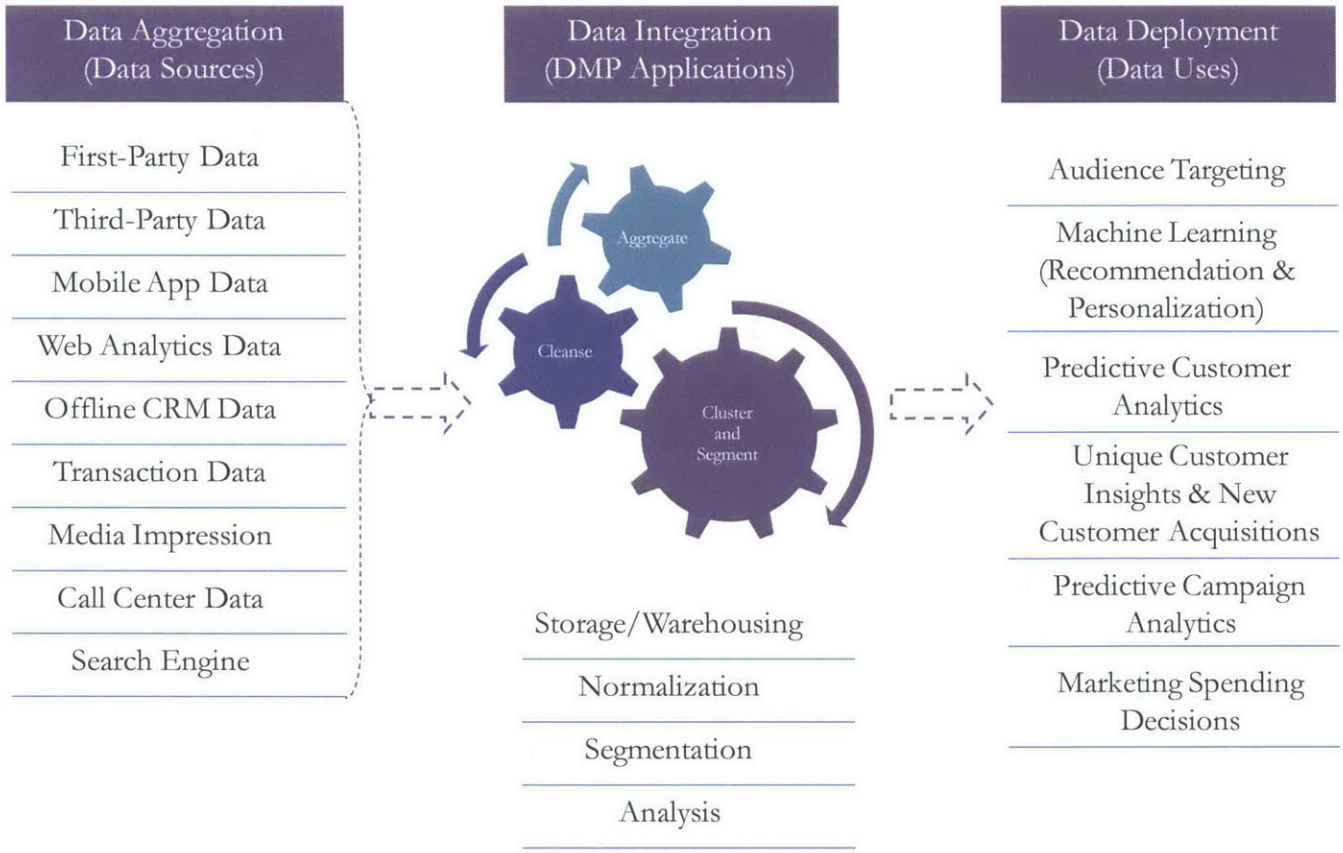


Figure 3: The Data Management Platform from Winterberry Group White Paper[12]

DMP data integration includes ingesting data from different input sources, performing the necessary data cleaning, and finally linking and merging the data before it gets stored into the data warehouse with the integrated schema. The integration has to happen at the finest granular level by linking the same audience or users across different platforms. In order for DMP to pull in all the big data and then use it to optimize multiple marketing channels, it has to have connection to each of those data types and channels. For instance, DMP can have direct server-to-server integration with an ad server or a supply side platform (SSP).

DMP data analytics provide cross-channel reporting and analytics capabilities such as data aggregation, user behavior correlation analysis, multi-touch point attribution, analytical modeling, etc. Moreover, DMP should be delivered through cloud-based software-as-a-service (SaaS) to end users and provider them the flexibility to plug in their own analytical intelligence[13].

What sets DMP apart from CRM is its ability to house a much larger and broader spectrum of information. Markters use DMPs to integrate information from all marketing databases, including a CRM system. DMP can house both structured data, typically quantitative in nature, as well as unstructured data, often qualitative in

nature (i.e. social network data). Once all of these disparate sources are entered, DMPs can standardize them to build a larger, more descriptive picture of a customer or audience base marketers can act on.

The DMP's central role within the advertising technology ecosystem makes it possible to act on this audience intelligence in a variety of ways. It is one of the few technologies that integrates with nearly every other system required to execute and track digital advertising programs: marketing automation, CRM systems, ad servers, dynamic content servers, email marketing tools, attribution tools, ad verification software and much more. This positions the DMP as the furnace of the digital ad engine – a capability that has only been leveraged within the last couple of years.

> *"18 months ago, a DMP was just a big box sucking in data.Now you have two branches emerging: one is data marketing platforms, which allow us to activate all of that data for targeting and more efficient ad delivery, and then there is the data analytics side, which allows us to use the data to better inform online and offline marketing decisions."*
>
> Mark Zagorski, CEO of data provider eXelate

DMP Competitive Landscape

Based on established DMP client base, proprietary technology, and scale, the top DMP vendors include: Adobe, Aggregate Knowledge, Blue Kai, and [X+1].

Key Players	Profile and Competitive Advantages
Adobe	• Adobe® AudienceManager is the industry's first data management platform that consolidates audience information from all available sources. It identifies, quantifies, and optimizes high-value target audiences, which can then be offered to advertisers via an integrated, secure, privacy-friendly management system that works across all advertising distribution platforms. • What really sets Adobe Audience Manager apart is its integration with the Adobe Marketing Suite, including Analytics and Targeting products. • Adobe acquired: standalone DMP technology Demdex, buying platform Efficient Frontier, campaign management system Neolane, and tag management system Satellite.
[X+1]	• The [x+1] Origin platform offers integrated and open software for data-driven digital marketing. Origin's Data Management Platform (DMP) with multi-channel execution capabilities is powered by a patented real-time decision engine, Web Services APIs, and advanced analytics. • Focuses on predictive modeling, user level decisions, and delivering connected experiences that addresses the challenges faced by marketers today. • A "digital marketing hub" model, which features a DSP, an in-site personalization engine, a tag management system, and a mobile platform among other tools.
Blue Kai	• Blue Kai is the undisputed champion in third-party data. It offers clients instant access to hundreds of third party data sources for more centralized management of audience insight generation and targeting. It provides DMP, mobile DMP, audience data, and audience analytics for marketers, publishers and agencies. It also has a data exchange platform that helps data providers monetize their data. • Clients are attracted to its well-established position in the market and platform-neutral

	stance.
Aggregate Knowledge	• Aggregate Knowledge is the only media intelligence company that offers advertisers and agencies an exact science to pinpoint where to reach highest performing customers in a single platform. Its patented media intelligence platform is the DMP that combines both media and audience data, enabling marketers to most effectively allocate media dollars, resulting in increased reach, higher sales and dramatically improved media spend efficiency.

INTEGRATION BETWEEN RECOMMENDATION ENGINES AND DMP

Personalization technology is a must in today's online retail business. However, existing recommendation engines focus on "product-driven" optimizations to target the right product to each visitor. Forward-looking companies such as Verizon demand "experience-driven" optimization to target the right marketing and offering message to each visitor[14]. Speaking at Forrester's Marketing Forum during the height of recession, a senior vice president at FedEx estimated that a 1% improvement in customer retention had resulted in $100 million in revenue. Therefore, there is a lot more that needs to be done besides just product and content recommendation.

This "experience-driven" optimization requires third-party data such as customer demographics, psychographics, and social media interactions. Therefore, the integration between DMPs and recommendation engines has the potential of delivering "experience-driven" optimization that focuses on customer retention and new customer acquisition.

Second reason for the consolidation is that consumers nowadays make purchase decisions across virtually all touch points, multi-channel personalization is required in order to deliver real-time recommendations across platforms. Therefore, recommendation engine needs to be fed with data intelligence collected across different sources and platforms, especially from offline data sources such as transactions taken place in physical retail stores and on mobile devices.

Meanwhile, marketers look to cross-channel campaign management applications that enable them to act on and react to empowered customers rather than just integrate more channels. In the future, marketers will select applications for their ability to orchestrate the always-on, bi-directional, and cross-channel between customers and businesses.[15]

A third reason propelling the consolidation is that professional marketers lack actionable data intelligence to influence or direct the site experience and product recommendations. Decision management helps identify interactions to influence or to which to apply various business rules, such as "if [x], then [y]" rules for optimizing campaigns.[16] Therefore, DMP's proprietary customer intelligence can serve as a basis for marketers to gain unique customer insights, enabling them to test an assortment of personalization strategies different from those

automatically recommended to customers online. This satisfies the customer need of giving recommendation control back to the merchandisers and marketers.

The last and most intuitive reason for the consolidation is that marketers do not want to pay for and deal with different vendors, one for DMP and one for recommendation engine. The most convenient for them is that recommendation engines are integrated into DMPs. That way, recommendations can be run on much larger and diverse sets of data and be pushed out directly to different touch points.

Up to date, most of the recommendation engine providers have not started consolidation with DMPs. For instance, major player like Baynote is still just getting data from online retailer websites with data such as buyers' behavioral inputs during the time the buyers remain on the website. Baynote has not worked with other data sources such as customer offline transaction, mobile platforms, or social media, unable to produce individual level customer insights and predictive marketing solutions to its enterprise clients.

Monetate is at the fore front with DMP integration. In April 2013, Monetate initiated integration with three leading DMP providers: BlueKai, Aggregate Knowledge and [x+1]. These three DMP partners add customer profile and advertising segment data to Monetate's historic and real-time attributes, such as referral and inbound marketing channel, location, device and behavioral data. Such integration empowers companies to align online acquisition targets with onsite personalization to maximize customer conversion engagement, loyalty and revenue.

> *"We are very excited about our partnerships with these leading data management platforms. The ability to manage data and use it for personalization across all channels is mission critical for marketers, and through our integration with these platforms, Monetate is making it easier for our customers to access and leverage this third-party data and use it to create intuitive and relevant experiences for their customers."*
>
> - Colton Perry, vice president of partnerships at Monetate

LEVERAGE SOCIAL MEDIA AND USER MANAGEMENT PLATFORMS TO IMPROVE ROI AND CUSTOMER INTELLIGENCE

In order for marketers to acquire more customers, marketers can leverage social innovations such as Facebook and Google+. However, this should not be confused or viewed as the destination for maintaining an ongoing and engaging relationship with customers. The next wave of innovation is focused on different ways of driving more value for the marketer once the customer has been introduced. As websites incorporate more social functionality, it is essential that they have the ability to collect, analyze and apply the data about their users.

In order to make branded destinations as social and engaging, marketers have increasingly turned to tactics such as social login. Instead of making users fill out lengthy forms to capture identify and social data, social login allows users to quickly log in to a site with existing social identity, thereby giving marketers access to data that can facilitate personalization. According to 2014 Janrain US Consumer Research, 88% of online customers have encountered social login before, and more than half of them use social login. Most of the users of social login claim that they use it because it's faster than traditional registration and means one less password to remember. Those who refuse to use social login do not trust that companies use their data in a secure manner. Therefore, marketers need to "pay" something in exchange for the data. Examples include promises that the data collected from social media is only used to personalize experience or a discount or free trial card for users for adopt social login.

For example, a company Janrain has a professional user management platform that combines the ability to acquire users across multiple digital and marketing channels—web, mobile, desktop apps and social media—with the management of user identity and profile data while delivering valuable customer insights. The open standards, cloud-based platform comprises core products for social login and sharing, social profile data, registration, profile data storage, and single sign-on.

After social profile data is combined into Janrain User Management Platform, a 360-degree view of customers is developed to provide a deeper understanding of the motivations, actions and predictable behaviors of their customers. With this knowledge, marketers can identify which marketing campaign tactics and messages are most impactful, and improve relevancy of offers to help reach their digital objectives of driving product awareness.

APPLY RECOMMENDATION ENGINES TO DRIVE SALES IN BRICK AND MORTAR STORES

While recommendation and personalization technologies are widely deployed to enhance online retail sales, most of the merchandisers view online sales as an extension to traditional brick and mortar stores. Online traffic is a big factor in driving in-store foot traffic. The opportunity to relate online content to offline sales may increase traffic to both sites, including the ultimate purchase and delivery of goods through the traditional store format. Retailers have to ask themselves whether potential local customers can discover them online or whether their omni-channel "big data" marketing strategies are effective at boosting in-store foot traffic.

Currently, large brick and mortar retailers such as Walmart and Macy's are racing to catch up with e-commerce giant like Amazon in order to keep pace with the changes happening in the consumer world. These large

retailers are linking online and in-store inventory systems, speeding shipping, and offering exclusive product sales to counter Amazon. On the other hand, merchandises displayed in physical stores are often very difficult to be tailored to individuals walking into the stores, which pose a new challenge to recommendation engine providers whose analytic tools thrive only in the e-commerce world. Such physical showroom limitations force data scientists to think beyond recommendation algorithms.

Another driving force behind deploying recommendation and personalization technologies to offline retail is that 90% of the world's retail sales occur in stores offline. In order to develop a comprehensive profile of customers, their path to purchase and actual transaction history, recommendation engine providers must obtain access to purchases happened offline. The offline transaction data collection process can potentially be a channel where offline recommendations are deployed. For instance, the biggest brick and mortar bookseller Barnes & Noble saw a significant sales boost after incorporating recommendation systems at its point of sales (POS) systems by recommending books customers may like at the back of their receipts.

CHAPTER 6 TRANSFORMING TRADITIONAL OFFLINE RETAIL WITH RECOMMENDATION ENGINES

TOTAL ADDRESSABLE MARKET

Retail sales in the U.S. totaled an estimated $5.1 trillion during 2013, according to Plunkett Research. Total sales were $4.881 trillion in 2012 according to the U.S Census Bureau. Sales at stores selling general merchandise, apparel, furniture and specialty items totaled $1.221 trillion in 2012. This segment is referred to as "GAFO," which is an important distinction. In contrast, retail sales of all types are considered to include automobiles, gasoline and restaurants. Excluding the $343 billion US online retail sales, $4.538 billion or 93% of US retail sales occurred offline in physical stores. Opus Research estimates that US offline retail and local services together added up to $9 trillion in 2014.

SITUATION OVERVIEW

According to the U.S. Bureau of Labor Statistics, more than 15.2 million employees are employed in the US retail industry (about one out of 10 workers) in 2012. The employment number in US offline brick and mortar retail is expected to gradually decrease because (1) change in customer preference fuels online retail sales that can be delivered with no in-store sales associates, (2) retail companies allocate more budgets on big data technologies than staff hiring, and (3) shoppers in brick and mortar stores do not find sales associates very helpful or different from cashiers at POS terminals.

Besides a shrinking demand for sales associates in physical retail stores, showrooming is a major challenge to traditional brick and mortar retail businesses, especially given the increasing adoption of digital sales and marketing on mobile phones. Showrooming is the practice of examining merchandise in a traditional brick and mortar retail store without purchasing it, but then shopping online to find a lower price for the same item. Online stores often offer lower prices than their brick and mortar counterparts, because they do not have the same overhead cost. Showrooming can be costly to retailers, not only in terms of the loss of the sale, but also due to damage caused to the store's floor samples of a product through constant examination from consumers.

Additionally, manufacturers have started bypassing retailers and forming direct relationships with consumers via online sales and social communities. Before this growing trend, the retailer alone owned the relationship with the consumer, but now the relationship is shared between the retailer and its suppliers.

"Given the new coopetition environment with suppliers, retailers must use analytics to compete". "Their decreasing brand equity means that they need analytics not just for brand strategy and planning, but more in tactical areas such as merchandising and promotional management…There has historically been a wall between the .com area of a company and the rest of the organization. Now, companies such as Sears are investing heavily to gain full digital transparency into the supply chain so that they can change pricing on the fly. Eventually the entire industry, including mid-tier retailers, will have to focus on how analytics can improve their business."

- Ventana Research

Offline and online consumer behavior is merging with online retailers like Amazon, threatening the business models of traditional brick-and-mortar retail businesses. Consumers are increasingly visiting physical stores but using smart phones and tablet computers to search the web to find the best prices for the products they go into the store to investigate.

Retailers have shifted away from focusing on customer acquisition to customer retention. As data proliferates, businesses gain the ability to look closely at how individuals contribute to a company's revenue and profit. Analytics can help pinpoint changes in behavior that matter, and more importantly, indicate what organizations can do to retain desired customers or expand share of wallet.

AREAS WHERE RECOMMENDATION ENGINES COMBINED WITH OTHER TECHNOLOGIES CAN ENHANCE OFFLINE RETAIL PROFITS

Currently, traditional brick and mortar retailers seek to gain competitive advantages from big data analytics mainly to accomplish the following objectives that are inter-related:

- Customer relationship management: develop closer relationships with customers based on a deep understanding of their behaviors and needs
- Product recommendations: deliver targeted advertising promotions and product offers to customers that will motivate the customers to buy
- Inventory management: balance inventory with demand so that retailers are not out of stock or carrying excess inventory
- Pricing optimization: charge exactly the price that customers are willing to pay at any moment
- Marketing mix selection: determine the best use of marketing investments
- Supply chain management: locate stores, distribution centers and other facilities in optimal locations

Besides some of the most analytically savvy retailers such as Walmart and CVS, most offline retailers find it difficult to make use of the enormous data from their POS systems, online transactions, and third party data like social media. They also find the many new analytical technologies quite overwhelming, especially when these technologies can eat into retailers' thin profitability margins while solving only one or two problems at a time. Instead of showcasing each big data technology available for offline retail, this paper researches into the most under-served needs of brick and mortar retailers ("enterprise customers") and in-store shoppers ("retail customers").

Point of Sales (POS)

POS is the place where an offline retail transaction is completed. It is the point at which a customer makes a payment to the merchant in exchange for goods or services. The POS unit handles the sales to the consumer but it is only one part of the entire POS system used in a retail business. "Back-office" computers typically handle other functions of the POS system such as inventory control, purchasing, receiving and transferring of products to and from other locations. Other typical functions of a POS system are to store sales information for enabling customer returns, reporting purposes, sales trends and cost/price/profit analysis. Customer information may be stored for receivables management, marketing purposes and specific buying analysis. Many retail POS systems include an accounting interface that inputs sales and cost of goods information to independent accounting applications.

POS transaction data is identified as the most valuable source of big data for retailers as 93% of the retail sales takes place in physical stores. POS data drives inventory replenishment, in-store staffing, customer relationship management, merchandise accounting and financial planning. However, the top 10 best-known POS vendors such as AccuPOS, AmberPOS, AIMsi, Harbortouch, Springboard Retail and RetailSTAR specialize in designing customized POS for retailers and do not have the expertise in developing recommendation engines that enable merchants to automatically optimize inventory procurement or make product recommendation to customers at time of transactions. For most of the smaller retailers, their POS transaction and CRM data is not stored in the cloud or in a format unusable for downstream data analytics such as product recommendation or personalized marketing.

Since better data is more important than better algorithm, the data scientist community believes that making good use of the POS data may revolutionize many aspects of retail, including lifting average dollar sales per customer via personalized product recommendations and speeding up inventory turnover by basing inventory procurement on a deeper understanding of consumer preferences. As a result, a few new trends are emerging in the world of offline retail:

- Traditional POS vendors start to develop could-based platforms to provide real-time POS data.
- A rising number of startups are launching monthly subscription fee-based mobile POS systems (iPhone or iPad as cash register) for small to medium businesses and offering store-level data analytics for free (i.e. Square enables payments with mobile devices at all of Starbucks' existing POS systems). According to a recent research from IHL Group, 28% of North American retailers had planned to adopt Mobile POS in some form by the end of 2013. Sales of mobile POS equipment hardware and software in retail are now a $5.7 billion business worldwide and continue to grow rapidly. It is the single fastest moving trend in retail since Internet was added to the stores.
- POS is being integrated into retailers' loyalty programs to facilitate better customer relationship management and personalized customer experience at checkout (i.e. automatic reward redemption based on shoppers' purchase history, personalized product recommendation or discount promotions at back of the receipts that motivate future in-store visits)

INDEX

One of the noteworthy innovations in retail POS is Index, a new personalization software company from the original members of the Google Wallet team that offers top-tier, brick and mortar retailers (i.e. the Macy's or the Best Buys of the world) a personalization software integration that plugs into retailers' POS terminals, which helps these retailers recognize their customers across channels beyond just credit card history, and parse through the data from their purchase history both online and offline. Index has raised $7 million in a Series A round led by Eric Schmidt's Innovation Endeavors, Khosla Ventures, AIMCo and 819 Capital.

The software is downloaded on a retailer's POS, and can then link in-store, online, mobile and social engagement with the retailers. For customers who opt-in, retailers can deliver personalized service, similar to the level of personalization customers get on Amazon. The software includes the ability to provide a linked identity and enable retailers to develop unified customer profiles and deliver truly personalized service.

Technology	Functions
Integration with POS	• With the POS integration, in-store transactions are connected to unified Index customer profiles, which also link omni-channel engagement and marketing efforts to in-store conversion. • Personalization is delivered right at POS, even without membership in loyalty program. By analyzing a customer's individual purchase behavior, Index can deliver personalized offers, messaging, or product recommendation directly on paper receipts and to mobile devices. • New tender processing: retailers of complex tender offers (i.e. coupons, offers, points, rewards) can use Index to resolve all the payment issues related to a wide array of tender offers. Actions like Facebook likes can instantly be redeemable in store.

Integration with Existing Mobile Apps	• Index software can be integrated directly to retailers' existing mobile-apps. With this integration, retailers can achieve real-time connections to customers so that they can deliver personalized messaging and premium service through the apps. • Index enables a mobile checkout at retailers' existing mobile apps instead of pushing shoppers to use a third-party wallet application. Retailers' private label credit card or prepaid card can go mobile with Index, and no new hardware is required for the shoppers. • Index can authenticate any iPhone or Andriod user based on his geo-location (the physical presence of his phone in store) and a unique Index PIN. The customer does not need to take out his wallet or phone to checkout.
Integration with Online Retail, Display Advertising, and Social Media	• In addition to brick and mortar stores, Index can be integrated into any online context. Index profiles can be linked to e-commerce customer accounts, which connect offline and online behaviors. By linking accounts such as Facebook and Twitter, retailers can harness the power of social media. Retailers can use Index to manage its marketing via display advertising, social, and email campaign, which gives great visibility into marketing campaign performance across channels. • By combining data from offline, e-commerce, social, mobile and advertising, Index can give retailers a 360 degree view of their customers. Index uses each of these touch points to inform its personalization engine and to communicate personalized messages or offers to customers. Index can do this automatically and give real-time insights to retailers. • Customers' saved special offers or coupons, whether in-store, online, or on mobile, can be automatically applied at checkout with no QR codes or redemption codes.

Mobile Retail

It is the first time that consumers with technology are taking the lead in mobile shopping whereas retailers are trying to catch up. Mobile retail is not just a new channel. It changes the nature of the retail experience. Purchases via tablets and smartphones are expected to comprise a large portion of e-commerce purchases, with eMarketer predicting that m-commerce sales will reach US $87 billion by 2016.[17]

"Mobile is more transformative than the web. E-commerce brought the store to the web, but mobile brings the web to the store", said Wendy Bergh, VP of Mobile and Digital Strategy at Walmart.

While retailers cannot reconfigure a physical space to personalize it, Shopkick co-founder Aaron Emigh advocates that mobile phones can be the personalization lens when customers walk into stores. This is about importing the things that are best about shopping online into the physical world where they weren't available before. Because of the ubiquity of the always-on, always-connected mobile devices, it is now easier than ever to collect consumer preference and behavioral data in an offline retail environment. The offline retail supplies data such as the frequency of customer in-store visits, their reactions to mobile digital offers, duration of their stay in store, and transaction history at point of sales. Such data completes the profile of a customer who shops both online and offline.

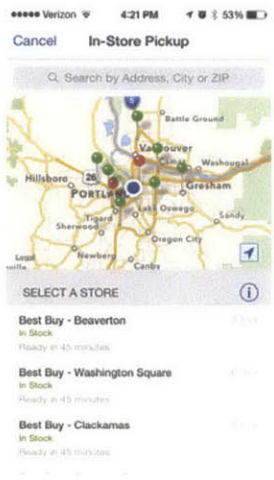
Mobile is a huge conversion opportunity for local retailers to gain a competitive advantage over competitors. The following table illustrates the functions for which shoppers currently use mobile devices in brick and mortar stores.

Application	Function	Future
Extended Packaging	Consumers access additional information about products through mobile phones	Personalized services based on consumer preferences
Coupons	Mobile phones are used to capture, manage and redeem coupons and discounts	Interoperability with POS, loyalty, personalization and location-based services
Loyalty	Mobile phones replace physical loyalty cards and provide personalized mobile services	Integration with digital wallets
Advertising & Promotion	Advertising and promotional information is sent directly to mobile phones	Initiatives driven by brands and supported in-store by retailers
Payment	Mobile phones serve as retail check out points (i.e. mobile POS) anywhere and anytime in store	Will become a reality globally as phones are enabled with RFID technology
Self-scanning and self-checkout	Consumers in supermarkets use their mobile phones to scan products as they shop, enabling them to check out with no assistance	Personalized services based on consumer preferences
Store Location	A map is displayed on a mobile phone showing where stores are located where consumers can buy a product	More integrated approach to store location, product availability and mobile shopping
In-store Navigation	Consumers find products more easily while in a store	Consumer access to stock information
Shopping Lists	Consumers build a shopping list on their mobile phones and access it when doing their shopping	Further development such as integration with social networks
Mobile eCommerce	Consumers can browse, order and pay for products directly from their mobile phone, anytime and anywhere	Integration with eCommerce site and consumer loyalty information/profile

Source: *Mobile in Retail, Getting Your Retail Environment ready for Mobile,* a GSI MobileCom White Paper

ebay mobile

Since 2008, eBay has acquired a number of mobile apps that highlight its strategy to different from Amazon by revolutionizing offline brick and mortar retail. Among its suite of offline retail mobile apps, which includes *PayPal*, *RedLaser* that finds product information and price, *StubHub* that brings the world's largest fan-to-fan ticket marketplace, *eBay Fashion* and *eBay Motor*, eBay also launched an innovative mobile app *eBay Now*, which allows customers to shop on their mobile phones and the purchases will be delivered to the customers' homes within one hour for a $5 fee.



Additionally, eBay also significantly updated its mobile apps with new sharing and personalization features with updates like in-store pickup, which are adopted by large retailers such as Best Buy, Autozone, and Toys R Us. Outsourcing some of the digital strategy and technological operations to eBay frees up companies to focus on what they presumably do best: Make and market their own products.

eBay's apps now also include AirDrop sharing, which lets consumers share content with nearby friends and family. The app also pulls in user's personalized feed directly into the homepage of the app. The feed is aimed at helping consumers discover new items based on their interests. Separately, eBay has also rolled out a new tool to its apps that Pinterest began to offer in 2013. Consumers can share items directly to their Pinterest boards from eBay apps. Consumers can also swipe through images directly from the View Item screen, and there are new features for sellers to streamline the process of listing an item online.

Table 3 eBay's Noteworthy Acquisitions Targeted to Enhance Offline Retail

Company	Business	Acquisition Price
RedLaser (mobile app)	With over two million downloads, RedLaser is the top-selling iPhone barcode-scanning application for comparison shopping and product information using a mobile device.	$10,000,000
Milo (shopping engine)	Milo lists real-time in-store product inventory for over 50,000 stores accross the country; featuring over 3 million products from Target, Macy's, Best Buy, Crate & Barrel and more. For eBay, Milo represents just another way to get into the $917 billion market of online research to offline buying. eBay plans to bring the inventories of its sellers to Milo.	$75,000,000
WHERE, Inc. (local search and recommendation)	WHERE, Inc. is best known to consumers for its location-based discovery mobile apps, but the company also runs a hyper-local ad network that handles more than 2 billion ad impressions monthly. It has a patent for geo-fencing technology, which creates a user-defined virtual perimeter for a geographic area and allows users to send and receive notifications based on their exact whereabouts. eBay would use WHERE, Inc. to expand its mobile commerce efforts.	$135,000,000
HUNCH	Hunch is a question-and-answer decision engine. It also focuses on building a "taste graph" to connect web users around their affinities. The site uses this data to make predictions about its users and provide them with personalized content recommendations. Hunch will enable eBay to move beyond standard item-to-item recommendations and use a broader variety of members' online tastes and interests	$80,000,000
Braintree	Braintree helps mobile businesses around the world accept credit card payments by providing a merchant account, payment gateway, recurring billing and credit card storage. Braintree's payment platform powers next generation innovators such as Airbnb, OpenTable, TaskRabbit and Uber, which are creating compelling new consumer experiences and disrupting legacy business models.	$800,000,000

Magneto	Magento offers an open-source commerce software suite that allows merchants to build flexible online stores that can be customized easily. Tens of thousands of merchants use Magento and its newer software-as-a-service (SaaS) solution called Magento Go. By swallowing up Magento, eBay is building what it calls X.Commerce, an open platform that can offer a wide array of end-to-end services to merchants, providing everything from local inventory data and discounts to historical information on pricing, transactions and browsing. It then offers tools for payment and helps close the loop on transactions so retailers know how it all came together.	N/A

Geo-Location Targeted Advertising

Geo targeting in geomarketing and internet marketing is the method of determining the geolocation of a website visitor and delivering different content to that visitor based on his or her location, such as country, region/state, city, metro code/zip code, organization, IP address, ISP or other criteria.[18] Brands and agencies can build local strategies through the location based advertisement in applications or mobile websites, with SMS, MMS or push messages, and on search engines too.

According to mobileSQUARE, offline retailers from a variety of sectors such as apparel, automotive, hotel chains, restaurants, and airlines have expressed strong demand for geo-location targeted advertising. The following statistics from a whitepaper research conducted by MobileSQUARE[19] have illustrated the business potential and growing significance of geo-location targeting in mobile advertising:

- 94% of purchases are still made at physical locations. That means geo-location will be considerably more appealing to retailers than developing a transaction-enabled mobile site or app.
- 50% of all iPhone iOS and Android data traffic is available to mobile ad networks for geo-location targeting purposes.
- More than 50% of mobile users have performed "shopping activities" (i.e. price comparisons) and 38% have actually made a purchase using their mobile.
- 39% of consumers said coupons for nearby stores were one of the most appealing aspects of location-based advertising.
- 16.7 million US mobile subscribers used location-based "check-in" services on their phones in March 2011, of which 12.7 million check-in users were using mobile phones.
- 80% of US consumers are prepared to share a little of their location data provided they get something back in return and their data is not shared.

- Location-relevant ads increase the digital mobile advertising average mobile click-through rate (CTR) from 0.5-0.8% to 1.5-2.0% and up. The increase in CTRs is even greater when compared to desktop Internet usage: 10 to 20 times greater.

Technology that enables geo-marketing range from GPS-based latitude and longitude coordinates shared via opt-in in application environments to ZIP codes shared by publishers based on opt-in user profiles they have collected. Today, the majority of geo-location volume in determined the same way as online, using the IP address from WiFi connections to derive latitudinal-longitudinal coordinates.

For geo-location targeting, it is important to mention a new technology beacons. Beacons are small and relatively inexpensive pieces of computing hardware, often wrapped in silicone or some other light material with adhesive on the bottom that can be affixed to a wall or countertop or plugged into a computer or electrical outlet. They use low-energy Bluetooth to transmit messages to mobile computing devices, such as smartphones or tablets.

Apple's iBeacon service, built into its new iOS 7 devices, uses the very same Bluetooth technology and allows retailers to add geo-fencing capabilities to their app design. iOS architect Conrad Stoll believes that iBeacons will lead to a host of interesting geographic applications. "Apple's announcement of iBeacons at WWDC is also really exciting for mapping apps," he says. "Developers will be able to build really engaging experiences around points of interest that would have been very difficult to do before."[20]

shopkick

In the world of geo-location marketing, Shopkick is one of the most used mobile shopping apps and an early mover with its shopBeacon service that detects when shoppers are in or near stores and offers rewards targeted to them. Shopkick's users obtain Kickbucks, the app's virtual currency, when their phone receives a signal from a Shopkick in-store transmitter or scans a bar code. For example, one gets 70 Kickbucks just for walking inside Best Buy. The process means check-ins cannot be faked like on other popular GPS-based location apps. The exchange rate is 25 Kickbucks to 1 Credit.

Shopkick, which has raised $20 million in rounds led by Greylock Partners and Kleiner Perkins Caufiled & Byers, is giving away Kickbucks to users even if they don't go inside — simply using the app to view a profile of a business that you're within 500 feet of will get you the currency. This helps engage users even if they don't visit stores.

Shopkick has partnered with Simon Property Group, owners of 100 shopping malls, plus many Best Buy, Sports Authority and American Eagle stores to roll out their walk-in promotion. Shopkick's hardware-to-mobile walk-in system was designed to work well in malls where a high density of businesses and low wireless signal can cause problems for GPS-based services. In the future, the app will reward users for walking to certain departments of retail locations. Users can also visit convenience stores or pharmacies and earn 25 Kickbucks for scanning bar codes of items including Kraft Philadelphia Cream Cheese and Tide detergent products.[21]

By ensuring customers are actually inside stores and physically handling products, Shopkick offers businesses something worth incentivizing with discounts, gift certificates, and Kickbucks redeemable for Facebook Credits, donations to charity, DVDs and more. Shopkicks prevents gaming of the system by only allowing one Shopkick account per phone number and by limiting how often Kickbucks can be earned by walking into a certain location or chain, or scanning a specific item. Shopkick's combination of security for businesses with quality incentives and fun for users could make it the killer location based loyalty app, all without having to tell people where you are.

Digital Wallet

A digital wallet refers to an electronic device that allows an individual to make electronic commerce transactions. Digital wallet is another channel where participating retailers can offer personalized coupons and promotional deals based on customers shopping history. The ultimate objective of digital wallet is not just a mobile payment platform hosted by a third-party company because smaller retailers may not be able to invest in mobile POS or mobile e-commerce platforms. The customer transaction data collected by digital wallets are important to participating retailers of the digital wallet app, and the digital wallet provider should implement recommendation algorithms to help participating retailers make personalized offers to customers who shop via digital wallets.

App-based digital wallets also enable the integration of value-added offerings geared towards consumers, such as virtual loyalty cards or coupons. Some digital wallet operators have also begun to offer permission-based, geo-location services, enabling retailers to better target consumers who are nearby their physical location through push notifications of specialized deals based on their mobile shopping list or browsing history, among other factors. These value-added offerings are used to battle "showrooming" – incentivizing consumers to purchase goods within the store, rather than searching online for the lowest price.[22]

For example, the new version of PayPal digital wallet allows users to create a personal list of items. Via PayPal's digital wallet, the user can search for items, compare prices and create lists of things he or she wants to buy. PayPal's digital wallet will then find deals and coupons for these items on the user's list whether the user is in the store or online. Additionally, the user is able to create spending rules that tie specific cards and payment instruments to specific merchants. So one can create specific "set asides" like travel funds and set rules by purchase amount. Specifically, one can earmark a bank account for all grocery store purchases, and a specific credit card for entertainment and travel directly from PayPal.[23]

While accepting digital wallet offers a number of advantages for brick and mortar retailers in the age of smartphones, there are several barriers that have prevented this trend from large scale implementation. One key challenge is that adopting digital wallets at the POS puts them in direct competition against giant rivals such as Visa and MasterCard that dominate the payment processing in the offline retail space. A number of companies including American Express and Visa have already enticed smart-phone users to use their phone as a digital wallet. PayPal attempts to solve this issue by integrating plastic card capabilities through their PayPal Anywhere platform using their partnership with Discover Card.

Another major challenge is the security of digital wallets. What happens if one loses his smart phone and someone else goes on a spending spree? Advanced encryption technology and the password required before you wave are safeguards. But if fraud occurs, the legal protections available vary dramatically depending on how one fund his digital wallet.[24]

Table 4 Comparisons of Digital Wallets[25]

Digital Wallets	Pros	Cons
Google wallet	• A large user base from Google • In the attachment options of the compose page in Gmail, one can click the money sign and select which linked funds you'd like to send money from. If the recipient is already a Gmail and Google Wallet user, then the money will be deposited into his or her Google Wallet account once the transfer is accepted on the other end of the email • Anyone with a Gmail account just needs to link a bank account, debit card or credit card to get started • High limit of $10,000 per transaction and $50,000 per five-day period	• Fees for debit and credit card transactions, with 2.9% charged to the sender • Can send money only in the U.S

PayPal	• Various funding methods • International transfers • Widely used • High limit of $10,000 per transaction • The sender decides which party pays transaction fees • All transfers and receipts are handled through the service's webpage or mobile app	• 2.9% of online debit or credit card transfers plus a $.30 fee, is tacked on to each transaction, as opposed to no-fee transaction with linked bank accounts • International transfers charges range from 0.5% to 2% for bank account transfers and 3.4% to 3.9% for credit or debit cards
Square Cash	• Eliminated transfer fees for debit card accounts. Square Cash is completely free with no hidden fees • After attaching a debit card, everything else is as easy as emailing the money	• No support for debit card accounts • Weekly limit is $250 unless you link a mobile phone number and Facebook account, or verify your full name, part of your Social Security number and date of birth — then it's raised to $2,500 • Only available in 48 U.S. states
venmo	• Send and receive money with a social networking twist. Transactions between friends can then be posted to the app's real-time Facebook-like newsfeed with personalized messages and comments if the user so chooses • No-fee transactions for bank accounts and "most debit cards"	• Available only in the US • Transaction fee of 3% for credit card transfers • $3,000 transfer limit per week.

Retailer Inventory Optimization based on Personalized Product Recommendation

While recommendation engines have been widely used by e-commerce to provide personalized product recommendations, few retailers have applied their new customer preference insights that are generated by the recommendation engines to their inventory procurement for cost saving and faster sales turnover. As this paper previously discussed, recommendation engines can be applied to a wide range of data from offline to online and from first party data to third party data. The potential of extending the use of recommendation systems from recommending existing in-stock items to optimizing inventory based on new insights of individual customers cannot be under-estimated. In other words, in the future, inventory can be personalized to enhance customer loyalty and improve average dollar sales to the same customer.

In order to implement recommendation systems to optimize inventory procurement, retailers can integrate its recommendation engines at any check-out point such as in-store POS, mobile apps, and online retailing sites. The transaction data at all check-out points will be automatically captured and analyzed in real time in order for the recommendation engines to recommend inventory for procurement based on individual customer preference. After integrating more disparate data sources such as social media, online cookies, customers' shopping and browsing history, recommendation engines can provide personalized product recommendation to

customers for products that the retailers may not even carry. Retailers can conduct the purchase from the manufacturer on behalf of the customer with zero warehousing or distribution costs.

CHAPTER 7 CONCLUSION

MULTI-CHANNEL RETAIL INTEGRATIONS AND RECOMMENDATION SYSTEMS

Most of the US top 500 retailers today have adopted omni-channel sales and marketing, which typically include physical stores, online retail sites, mobile e-commerce apps, and social media. As a result of omni-channel retailing, the border line between offline is becoming more obscure. Retailers who used to operate channels as separate businesses have to rethink how to combine the unique capabilities of all channels to provide a cohesive customer experience. In other words, channel integration is becoming a more and more issue for retailers.

Recommendation systems are effective at helping retailers take a holistic view towards all channels as recommendation systems require data from all sources to be integrated and processed in real time. With recommendation systems and centralized data warehouses like DMPs, retailers can scrutinize the interactive dynamics among different channels and optimize resource accordingly. For instance, personalized promotional emails of customers' favorite brands not only bring sales to e-commerce; it can also bring sales to the brand's physical stores, which encourages more cross selling activities.

PRIORITIZE CUSTOMER EXPERIENCE OVER TECHNOLOGIES

The thesis has demonstrated a variety of new technologies that complement recommendation engines, including DMP, social log-in, geo-locating targeting, POS, and mobile payments. However, the most effective use of recommendation engines varies case by case, and retailers should focus more on improving customer experience and worrying what customers worry.

For instance, while digital wallets, combined with recommendation engines, can provide attractive personalized coupons that induce an increase of in-store transaction volumes, customers worry more about losing their phones and therefore exposing their confidential payment information to strangers more than the convenience that digital wallets bring. From the customer's perspective, benefits should be weighed against potential losses, including loss of privacy and security. Similarly, retailers should prioritize customer engagement over technological advancement. Sometimes, with recommendation engines performing at the back end, customers are engaged with little technological presence at the shopping scene.

COMMODITIZATION OF RECOMMENDATION ENGINES

An apparent trend is that retailers with in-house technical capabilities prefer to build their own recommendation engines in house. While third-party service providers may provide more sophisticated computational algorithms or more comprehensive services across channels, retailers are concerned about the security of their proprietary customer data and the time delay when the retailer needs to implement changes to manually set recommendation rules. Aggregate Knowledge had Overstock as one of its recommendation system clients for one year. Overstock terminated the contract with Aggregate Knowledge early in order to develop its own recommendation system. Since there are few patents on recommendation engines and most of the knowledge is publicly available, the technology is hard to be protected.

However, the risk of technological commoditization is best mitigated by continuous improvement in ROI for retailers, which is a much tougher task for a newly developed recommendation system to accomplish. To remain competitive, vendors of recommendation systems need to stay relevant and different themselves with economies of scale in technical support and development expertise.

APPLY RECOMMENDATION SYSTEMS TO THE ENTIRE VALUE CHAIN IN RETAIL

A value chain is a chain of activities that a firm operating in a specific industry performs in order to deliver a valuable product or service for the market. The idea of the value chain is based on the process view of organizations, the idea of seeing a manufacturing (or service) organization as a system, made up of subsystems each with inputs, transformation processes and outputs. Inputs, transformation processes, and outputs involve the acquisition and consumption of resources - money, labour, materials, equipment, buildings, land, administration and management. How value chain activities are carried out determines costs and affects profits.[26]

As the thesis suggests, recommendation systems have the potential of optimizing the entire value chain, starting from downstream sales all the way to upstream raw material purchases, all based on insights about customer preferences. When raw material orders are placed tailored to end customers' likings, not only can inventory turnover faster in a shorter amount of time, retailers can save warehousing and transportation costs, which contribute to a higher bottom line profit.

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