



Retail Analytics: *Putting Data to Good Use*

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Introduction

There is some debate as to whether or not Retailers are as numbers-addicted as some baseball fans we know (seriously, the “Pythagorean Expectation” ?!?). That said, retailers have made a lot of progress since the early days when quarterly and annual financials were the main data to be analyzed. As information technology started to infiltrate the supply chain and the store, operations in both became more efficient while generating data that heretofore had seen little in the way of serious analysis. As retailers sought to make better use of these data to further enhance efficiencies, budget was spent to hire analysts and procure applications that could assist their efforts.

The application of technology has given rise to Big Data, which in turn has increased the need for analytical effort (in Retail, a fair portion of this effort is centered around data related to customers and their purchase tendencies, in hopes of being able to more accurately target promotions). As retailers have matured in their need for data, they have also matured in their abilities to analyze data. Long story short, retailers have come a long way from the early stages of CRM (think 1990’s supermarkets with loyalty programs) when hard drives were filled up with customer names, addresses and phone numbers but little was done to make that data actionable. Nowadays, supply chain and store operations generate more data than ever before, and analysis of various levels and types (Descriptive, Predictive, Prescriptive) can be performed, in some cases using natural language queries. Planned analytics-related IT spend continues to increase (for 2016 the planned spend increase for Predictive Analytics is 6.5% over 2015) as retailers continue to gain advantage over their competition.

The purpose of this study is to provide the retail community with a broad overview of Analytics as is currently found in Retail and Hospitality. We will present a broad overview of analytics in retail, along with the related trends and barriers. We will also provide a description of each major type of analytics currently in use in Retail, as well as rankings and positionings of the various vendors providing the technology.

Retailers are encouraged to use these charts in discussions with their vendor partners. It is our intent that they provide unique insights into vendor strategy and provide thought-provoking questions as we all move through and prosper in the Era of Intentional Innovation.

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Background and Market Overview



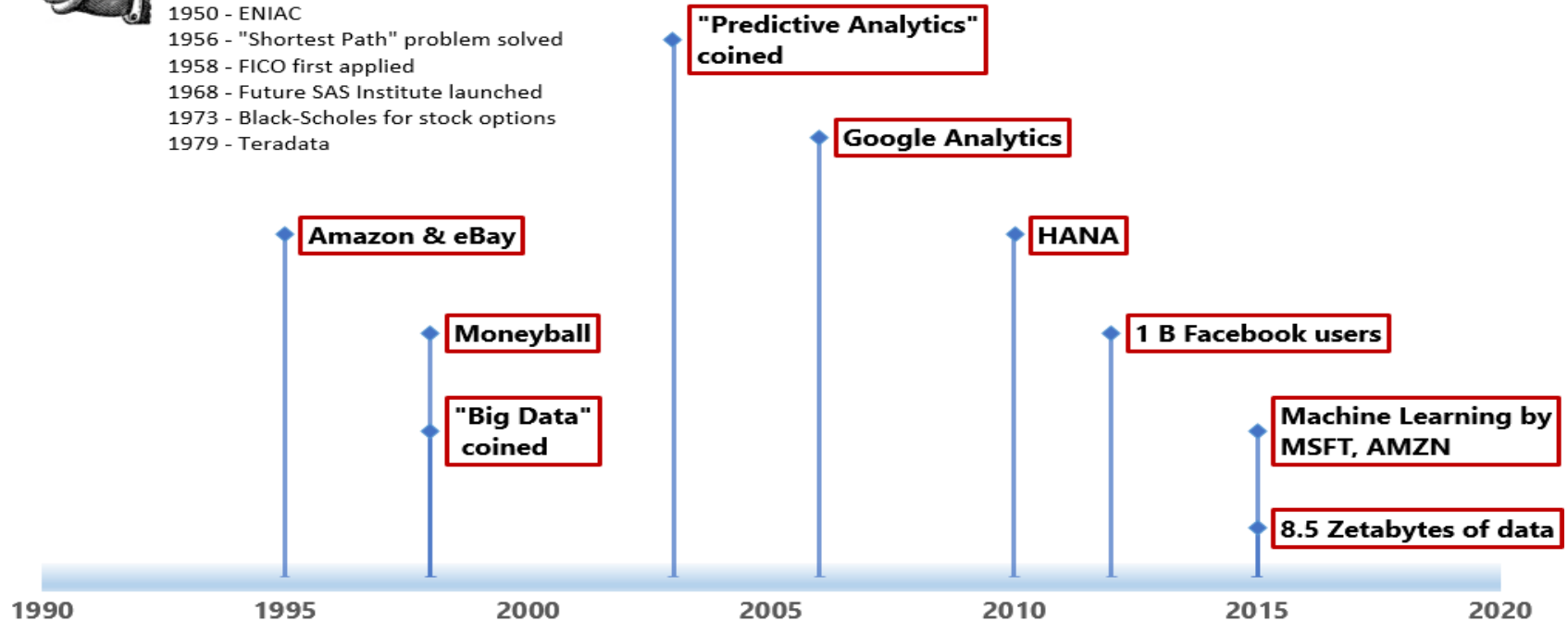
Quick History Lesson

Analytics Development Timeline

Other Related Developments



- 1688 - Lloyds of London underwrites sea voyages
- 1940 - Turing & Good decode Nazi messages
- 1944 - Manhattan Project
- 1950 - ENIAC
- 1956 - "Shortest Path" problem solved
- 1958 - FICO first applied
- 1968 - Future SAS Institute launched
- 1973 - Black-Scholes for stock options
- 1979 - Teradata



Source: Various

Quick History Lesson, con't

Strange as it seems, the leading-edge technology that we address in this study actually has its roots before the turn of the century...the last century, that is. In 1880, Alexander Graham Bell and his assistant Charles Tainter invented the photophone, a device that allowed for the transmission of speech on a beam of light. Simply, this was the earliest precursor to fiber-optic communications, which serves as the main backbone for the Internet. Before the PC, Retailers were interested in location-based technologies, even though they didn't know to call it that. They were interested in knowing where their customers lived, where their delivery fleet was, and where their customers spent time in their stores, among other things. These data points were very valuable, but the technology of the time made obtaining the data very difficult.

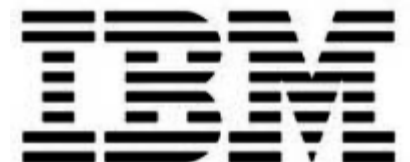
Prior to the 1980's – Prior to the invention of reel-to-reel film media, determining the location of a customer in the store was done through direct human observation. The early days of reel-to-reel showed some promise, but the development process was cumbersome and time consuming. This changed with the advent of filmless cameras and VCR's during the 1970's and 1980's. As the cost of these small, high-resolution cameras came down, retailers adopted them in droves. The development of the Internet eventually gave rise to IP cameras in the mid-to-late 1990's, and these have been successfully deployed throughout the Retail enterprise.

1990's – At the time when parachute pants were still popular, GPS devices, heretofore the sole domain of the military, were developed and widely deployed in delivery and executive fleets. The rise of the Internet during this decade opened a whole new world to retailers and consumers alike.

2000's – Consumer technologies, most notably smartphones, have advanced and been widely adopted since the turn of the century, when Japan's NTTDoCoMo released their first smartphones. Adoption in North America didn't begin until 2002, with the release of Danger, Inc.'s Hiptop (aka T-Mobile Sidekick). Around the same time, Windows and Blackberry devices started appearing, and then in 2007 Apple released the first iPhone.

2010's – Since 2007 Apple has released 12 different models of the iPhone, and every model came with Bluetooth, and all but the very first came with a GPS chip. Every other smartphone manufacturer can make similar claims. Smartphones have become so ubiquitous that they began to disrupt markets once dominated by other devices, like PDA's, wristwatches, portable radios, and GPS devices, etc.. Seriously, when was the last time you bought a road atlas?

Some of The Players



Technology Descriptions

**Many Players,
Many Approaches**



Retail Analytics

Overview

- Retail Analytics has to do with using data collected in the retail enterprise in order to characterize aspects of that enterprise and its operations. The data may take the form of customer information (name, address, purchase history, etc), product information (case lot, cost, margin, etc), transaction information (payment type, number of items, price of items, etc) or any number of elements that may be measured and recorded.
- Analysis complexity can run from simple (sales per store) to complex (forecast of multiple sales outcomes for multivariant pricing scenarios).
- Software can be either a stand-alone application or a part of a larger package. Specific software intent can vary widely (consider financial packages that range from Quickbooks through Great Plains up through Oracle or SAP Financials). Systems integration issues will be dependent upon past and current relationships between software providers, as well as a host of other ancillary issues.
- Specific enterprise functions that are ripe for analytics applications include:
 - Customer Relationship Management / Promotions
 - Supply Chain
 - Merchandising
 - HQ Operations
 - Store Operations
 - Marketing & Finance
 - Loss Prevention

Descriptive Analytics

Description

- This is the simplest class of analytics that allows one to condense big data into smaller, more useful chunks of information. In short, Descriptive Analytics summarizes what has happened in the past. Data examples number in the thousands and might include storecount, lanes per store, SKU's in the supply chain, store-based employees and many others relating to the retail enterprise. In addition, there is a data group that relates to financial reporting, and another that relates to online interactions (page views, post mentions, etc). We estimate that between 70-80% of all retail analytics fit in this category. Vendors include essentially anyone that provides software solutions to the retail industry.
- We would be remiss in not pointing out that while Descriptive Analytics deals with what happened in the past, there are two classes of this type of analysis. The predominant class deals with historical data on an as-needed basis; that is, the data is collected in either an active or passive manner and then analysis is done at a time of convenience for the analyst, those to whom he/she is reporting, and the enterprise computing resources. The second class of analysis is done in essentially real-time; that is, the data is not only actively collected, but it is analyzed immediately. Examples of this second class of Descriptive Analytics might include a retailer's ability to determine the exact quantity of any number of SKU's sold in each of their stores in order to direct supply chain efforts. Another example might be Zebra's MPact Platform (Cozumo is their partner), which converts POS scan data into targeted offers in real-time.

Applications

- The types of analysis that can be performed using descriptive analytics is limited only by the historical data available. Some specific examples would include historical stock price, store count, quarterly or annual sales (by enterprise, region, cluster, store, department or SKU), stock level by SKU, website visitors, number of abandoned shopping carts, shrinkage (per store, department or SKU), etc.

Predictive Analytics

Description

- This is the next most-complex form, and it accounts for between 15-25% of all retail analytics depending on the segment. Simply, it uses historical data in order to make predictions about what might happen in the future. It employs data mining, statistical modeling, and (in some cases) machine learning techniques to develop probabilities of hoped-for future events. In short, it allows the retailer to use data that he/she already has to predict data they do not yet have.
- The buzz concerning Predictive Analytics has increased with the rise of Big Data, and retailers have been adopting it in droves. While each retail segment can benefit through Predictive Analytics, we think that the retailers in the Food/Grocery segment are the ones who have the most to gain for two reasons.
 - Incentive – These retailers have the thinnest margins in all of retail, and therefore have the biggest incentive to not just survive, but to thrive.
 - Deep Data – While Supermarkets don't necessarily have the greatest track record in terms of making good use of store-based data, no other segment has the experience or the kind of data that Supermarkets do (think loyalty programs over the past 15 years).
- Key solutions in this arena include IBM's SPSS suite, SAP Business Objects suite, SAS Visual Analytics, Oracle Data Mining, and Microsoft Advanced Analytics (result of Revolution Analytics acquisition)..

Applications

- While we'll leave the deeper discussion for another time, retailers can benefit from Predictive Analytics in areas such as promotions (including overall campaign management as well as shopper-specific targeting), pricing (especially as it pertains to end-of-season closeouts, where pre-buy decisions can be made to reduce the need for markdowns and post-buy decisions can be made to maximize margin), and inventory management (stocking levels by store to increase sales and decrease markdowns).

Prescriptive Analytics

Description

- Prescriptive Analytics is the process of using both Descriptive and Predictive Analytics to determine the best outcome among various choices, given known parameters.
- Some view Prescriptive Analytics as the third and final phase of business analytics. We instead look at it as another tool in the retailer's analysis kit, preferring to leave the door open to the possibility of other analytics capabilities being developed beyond what we now know.
- Another way of looking at Prescriptive Analytics is to say that it anticipates what will happen, when it will happen, and why it will happen. It can be a set of decision options on how to take advantage of a future opportunity or reduce a future risk. Prescriptive Analytics can be iterative in nature, taking in new data to re-predict and re-prescribe. In so doing, it can improve prediction accuracy and therefore prescribe better options.
- Current Prescriptive Analytics efforts incorporate hybrid data, structured data (numbers, categories), unstructured data (videos, images, sounds, etc), and business rules to predict the future and prescribe how to take advantage of it.
- Prescriptive Analytics are the least mature of the current retail analysis capabilities, and therefore have a penetration rate in the 5% range.

Applications

- Some of the initial efforts at using Prescriptive Analytics are pricing (does a retailer need to compete with Amazon, or is there brand-related margin available?) and demand (if we buy X, how much will move by Christmas?). Some of the more known applications include IBM SPSS Modeler, Microsoft Azure Machine Learning and Cortana, Oracle Business Analytics, HP Vertica and SAS Enterprise.

Methodology

Here's how we did it



How We Got Here

This study leverages a variety of resources available to IHL. Market data for some of the technologies in this study remain somewhat sketchy, but reliance upon data received in surveys and interviews of retailers and vendors we have a high confidence that we can “get our arms around” the markets in question. Typically, our process resembles the following.

Step 1 – We leverage our [WorldView IT Sizing Forecast Model](#), a sizing and forecast tool for over 300 retail Hardware, Software, SaaS and Services categories. IHL has been sizing and forecasting the retail / hospitality market worldwide by solution for over 10 years. This provides the upper bounds of the market data and total market size.

Step 2 – We combine this with our [Sophia Data Service](#) that tracks over 4,500 enterprise retailers and hospitality providers (with a minimum of 50 locations) in terms of which vendor’s technology a given retailer / hospitality provider has installed, the total lanes / licenses, the timing of those installations and when they are due to be replaced.

Step 3 – We validate the installs and business sizing for each vendor through public records and vendor / channel interviews. Customer service / traction is validated through existing customer interviews and surveys.

Step 4 – We merge all of this together into a singular view that provides total market size.

This study represents the overall worldwide retail and hospitality beacon systems market as defined in this study. For more information on this study, please see our website or contact us at +1.615.591.2955.

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