

Client application white paper



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Unstructured Big Data: Investing advantages with expanded market sentiments

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Executive Summary

Discovery Patterns [DP] has created an analytic platform for unstructured big data that amplifies the worldwide market insights of human analysts, investors, competitive intelligence professionals and strategic planners. One of the outputs of DP analytics are **Expanded Market Sentiments**. These expanded sentiment discoveries can be used to anticipate actual market movements ahead of prevailing market sentiments. Two case studies will illustrate the process of creating expanded market sentiments, then discovering mismatches and investing opportunities based prevailing market sentiments. This paper demonstrates the power of DP analytics for superior investor/analyst decisions in the era of big data.

Important Terms Used in This Paper

Prevailing Market Sentiment

“Market sentiment is the [current] feeling or tone of a market, or its crowd psychology, as revealed through the activity and price movement of the securities traded in that market. For example, rising prices would indicate a bullish market sentiment, while falling prices would indicate a bearish market sentiment.”¹

Expanded Market Sentiment

Is the revealing of an expanded crowd psychology of the feeling or tone of a marketplace, if investors had a greater scope and depth of competitive insights. Discovery Patterns derives these deeper insights from innovative context, analytic and visualization engines. In general, expanded market sentiments lead prevailing market sentiments. Over time, market sentiments approach expanded market sentiments.



¹ [What is Market Sentiment?](#) Investopedia



Market Theme

A general definition of a theme is a “unifying or dominant idea, motif, etc., as in a work of art.”² McKinsey further defines a theme as opportunities created by long term structural trends.³ In regard to markets, a theme is a unifying idea about a market premise that needs to be maintained or proved to be relevant over time. Themes are rich grounds for early trend discoveries and market sentiment mismatch opportunities.

Structured versus Unstructured Data

Structured data are those information streams that are characterized by numbers associated with quantified market events – as in revenues, earnings, stock prices, future estimates, market shares, etc. The more difficult data sibling of structured data are unstructured data, where it is estimated that 80-90% of all potentially usable business information may originate⁴. Unstructured data is characterized by news articles, blogs, texts messages, social media, reports or any other communication that is typical of words and the imprecise ways that humans use them. As such, unstructured big data has the potential to capture the “crowd psychology” of a marketplace.

The Value & Process of Discovering Expanded Market Sentiments

Expanded market sentiments can offer insights into future market directions. And mismatches between prevailing market sentiment and expanded market sentiment can be investment opportunities. Expanded sentiments can be compared with an elevated or even satellite vantage point. More visibility in a useful context is achieved versus a ground level vantage. With expanded market sentiment discoveries, one simply sees more in a useful competitive context over short and long periods of time.

Discovery Patterns employs three analytic engines that enable expanded market sentiments to be discovered and tracked:

1. Industry Context Engines: The ultra-granular Industry Building Blocks [IBB] database
2. Competitive Analytic Engines: Big data analytics based on market force relationships
3. Trend Visualization Engines: Animated visualizations of emerging and dissipating market forces among each other over time.

² [Theme definition](#), (Dictionary.Reference.com, March 2016)

³ V. Berube, S. Ghai and J. Tetrault, *From Indexing to insights: The rise of thematic investing*, (McKinsey, Dec. 2014)

⁴ [Big Content: The Unstructured Side of Big Data](#), (Gartner, May 1, 2013)



Ultra-Granular Industry Context Engine

Industry Building Blocks [IBB] is the world's most granular industry classification system, created by Alan S. Michaels who was a strategic planner for technology, banking and insurance companies. It was Alan's goal to focus on granular market competitiveness to create a superior classification, different from correlated stock classifications. At present, there are over 17,000 IBB industries in the IBB database, which is more than ten times the number of industries in SIC and NAICS industrial classification codes.

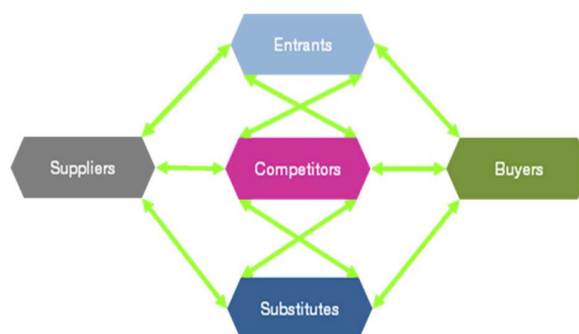


Figure 1: The Five Porter Forces Defining IBB Industries

IBB classifications are based on Michael Porter's five archetypical competitive forces⁵: competitors, buyers, suppliers, substitutes, potential market entrants and all the relationships among these forces. The controlling Porter and IBB rationale is that each industry has a unique competitive dynamic among these archetypical industry forces. If one or more of these five forces is significantly different from a related industry, then IBB will define them as different industries in its classification system⁶. Winning and losing companies and products are better understood in this basic competitive context. Market trends and evolving industries can be better identified and projected into the future once these complex competitive interactions are identified and tracked. Unrecognized industries can also be identified early within IBB. Stock and asset values are coupled with these changing archetypical forces and industry classifications.

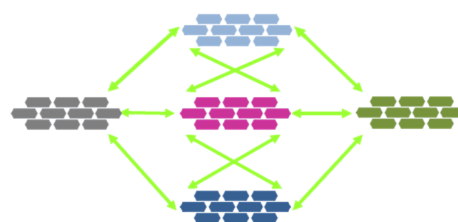


Figure 2: Force Complexity within Industries

IBB arose out of the needs of corporate planning for multinationals. Granular IBB industries or business units are resourced and planned based on their competitive standings and likely financial performances. Within a company all these financial measures are visible and therefore a truer measure of market performance. Even though a company may not use IBB classifications for its corporate planning, these companies are nonetheless using classifications that approach IBB in granularity versus standard industrial classifications. Public financial markets crave this level of detail for market evaluation.

For example, infant diapers is a different industry from adult diapers; cloud computing represents dozens of unique IBB industries; Alphabet now competes in 82 industries; and GE competes in 203 industries. IBB also delivers insight complexity among all the interactions of market forces in

⁵ Michael E. Porter, *Competitive Strategy*, (Free Press, New York, 1980)

⁶ Alan S Michaels, [IBB Overview Video](#), (February 18, 2015)



each industry and among multiple industries. For example, the recent merger of Dell with EMC created a portfolio of 278 combined IBB industries in which only 31 of those industries were initial overlaps, a smaller number than many might have predicted.

The sum of all a company's IBB industries, with their embedded competitive force relationships, defines the overall expected performance of a company. These forces govern shareholder returns because they influence prices, quantities sold, costs, investment, and the riskiness of firms in an industry. These force variables, in turn, are the building blocks for the value driver determinants of shareholder value. IBB categories enable granular industry comparisons between companies, where overlapping industries serve as points of comparison, and non-overlapping IBB industries serve as points of contrast.

Table 1 gives an example of Apple IBB ultra-granularity. Today, Apple is now composed of 50 IBB industries, 45 of which are detailed in Table 1. Each of these industries composing Apple has a unique combination of Porter market forces characteristics to make it a distinct IBB industry. Specifically, each of these industries has a unique combination of competitors, buyers, suppliers, substitutes and entrants as defined by Porter. This specification yields the most granular and unique industries in accordance with Porter's five archetypical competitive forces. As such, each Industry is unique, without overlaps with other industries. Additionally, each IBB industry can be modular inputs for combinations like market themes and electronic traded funds (ETF's).

The overall market performance of Apple is the sum of all Apple's market performances in each IBB industry⁷. iPhone® [IBB Industry = Smart Phones] may be important to Apple, yet there are 49 other Apple lines of business (industries) that also define the cumulative market performance of Apple. IBB industry context engine enables a realistic capture and reduction of true market complexity that is often unrealized in traditional market classifications.

⁷ Alfred Rappaport, *Creating Shareholder Value*, (The Free Press, 1986)



Table 1: Sample IBB Industries Defining Apple – (45 of 50, March 2016)

#	IBB Industry Name	Report Date = March 21, 2016
1	Payments / Mobile Payment Services & Digital Wallets	
2	Cameras / 3D Embedded Camera Manufacturing	
3	Digital Music Players / Portable Media Player Manufacturing	
4	MP3 Player / Portable CD + MP3 Player Manufacturing	
5	DMPs / Digital Media Players & Digital Media Receiver Network Device Manufacturing	
6	Smartwatches / Smart Watch & Computerized Wristwatch Manufacturing	
7	Social Media / Social Gaming Services	
8	Digital Media Services	
9	Publishing / Digital Publishing Software	
10	Collaboration Software & Workgroup Team Collaboration Software & Services	
11	Email / Internet Services for Email, Contacts & Calendars	
12	Health Data Platforms	
13	Hardware Servers / Rackmount Server & Rack Server Manufacturing	
14	Routers / WLAN Routers & Wireless Local Area Network Router Manufacturing	
15	Displays / Flat Display & Flat Panel Screen Monitors	
16	Displays / HDTV - High-Definition TV Monitors & Flat Panels	
17	Displays / LCD - Liquid Crystal Display Computer LCD Monitors	
18	Cables / Lightning to USB Cable Manufacturing	
19	Notebooks / Business Laptop & Notebook Computer Manufacturing	
20	Notebooks / Consumer Laptop & Notebook Computer Manufacturing	
21	PCs / All In One PCs & All-In-One PC Manufacturing	
22	PCs / PC Desktop Stand-Alone System Units	
23	Tablets / Apple iOS iPad Tablet Manufacturing	
24	Ink / Ink-jet Printer & All-In-One Inkjet Replacement Cartridges	
25	SANs / Storage Area Networks Infrastructure Products	
26	Web Browser Software	
27	Video Conferencing & Web Conferencing Software & Services	
28	Business Intelligence: Analytics - Big Data Analytics & Social Media Analytics Software	
29	PC Databases	
30	Content Authoring Tools	
31	SDK / iOS Software Developers Kits	
32	Collaboration / Cloud File Sync & File Sharing, Storage & Collaboration Solutions	
33	Digital Media Player Application Software	
34	Music / Consumer Music Creation Software	
35	DVD Application Software	
36	Photo Editing Software / Digital Photo Application Software	
37	Video Software / Digital Video Editing Software	
38	Auto Operating System, Car OS & Commercial Vehicle Operating System Software	
39	PC OS / Personal Computer Operating Systems Software	
40	Portable Intelligent Device OS Software for Handheld Computer, Cell Phone, Tablet & Smart Phone	
41	Tablet PC Operation System Software	
42	TV & Home Entertainment Media Center Operating Systems Software	
43	Phones / Smart Phones - Smartphone Manufacturing	
44	Internet - Music Downloads Subscription Services	
45	Internet Music / Digital Music Service & Personalized Music Listening	95



DP Analytic Engine

DP Analytic engines sift through unstructured big data streams, seeking ever changing relevant market forces defined by the Porter five forces. This DP analytic process starts with three key advantages:

- The analytics are programmed that they are not just seeking any pattern, but the patterns that matter most for market sentiments - relevant market forces and their inter-relationships based on the Porter competitive archetypes,
- The IBB database seeds DP analytics with ultra-granular industry market forces and their interrelationships, and
- The discoveries of the analytic processes become inputs to the IBB industry definitions as new competitors, buyers, suppliers, entrants and substitutes emerge.

Some of the key outputs from DP analytics include:

- Most relevant market forces over time
- Emerging market forces
- Declining market forces
- Most relevant relationships among market forces over time

DP analytics first refer to “relevant” market forces and relationships. This idea of DP relevancy derives from the idea that important market forces have the most influence on market outcomes, whether anyone notices them or broadcasts their existence. With this idea of relevancy, market truths exist, if only they might be discovered. There are absolute market insights to be discovered, hit upon or missed.



It is additionally important that key outputs are discovered, tracked and prioritized over time. The inclusion of daily, weekly, monthly and longer time period changes enables DP analytics to discover market trends and themes before they might be recognized in prevailing market sentiment. DP analytics enable the creation of expanded market sentiments.

There are many existing methods of analyzing prevailing market sentiment as developed by leading universities^{8 9 10} news organizations^{11 12}, intelligence services companies^{13 14} and social media analytic^{15 16} companies. Most of these methods focus on the positive-negative sentiment of single articles, or extend interpretations of single events. They complement DP Analytics and yield the



⁸ Zhai, Cohen and Atreya, [Sentiment analysis of news articles for financial signal prediction](#), (Stanford University, 2008)

⁹ Tetlock, Saar, Tschansky, and Macskassy, Columbia, [More Than Words: Quantifying Language to Measure Firms' Fundamentals](#), (The Journal of Finance, June 2008)

¹⁰ Pablo Azar, [Sentiment Analysis in Financial News](#), (Harvard, April 1, 2009)

¹¹ [Thomson Reuters Adds Unique Twitter and News Sentiment Analysis to Thomson Reuters Eikon](#), (Thomson Reuters, Feb. 2014)

¹² [Dow Jones News Analytics: Transforming News Into Data](#), (Dow Jones and RavenPack, March 2016)

¹³ Peter Hafez, [Creating Thematic Alphas with News Sentiment](#), (RavenPack, July 15, 2015)

¹⁴ [Sentiment Analysis API](#), (Alchemy-IBM, 2016)

¹⁵ [Radian6 scan bares netizens' sentiment on 'fight of the century'](#), (Rappler, May 3, 2015)

¹⁶ [How Esurance Engineered Its Way To Winning The Hashtag Bowl](#) [about Crimson Hexagon] (Forbes, Feb. 8, 2016)



advantages of fast positive or negative sentiment summations used for automated stock trading. The primary difference between these methods and DP analytics is that they start with the presumption that the user or analyst knows the right company criteria for analytic inputs. A targeted company name is the most often default input. Single company sentiment analytics neglect the greater competitive context as defined by Porter forces and IBB classification context. If one is focusing too narrowly, and one does not start with all the archetypical market forces and relationships - as in a realistic competitive context - it is improbable that expanded market sentiments could be discovered.

Trend Visualization Engine

Trend Radars are animated visualizations of DP analytic outputs. Even though visualizations are not required to discover expanded market sentiments, they offer a very fast¹⁷ neuroscience method for analysts and investors to tame the complexity of markets and to be alerted to changing market forces. Trend Radars condense thousands of daily unstructured data articles into granular IBB competitive context market forces, where analytics highlight and animate the most relevant market forces and trends over time.

DP Trend Radars use elements of graph theory¹⁸ to display the key outputs of DP analytics. With Trend Radars...

- most relevant market forces win the center of the radar space over time;
- emerging market forces move from the radar periphery to the center, displacing existing market forces over time;
- declining market forces are pushed to the radar periphery by more relevant market forces over time; and
- most relevant relationships among market forces are highlighted by bold connecting lines

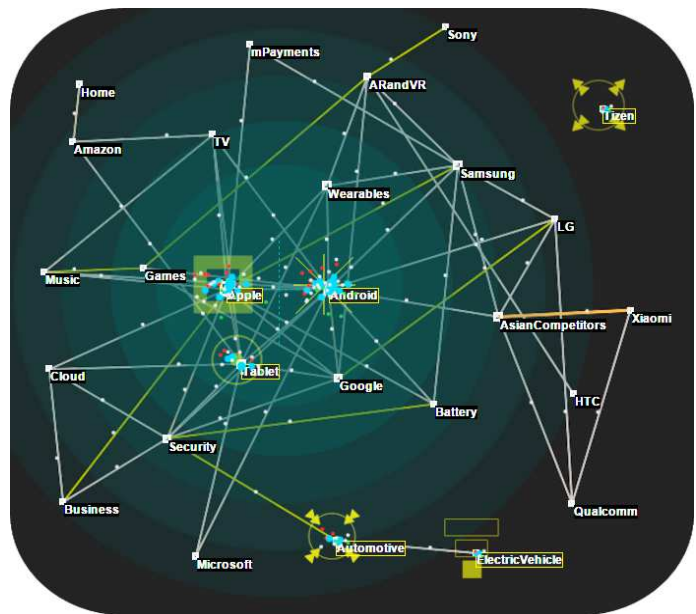


Figure 3: Example Trend Radar of Apple, including many IBB industries

¹⁷ Humans read at bandwidth of 200 bits per second, whereas they perceive images at 10,000,000 bits per second. Therefore, useful visualizations have a huge information delivery advantage over text alone which is the common method of unstructured data reporting.

¹⁸ [Graph Theory Definition](#), Stanford University



Figure 3 is an example Trend Radar for Apple¹⁹ competitive ecosystem on February 26, 2016. It includes many key IBB industries as part of greater competitive ecosystem inputs. Unstructured data inputs are news and blog articles at the rate of 22,000 articles per week. One can see at the radar center, the most relevant market forces on February 26 were Apple versus Android. The orange connecting lines among Xiaomi, Asian Competitors and Qualcomm highlighted potentially significant market events as part of an expanded market sentiment about Apple:

- The Wall Street Journal: *Chinese giant Xiaomi takes aim at Apple iPhone with launch of Mi5 handset*, February 24, 2016
- Computer World: *Xiaomi Mi 5 smartphone: Snapdragon 820 [QUALCOMM] for \$300? Sign me up!* February 24, 2016

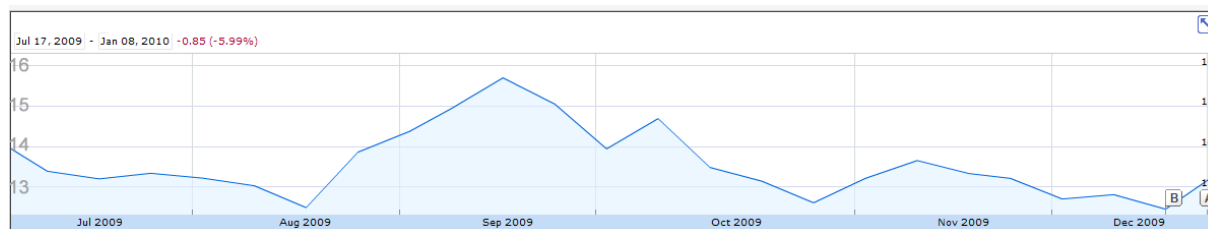
The combination of three engines - IBB ultra-granular context, DP analytics and trend visualizations creates a rich intelligence environment to discover expanded market sentiments. Investment and risk avoidance opportunities emerge when there are mismatches between these expanded sentiments and prevailing market sentiments.

Case Study 2009: Sentiment Mismatch about Nokia Smartphones

Discovery Patterns [DP] analytics were first developed to provide a superior situational awareness of competitive marketplaces for corporate enterprises. Some of the early work of DP market analytics focused on smartphone industries. In late 2009 and into early 2010, DP analytics discovered the expanded market sentiment about Nokia - that Nokia was becoming increasingly irrelevant as a smartphone competitor. This early and expanded market sentiment was unnoticed by the stock market with its prevailing market sentiment about Nokia.

Throughout 2009, the stock price of Nokia was reacting to increased competition from the Apple iPhone. Nevertheless, throughout the second half of 2009, NOK was relatively stable as seen in its stock history of Figure 4. Prevailing market sentiment was remembering that Nokia was a 40% smartphone market share company. No data had been released to the public through 2009 that contradicted this positive sentiment about Nokia.

Figure 4: Nokia Stock Price Second Half of 2009



¹⁹ [Apple Trend Radar](#), public Discovery Patterns site (this radar is constantly evolving with new unstructured data.) iPhone is not plotted as a separate market force due to the very high market context correlation of Apple with iPhone during this time period.



During most this same period of 2009, DP expanded market sentiment correlated with prevailing market sentiments about Nokia, continuing to display Nokia as a central market force in its DP Analytics and Trend Radar for the smartphone industry. This expanded market sentiment was calculated from hundreds of thousands of unstructured news, blog and message board articles without social media like Twitter or Facebook.

Yet in September of 2009, the expanded market sentiment of Nokia started a significant disconnect with the prevailing market sentiment about Nokia. By November 1, 2009, Nokia's greater market relevancy had fallen by 80%. During this same sixty day period, the stock price of Nokia dropped only 8%. Figure 5 shows the significant change in smartphone market relevancy about Nokia as displayed in Trend Radar graphics. Nokia, once of central relevance, was reduced to low peripheral competitive relevancy.

Figure 5: Changing Nokia Market Relevance Displayed on Trend Radar Displays – Sept. 1 versus Nov. 1, 2009

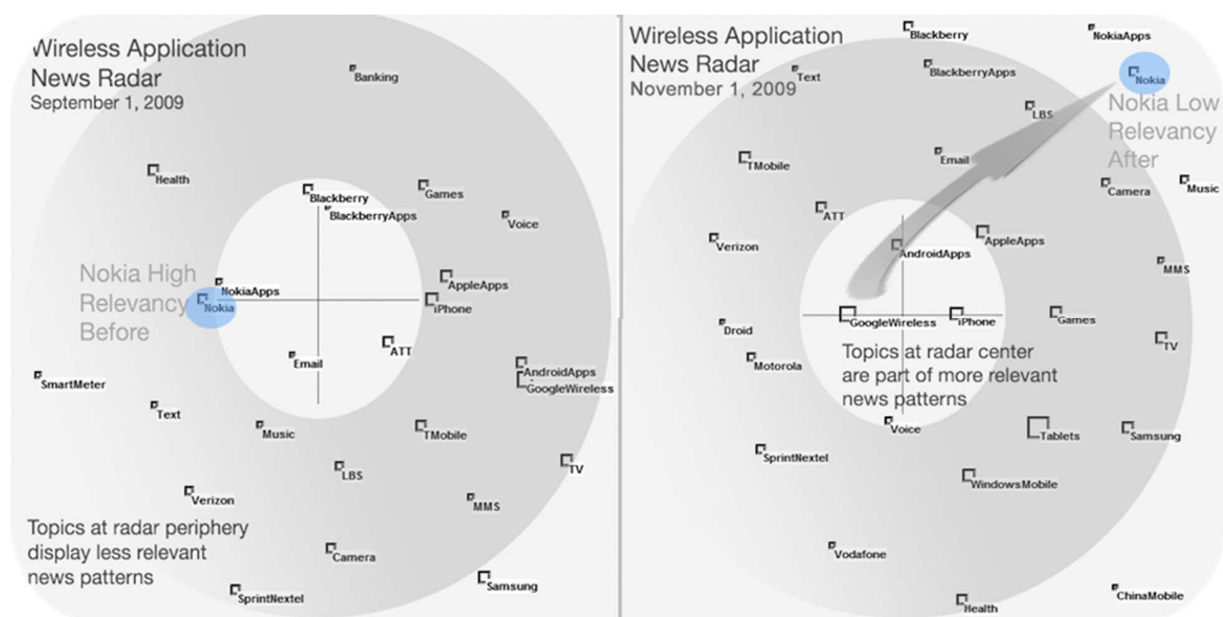


Figure 6 compares the indexed stock price of Nokia with the indexed DP analytic relevance of Nokia, starting on September 1, 2009. These two indexes serve as respective proxies for prevailing market sentiment and expanded market sentiment about Nokia. Over this ten month time frame of Figure 6, one can observe that the prevailing Nokia market sentiment was stable or slightly rising until Nokia's public announcements on April 22, 2010, when Nokia revealed that its smartphone sales were projected to be significantly below analyst estimates.



Figure 6: Normalized Nokia Stock Price versus DP Analytic Nokia Relevancy



April 22, 2010, Reuters - Smartphone Competition Hits Nokia Oyj, Shares Dive; Cuts FY 2010 Profit Outlook
Reuters reported that Nokia Oyj cut its profit outlook and delayed the launch of phones it needs to compete with the iPhone and Blackberry. The Company cut the outlook for its fiscal 2010 operating profit margin at its key phone unit to 11%-13%.²⁰

In contrast to the prevailing market sentiment about Nokia, Figure 6 shows that the expanded market sentiment of Nokia crashed prior to November 1, 2009. During this time, not only was the expanded market sentiment aware of iPhone competition, it was also noticing the emergence of the Android operating system as another competitor. [Noted as “Google Wireless” in Figure 5.] In fact, Android, not Blackberry, completely displaced Nokia by year end of 2009 as the primary competitor to the iPhone.

DP Analytics discovered this free fall in Nokia competitive relevancy in November of 2009, and thereby offered an expanded market sentiment that diverged from the prevailing market sentiment until April 22, 2010. The mismatch of market sentiments offered significant investment or risk reduction opportunities. After April 22nd, Nokia prevailing market sentiment began to catch-up with the DP analytic expanded market sentiment.

In January of 2010, prevailing market sentiment did not reflect that Nokia was on the precipice of a short term 41% decline in stock price, and an expanded stock decline of 87%. DP Analytics was able to factor in the greater context of Nokia’s changing competitive position by considering Android, a Porter market entrant force.

²⁰ Interesting that Nokia was not considering the market force entrant threat of Android OS smartphones at this announcement, instead referring to Blackberry.



Table 2: Nokia Theme That Unexpected Smartphone Competition Was Emerging 300 day theme performance			
Market Theme September 4, 2009	Prevailing Market Sentiment	Expanded Market Sentiment	Theme 088 Tracking July 2, 2010
NOK = \$14.38 NOK is at risk from emerging competitors and existing competitors in greater smartphone ecosystem.	Nokia is the preeminent smartphone manufacturer, with a recent worldwide smartphone market share approaching 40%.	Android is emerging to replace Nokia as one of the smartphone leaders with iPhone – a sea change in ecosystem competition.	NOK = \$8.43 Over the 300 day period from theme start, NOK stock declined by 41%.

Case Study 2015: Sentiment Mismatch of Apple iPhone Sales Deceleration

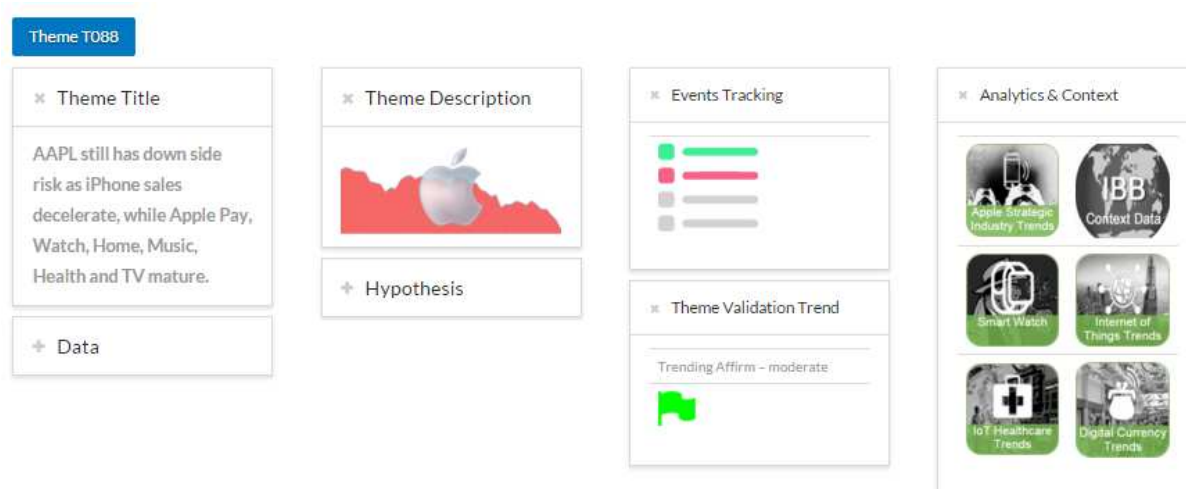
The following four steps outline the discovery of potential sentiment mismatches and the market theme that captures and tracks the sentiment mismatch opportunity.

Step 1: creating a market theme as part of DP Analytics platform

In January of 2016, DP analytics started to indicate that there might be a market sentiment mismatch with AAPL stock. Discovery Patterns created a market theme that might capture these potential mismatches. Theme 088 was created as seen in Figure 7. This theme creation and tracking process was an advancement in DP analytics since the 2010 Nokia case study. These themes originate from the many outputs of the DP analytic platform. Themes can be created to capture almost any “dominant or unifying idea” about a marketplace. In this case, a rather specific theme was created about Apple.



Figure 7: Apple Theme 088 derived by and tracked by DP Context, Analytics and Visualization Engines



Theme 088 was originated on January 23, 2016, days ahead of Apple's first quarter earnings release on January 26, 2016. This theme was created because it appeared that prevailing market sentiments about AAPL were overly optimistic in comparison to expanded market sentiments about AAPL. A DP Theme first defines the unifying market idea. Then the process outlines the rationale of the theme in a hypothesis. And finally the theme tracks the ongoing market relevance or validity of the theme and any sentiment mismatches with DP analytics. Key market events either validate or refute the theme over time.

Over the twelve months of 2015, Apple attempted to create the "next big thing" after the iPhone with products like the Apple Watch®, Apple Pay®, Apple TV®, Apple Music®, HomeKit® and HealthKit®. Nevertheless, 2015 DP Analytics indicated, based on relevancy measures, that it was improbable that these Apple products would soon be able to replace the long standing prevailing market sentiment of iPhone driven Apple. Throughout 2015, DP Analytics showed that Apple smartphone competitors were not losing market relevancy. Likewise throughout 2015, no game changing new Apple products appeared to be on the near term horizon. At the start of 2015, there was market sentiment that the Apple Watch could be the redefining product for Apple. Nevertheless this scenario did not materialize. Additionally, through 2015, smartphone competitors to iPhone were not falling into market irrelevancy. In fact Chinese and Indian smartphone competitors were gaining market strength. Was the prevailing market sentiment overly optimistic about AAPL on January 23, 2016?

Step 2: Assessing Prevailing Market Sentiment about Apple

Over the five years of 2011 through 2015, Apple revenues grew by 116% [Figure 8], fueled by iPhone sales that accelerated from 44% of total Apple revenues in 2011 to 66% of total revenues in 2015 [Figure 9]. Therefore, the ongoing market sentiment about Apple was tightly coupled with the market performance of iPhone.



Figure 8: Apple Sales History, 2004-2015

Apple's revenue from 2004 to 2015* (in billion U.S. dollars)

This statistic shows the total net sales or revenue made by Apple Inc. from 2004 to 2015, according to the company's own financial years. In the 2005 financial year (October 2004 to September 2005), Apple's revenue came to a total of 13.9 billion U.S. dollars. In 2013, revenue was up to more than 170 billion US dollars.

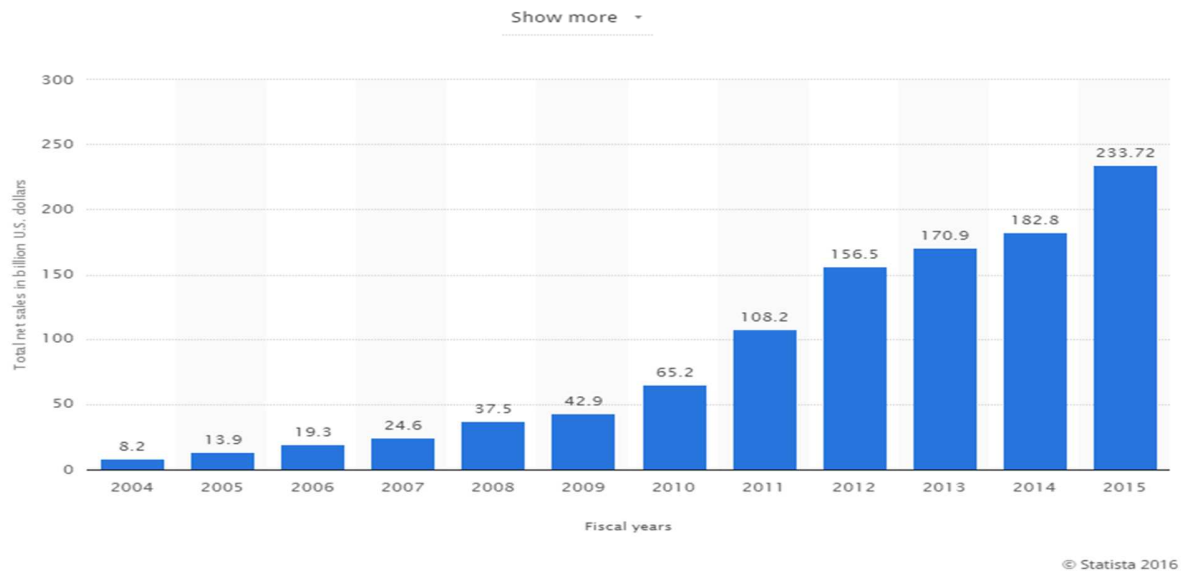
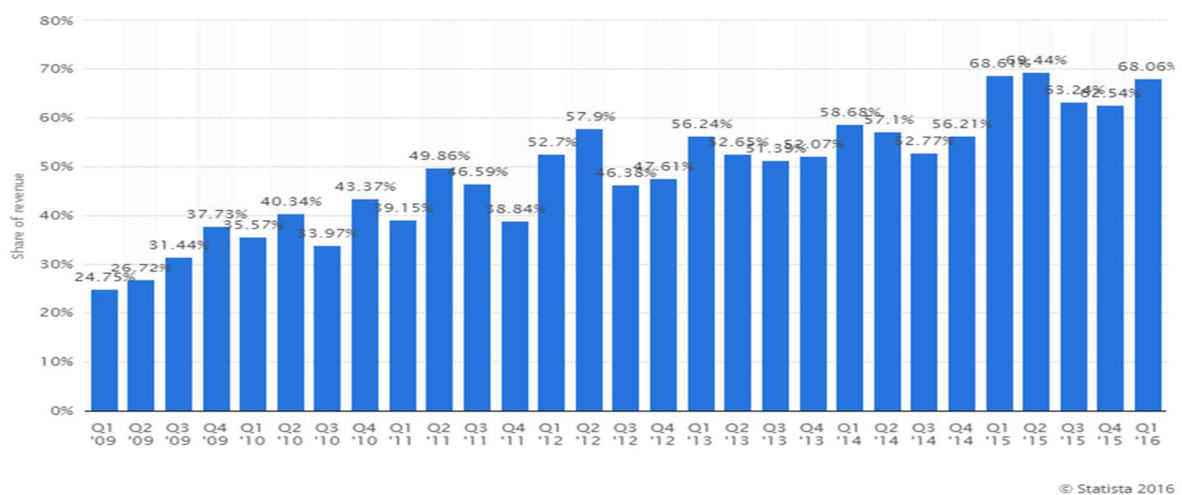


Figure 9: iPhone Sales as Percentage of Total Apple Sales, 2009-2015

iPhone sales share of Apple's total revenue worldwide from 1st quarter 2009 to 1st quarter 2016

This graph shows Apple's iPhone revenue as a percentage of the company's total global revenue in each respective quarter from 2009 to 2016. In the fourth quarter of 2015, Apple generated 62.54 percent of its revenue from [iPhone sales](#).





Over the 2011-2015 five year period, the stock price of AAPL reflected the market's awareness of iPhone as part of Apple's overall market success. Over this time, AAPL peaked at a 300% increase versus the peak increase of the S&P 500 Index of 80%, or a peak positive advantage of 220% for AAPL. [Figure 10]

Figure 10: Six Year Apple Stock History Index versus S&P 500



Nevertheless, all good things must come to an end. During the second half 2015 and up to the date of Apple earnings release in January of 2016, the market sentiment for AAPL started to shift as news of iPhone supply chain slowdowns started to be made public^{21 22 23}. Over this six month period [Figure 11], AAPL dropped 24% versus S&P 500 dropping 12%. The five year advantage of AAPL at 2015 year end was a 108% gain versus the S&P 500 gain of 51%, or a five year AAPL advantage of 57%.

Figure 11: Apple Monthly Stock History versus S&P 500 Index



²¹ [Taiwan Gives The iPhone a Vote of Confidence as Apple Sales in Asia Go Down](#). (Buzz Orange, August 24, 2015)

²² [Here's why the iPhone isn't going to catch up to Android any time soon](#). (Business Insider, August 26, 2015)

²³ [Apple gives itself an extra 6 days to sell 10M iPhones, hinting at slower pre-orders](#). (Computer World, September 14, 2015)



Step 3 – Seeking Potential Mismatches between Apple Prevailing Market Sentiment and Expanded Market Sentiment

Mismatches between prevailing market sentiment versus expanded market sentiment can yield investment or risk reduction opportunities. The prevailing market sentiment on January 23, 2016 was that Apple's stock price was already considering an iPhone deceleration through the end of 2015, showing a negative 12% drop [24% drop for Apple, versus 12% for S&P 500 index]. The prevailing market sentiment on January 23, 2016 was optimistic that Apple would not give back more of its five year 57% advantage over the S&P 500 index.

In the context of an expanded market sentiment, Apple would soon need to rejuvenate iPhone sales or boost up market enthusiasm for other Apple products if AAPL were to hold onto this 57% advantage into 2016. Was this probable?

Figure 12: Index of DP Analytic Relevancy of Apple Competitors (July 1, 2015 – Jan. 23, 2016)

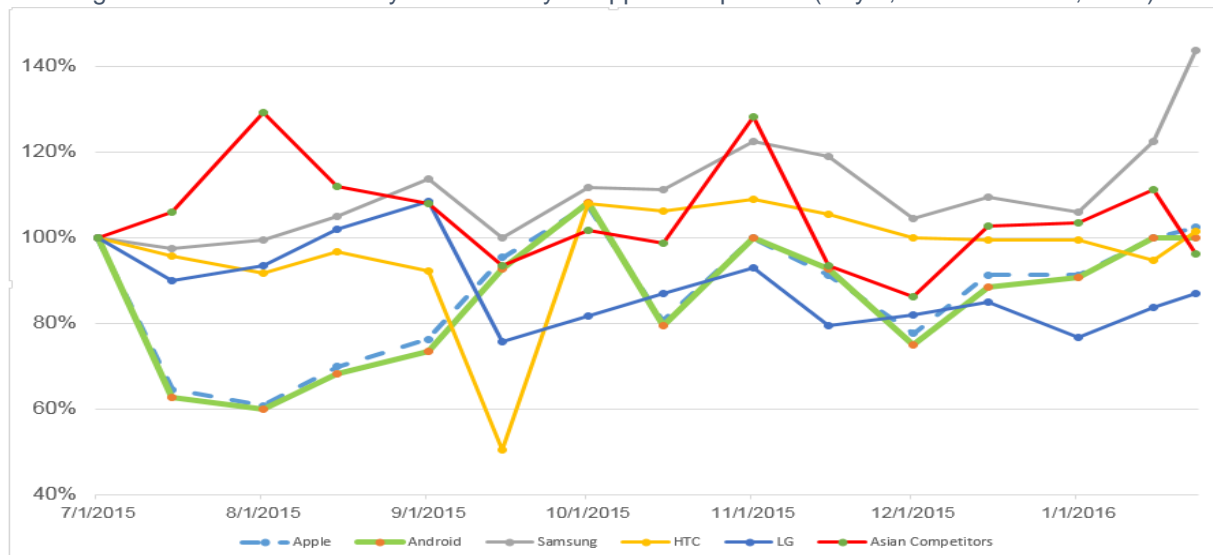
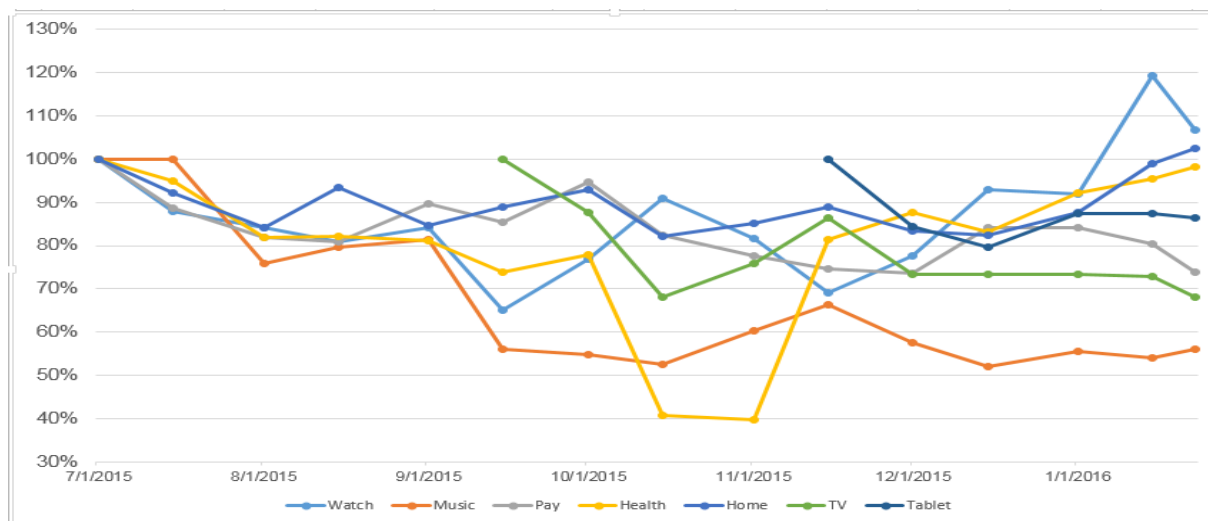


Figure 12 displays the DP competitive relevancy index of Apple and its smartphone competitors during the second half of 2015 and up to January 23, 2016. Over 1,000,000 news and blog articles were used as unstructured inputs over 2015 and into 2016 to create the expanded sentiment outputs. Note that Apple and Android were in sync with each other as most relevant smartphone competitors. Also note the competitive relevancy of major Apple competitors remained steady based on DP competitive analytics. Apple's chief operating system rival Android remained as the primary iPhone competitor. None of the major iPhone rivals decayed into market irrelevancy as Nokia did in 2009. The DP Analytic indices used in Figure 12 are similar to the Nokia indices used in Figure 6. The expanded market sentiment tells the story that if iPhone were to rally in 2016, it would not be at the expense of floundering smartphone competitors.



Figure 13: Index of DP Analytic Relevancy of non-iPhone Apple products (July 1, 2015 – Jan. 23, 2016)



DP analytics were also adding new product influences on AAPL's expanded market sentiment. Figure 13 shows competitive relevancy trends of major Apple new product groups from the second half of 2015 to January 23, 2016. These indexed measures of comparative market relevancy are similar to Figures 6 and 12. Figure 13 indicates that none of the Watch, Pay, Music, Health, Home, TV or Tablet products appeared to be ramping to greater market excitement. Apple Watch did generate great market excitement at the start of 2015. Yet this excitement dissipated by the second half of 2015.

In summary, the expanded market sentiment for AAPL on January 23, 2016 was more pessimistic of Apple than prevailing market sentiment.

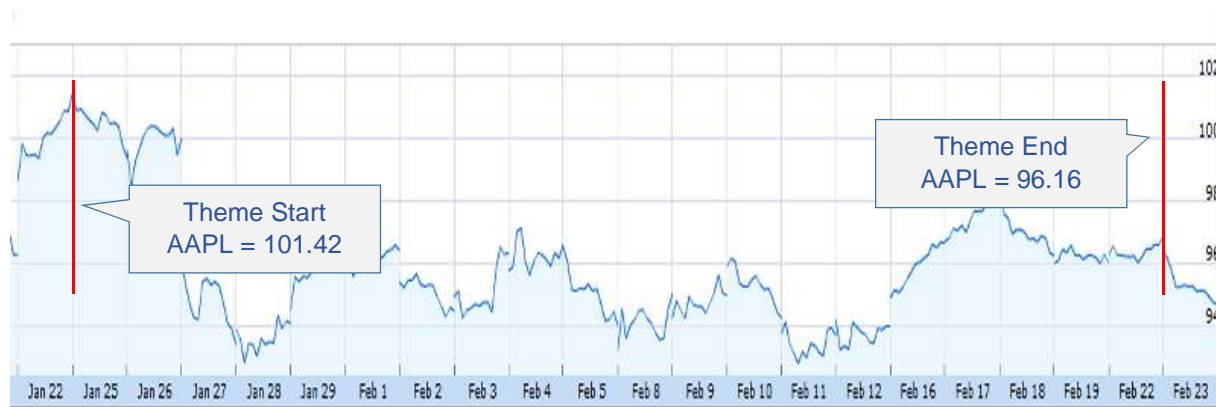
Step 4: Incorporating theme tracking as part of investment decision making

Ultimate financial decisions are the sum of many market insights. DP Analytics with expanded market sentiments, are an innovative and complementary insight. As market themes are given probable validity through discovered DP Analytic sentiment mismatches, investment decisions can be taken and tracked. Tracked themes are validated or refuted over time.



Table 3 and Figure 14 show how the prevailing market sentiment approached the expanded market sentiment between January 23, 2016 and February 22, 2016. The market reality that AAPL dropped 5.2% over this 30 day period is objective support for Theme 088.

Figure 14: AAPL thirty day stock price



Theme 088 was created and then tracked based on all DP insight engines.

- The ever changing granular competitive context of Apple was captured in IBB database [example Table 1]. Theme 088 analytics and tracking makes direct access to this IBB ultra-granular classification data. [Figure 7]
- Throughout 2015 and into 2016, over 1,000,000 unstructured data articles were used as DP analytic inputs. [Social media data like Twitter and Facebook were again excluded.]
- Throughout 2015 and into 2016, billions of weekly DP analytic calculations sought the most relevant market forces, emerging market forces, declining market forces and most relevant relationships among market forces. [Figure 3 is a visualization of Apple Ecosystem Trend Radar where these market force trends were animated.]
- Theme 088 also includes “Event Tracking” where DP or client human analysts can complement DP analytics and highlight key market events that either validate or support the respective market theme. [see Figure 15 for Theme 088 tracking example.]

Table 3: Theme 088 Sentiment Composition and Tracking 30 day theme performance			
Market Theme 088 January 23, 2016	Prevailing Market Sentiment	Expanded Market Sentiment	Theme 088 Tracking February 22, 2016
AAPL = \$101.42 AAPL still has down side risk as iPhone sales decelerate, while Apple Pay, Watch, Home, Music, Health and TV mature.	The prevailing AAPL market sentiment indicates that AAPL can retain its 57%, five year advantage over the S&P 500 even as iPhone sales slow.	The expanded market sentiment of AAPL shows a competitive context of ongoing smartphone competition and unlikely near-term replacement sales from Apple's other product developments.	AAPL = \$96.16 Over the 30 day period from theme start, AAPL stock declined by 5.2%.



Figure 15: Theme Key Event Tracking Example

Discovery Patterns Data Tracking

Theme 088: AAPL Down Side After iPhone Decelerates

Apple Plans New Devices as iPhone Sales Lag

Apple CEO Tim Cook speaks about the Apple Watch during a Special Event at Bill Graham Civic Auditorium on Sept. 9, 2015, in San Francisco.

Published: 2016-02-16 16:55 | Urgency: 1000 | Source: U.S. News & World Report

Every single one of Apple's major products saw unit sales decline (AAPL)

Apple did not grow unit sales year-over-year in any of its major product categories during 2015's crucial holiday sales quarter. The number of iPhones sold was basically flat (slightly down) from a year ago, Mac unit sales declined 4% year-on-year, and iPad unit sales plunged 25%. Apple doesn't break out numbers for the Apple Watch, so we don't know how sales of that product fared. All in all, it's not a very encouraging set...

Published: 2016-01-26 17:30 | Urgency: 1000 | Source: Tech

Supply chain rumors say Apple has slashed its Watch forecast for 2016 (AAPL)

Apple has reportedly slashed its Apple Watch forecast for 2016 due to "weaker than expected shipments" in the device's first year on sale. According to DigiTimes, Apple planned to expand Apple Watch production to a second supplier, but decided to stick with its current manufacturer "as volumes will not be high." Apple famously does not report Apple Watch shipments, like it does for the iPhone and Mac, and weak sales would be one reason...

Published: 2016-01-26 13:00 | Urgency: 1000 | Source: Tech

Apple Pay reaches mobile app inflection point

Apple Pay has seen an acceleration in mobile app acceptance across the US, according to Piper Jaffray analyst Gene Munster, who calls it an ...

Published: 2016-02-10 09:30 | Urgency: 900 | Source: NFC World

PayPal (PYPL) Is Losing Its Edge - PiperJaffray

... American Express are enabling faster checkouts online while retaining rewards acceptance; we believe Android Pay, Apple Pay and Samsung Pay ...

Published: 2016-02-09 08:10 | Urgency: 900 | Source: StreetInsider.com

Opinion: Forget bigger Alphabet is way better than Apple

Meanwhile, Apple is suffering a serious slowdown in its iPhone sales, with less than 1% annual growth. Worse, Apple has forecast that iPhone sales ...

Published: 2016-02-03 13:20 | Urgency: 900 | Source: MarketWatch

iPhone sales up less than 1%

Some investors are treating Apple more like a value stock

Published: 2016-01-27 20:01 | Urgency: 900 | Source: Business Standard

Brett Arends's ROI: Apple has another problem: The iPad is dying

Sales of the pioneering tablet plunged to five-year lows over the holidays, writes Brett Arends.

Published: 2016-01-27 17:35 | Urgency: 900 | Source: MarketWatch



Implications for Market Analysts, Portfolio Managers and Strategic Planners

All sophisticated investors and analysts have a wide variety of analysis tools for their market and investment decisions. Recent developments in big data analytics have offered a wide variety of analysis tools that address the potential insights in unstructured data. Discovery Patterns has advanced the science of big data analytics by leveraging and seamlessly combining granular industry context, competitive relationship analytics and visualizations of key emerging trends and relevant market forces.

One of the key insight discoveries of DP Analytics are potential mismatches between prevailing market sentiment and the expanded market sentiments. Because expanded market sentiments include a wider scope of the true competitive situation of a company, an investor can see more of the market.

In the 2009 Nokia case study, expanded market sentiment foretold of a collapse of Nokia relevancy as a smartphone competitor. In the 2015 Apple case study, expanded market sentiment highlighted the downside risk of AAPL stock as iPhone sales cooled. Every day there are numerous scenarios where the prevailing market sentiment would adjust if only the market could see more of the complexities of a company and the many Porter competitive force environments where these companies actually compete. Seeing these complexities early creates an investing competitive advantage.

Times of complexity and change are rich environments for expanded market sentiments. The two case studies of this paper referred to dynamic mobility markets. Before mobility, there was the dynamism of Internet markets. Now we are in the era of Internet of Things markets where ubiquitous data collection and analytics are revolutionizing almost every industry. Discovery Patterns offers operational analytic ecosystems and packaged market themes [including ongoing tracking for validity] that can be used as simple modular inputs for sentiment mismatch discoveries and general situational awareness. DP clients can subscribe to existing themes, create their own themes or build entirely new competitive ecosystems.



Discovery Patterns

Discovery Patterns has been a pioneer in unstructured big data analytics for over a decade, creating unique software, big data processes and animated interfaces. Our original intelligence implementations were for Fortune 50 multinationals. Their needs for market planning laid the foundation for investor intelligence needs.

Discovery Patterns offers public intelligence ecosystems for the Internet of Things, healthcare, finance, digital currency, robotics, smart optics, cloud computing, smart homes, smart factories, wearable devices, smart garments, smart cities, energy transformations and smart retail. DP primarily is located in the greater Boston, Massachusetts, US area - enabled by worldwide cloud networks.

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James Andrus is the technical founder of Discovery Patterns, with fifteen years of experience in data science, unstructured big data analytics, information displays and intelligence services based on those analytics. He was educated as an engineer from the University of Cincinnati, and as a market analyst manager from the Kellogg School of Northwestern University.

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