

Anticipating Financial Market Moves Using Long Term Patterns in the News



October, 2011



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Abstract

Internet carried news has created many opportunities for improving the understandings of worldwide markets and trends. Almost all existing news tools focus on instantaneous trading opportunities that need to be acted upon within seconds or minutes of news publications. Many of the news innovations have not addressed the opportunity of discovering and tracking useful long term patterns. In fact the time period of “days” is often considered long term in these frenetic trading environments. Yet, many investment opportunities evolve over many weeks and months, often hidden among torrents of daily news articles.

News Patterns has developed a complete long term market anticipation system that uses the *swarm intelligence* of thousands of news content creators as its inputs. These swarm inputs yields the dual benefits of superior real-time (hours) situational awareness and long term market anticipations measured in days, weeks and months. This foreground vision can be used to achieve a market advantage in financial decision making that is often referred to as Alpha.



The News Patterns™ company has been creating and improving upon news patterning networks for a decade. Much of our work has been focused on algorithm development and visual displays of interesting patterns. Along the way we have served Fortune 50 corporations and major political campaigns. In many instances, we perceived shifts in our news patterns that actually preceded major movements in certain stocks and elections. The primary goal of this paper is to describe our News Patterns process as it can be applied to long term market anticipations. News Patterns also has the goal of inviting future innovations and partnerships that will extend our patterning technology into superior market decision processes.

Sections

- News Evolutions for Market Awareness
- Competitive Archetypes Enable News Based Swarm Intelligence
- The News Patterning and Awareness Process
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Keywords: news patterns, industry trends, market anticipation, financial markets, alpha, swarm intelligence.

News Evolutions for Market Awareness

A Short History of Recent News Evolutions

All traders and analysts who make market decisions read the news. News is the information source that defines the current situation, offers support to, or challenges current assumptions, and introduces surprises that no manager ever contemplated. Therefore, relevant news seeking and uptake is a vital part of any financial decision process. The Internet revolutionized the news process, placing new challenges on decision makers. Since the advent of the Internet, these news services have evolved:

- News aggregation services provide a concentrated source for the content of thousands of news organizations.
- Blogs became a new source of news, allowing subject matter experts the means of publishing news and analysis under their own identities.
- RSS feeds enable the wide syndication of news from original content providers.
- Google® Alerts provide a free news aggregation service based on Google search power as a challenge to fee based news aggregation services.
- Wire services provide real-time market information.
- Low latency trading alerts trigger instantaneous trades.
- Analytical engines distil market sentiment out of millions of news, blogs and social media articles.
- Social media like Twitter® enables real-time reporting on major market and world events.

As news evolutions have progressed, so too has the volume of news content exploded. For example, in the transportation energy and mobility applications ecosystem there are over 12,000 and 25,000 weekly news articles, respectively. With this flood of news, it is no longer possible for a decision maker to go to a few trusted publications to learn all that is needed for superior investment decisions. Even if one were to seek the news from the expansive scope of Google Search, decision makers would be forced to consistently ask the right question with no process for surprises. Inserting the correct search query is impossible for unimaginable events.

Competitive Archetypes Enable News Based Swarm Intelligence

Swarm Intelligence as it Applies to News Patterning

Modern news and the Internet have enabled a *swarm intelligence*¹ in the news to be discovered and leveraged for decision making. Swarm intelligence is very similar to the information architecture of bees in a hive or schools of certain fish. Today, large flows of news are created by millions of news content creators working as writers for traditional news organizations or as independents in their own blogs and social media outlets. It has been demonstrated that there is a high level of intelligence or patterns in these news flows that may not be apparent to any individual news content creator.^{2 3 4} If these patterns of the collective could be captured in a network that automatically shares the composite intelligence among its members without any centralized command and control, enabling the individual members to adapt their behaviors, then a swarm intelligence utility could be created.



Figure 1: School of fish behaving with a swarm intelligence to confuse potential predators.

¹ Swarm Intelligence, http://en.wikipedia.org/wiki/Swarm_intelligence (useful reference due to many definitions of SI)

² The Economic Times, Wall Street too turning to Twitter for stock market predictions, May 5, 2011

³ Maryam Omid, Financial News, The future of the markets is written in...blogs and tweets, June 22, 2010

⁴ Harshavardhan Achrekar, et al, The First International Workshop on Cyber-Physical Networking Systems, Predicting Flu Trends using Twitter Data, April 15, 2011

Friedrich Hayek, a Nobel Laureate in Economics, first introduced the idea of a collective swarm for markets in 1944. Hayek postulated that “Almost all information that matters is decentralized, that it exists in the minds of millions of participants in an economy. Therefore, the challenge is how to best maximize the benefits of decentralized information that exists as millions of single data points spread across the globe.”⁵ Today that decentralized universe of “information that matters” is often reflected in modern news. The challenge is to capture and distill useful patterns out of all our modern news flows.



Figure 2: Friedrich Hayek

Competitive Archetypes Drive Swarm Patterns

The most useful patterns are those that are based on some fundamental law of science, including economics. Financial market anticipations are often derived from competitive patterns that naturally occur among competitors and the marketplace. For example, over long periods of time, winning competitors gain the most lucrative buyers, purchase quality materials, thwart substitutes and keep market entrants at bay. Likewise waning competitors fail in these market relationships. Michael Porter of the Harvard Business School has dedicated a career in defining these archetypes of market competition⁶. And because these archetypes of the marketplace do exist, they can be applied to pattern discovering processes.

Here is where modern Internet news content creators comes into the picture. These writers create news content about the many transactions among competitors, suppliers, buyers, substitutes, and potential entrants through long and short business and product life cycles. Normally this news content is absorbed as individual articles by financial decision makers without the benefit of a cohesive competitive context. In this scenario, there is no swarm intelligence to guide the investment decision process. But if these news articles could be organized into competitive archetypes, with special attention paid to the interactions among the archetypes as they fight for market dominance, then swarm derived patterns could be discovered as part of an overall industry based swarm intelligence.

News Patterns has discovered that massive news inputs about markets can be organized into competitive archetypes where patterns are discovered that create a foreground visibility for anticipations in both business and politics⁷. In market situations, it is important to first start with industry definitions that are granular enough to capture “apples to apples” competitive interactions. For example, the competitive interactions among competitors Apple®, Samsung®, and Google are useful in the tablet device industry if only tablet related news is collected, while filtering out Apple TV, Samsung video recorders, and Google search engine articles. News Patterns often employs the very granular 12,000 plus Industry Building Blocks Classification System™ and analyses⁸ as starting archetypical inputs for subsequent news patterning processes.

⁵ Friedrich von Hayek, "The Road to Serfdom" 1944.

⁶ Michael E. Porter, "Competitive Strategy: Techniques for Analyzing Industries and Competitors" 1980. Also, see: Porter's, HBR article, 'The Five Competitive Forces That Shape Strategy' 2008

⁷ James Andrus in News Patterns Intelligence Discovery Blog, News Pattern 2012 Radar Predicts that Candidate Perry Will Soon Lead Presidential Polling, August 2011.

⁸ Alan Michaels and James Andrus, Strategic Decision Making Using Real-Time News Patterns, October 2011

The News Patterning and Awareness Process

News Patterning Steps

In the news patterning process, these steps are executed in a continuous mode as news content is created and pushed to the Internet.

- Collection from a wide diversity of sources including dedicated news sites, blogs, video sites, Google Alerts and Twitter.
- Filtering of articles into archetypical competitive industry topic folders. These folders often correspond to industry competitive forces like current competitors, potential competitors, customers (including: channels, buyers and end users), vendors, substitutes, industry products and services, complements, and additional industry information.



Figure 3: News patterning process overview as employed by News Patterns

- Discovery of patterns among articles and topics using sophisticated pattern seeking algorithms.
- Transformation of the topic folders into organization and visualization structures that highlight relevant topics, articles, context among topics and urgencies among topics.
- Deployment of patterns and news to all the information devices which are integral to financial decision makers including tablet and smartphone devices. These patterns are packaged with useful context, urgencies, relevancies, real-time situational awareness, and anticipations of future scenarios.
- Hypothesis testing on an ongoing basis of expected trends and market scenarios.
- Interactive human behavior captures and uses results to continually make patterns smarter and news more relevant.

With an operational news patterning network, financial managers can complement their trading strategies with real-time situational awareness that will either support the ongoing investment plan or challenge it.

The Importance of Topic Relevance Algorithms

Relevant news topics and patterns have the characteristic that they are well connected with other topics and patterns. This measure of connectedness mirrors the neurons in our brains. We become smarter when our neurons are well connected. In the case of news patterning, special algorithms seek interesting connections among news topics and compare the strengths of these connections versus other connections. Comparisons are also made of changing connections and their strengths over time.

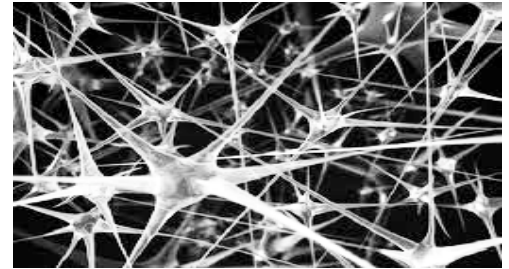


Figure 4: Human brain neuron connections

At the onset of our news algorithm development, other patterns of news like frequency counts and sentiment were also investigated. Frequency counts are part of our patterning algorithms. These counts support our preceding relevancy algorithms. The characteristic of news sentiment was not included in initial News Patterns algorithms due to high error rates of article characterizations, and the universal problem that sentiment is in the eye of the beholder and the intention of the writer.



Figure 5: News Radar topic connections

The correlation of our patterns with market or election results was not obvious at first. We were indeed not sure that thousands of news content creators could contribute to a useful swarm intelligence. Only through a decade long process of experimentation, trial, error and continual algorithm enhancement did useful news patterns evolve. We did discover our own forms of collective intelligence as others are discovering.

The simplest explanation of the importance of relevancy in useful news patterns is that content creators write about what is interesting or relevant to themselves. There is certainly the aspect of repeating what others have already written, but this repeating is also an indication of relevancy, sometimes amplifying original ideas. We have also discovered the limited effect that a single company's public relations efforts can have on competitive news patterns. In these instances, there is an overarching aversion of independent news content creators to parrot a company's public relations press releases. Contributing to the utility of this swarm intelligence is the drive of news creators to create original content or to first report important events or "scoops" in the news.

The current state of the art in our news patterning is that highly relevant company topics often correlate to competitive industry market success, with market leading companies fighting for and winning central locations in News Radars over time. Likewise highly relevant politician and issue topics often correlate to polling and election success. Figure 5 displays the pattern connection layer among news topics in a News Radar™. This News Radar image also illustrates the point that the most connected points are nearest the center of the News Radar. A simple interpretation is that companies located closest to radar center are the most relevant in news patterns, and this proximity to the center often correlates with market or election leadership.

The Display of Patterns and News through Animated News Radars

Visualizations of interesting patterns became a requisite for calculated news patterns. From a human neuroscience perspectives, the use of visualizations enables human awareness at the information uptake rate (sometimes referred to as bandwidth) of 10,000,000 bits per second.⁹ This large number compares with the slow rate of human reading of 200 bits per second¹⁰. We call our news and pattern display visualizations News Radars. Figure 6 is an example of a News Radar for the tablet device industry.

One of the challenges of our news patterning process is that it is possible to create far more patterns and connections than there are actual

companies to compare and track. For example, if one were seeking patterns among 10, 20 and 30 companies, then there would respectively be 45, 190 and 435 one-to-one company connections – an exponential growth of market relationships to investigate!

News Patterns has created its New Radar interfaces to both leverage the human ability to quickly perceive visual patterns and to solve the problem of pattern overload. With algorithms that prioritize certain patterns, some of the most interesting patterns are highlighted, while other patterns become interesting to our users who can follow their curiosities to investigate other patterns.

News Patterns Interpretations

- News patterns and trends are visualized, thereby enabling user discoveries that cannot be efficiently described by words alone.
- The most connected and potentially relevant news topics compete among other topics to be at the center of the news radar, just as previously described market archetypes compete for dominance.
- Topics losing their news pattern relevancy are bumped to the periphery of the news radar.
- News Radars can be animated to display pattern changes among news topics.
- Potentially interesting patterns are highlighted based on the type of pattern and the likelihood that a pattern may be disruptive to the competitive landscape.
- Radars are accessed through web browsers, and continually updated over the course of a day.
- Radars can embed tens of thousands of patterned articles with instant access to those articles.
- Users can recall historic patterns and compare them with contemporary patterns .

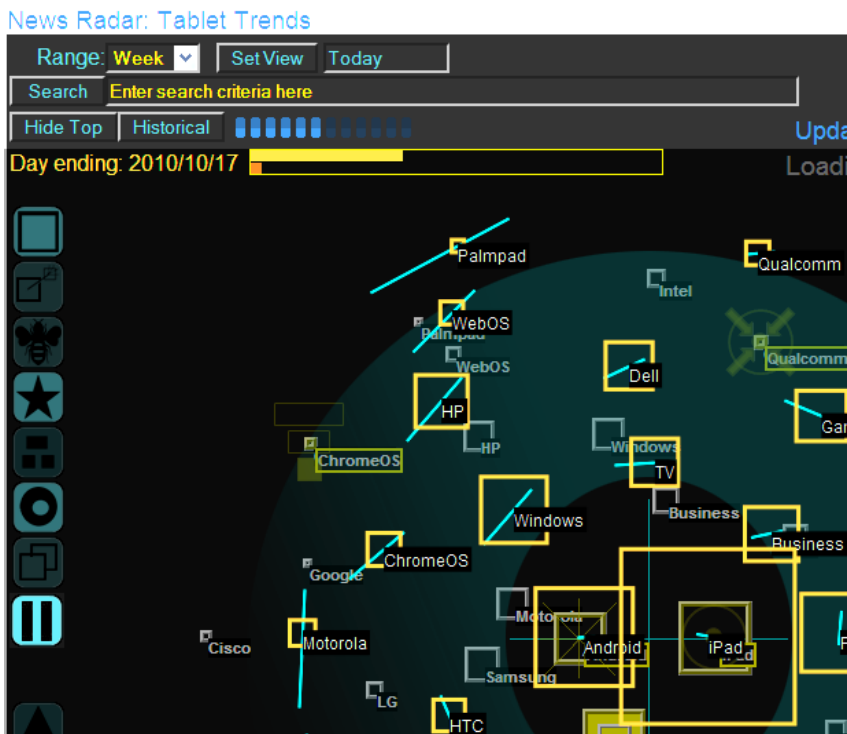


Figure 6: Example tablet industry News Radar in the animation mode

⁹ Kristin Koch, Judith McLean, Ronen Segev, Michael A. Freed, Michael J. Berry, II, Vijay Balasubramanian, and Peter Sterling, How Much the Eye Tells the Brain, National Institute of Health Public Access, July 26, 2006.

¹⁰ James Andrus, Using Dynamic Graphical Images of News Articles to Increase Market Awareness Bandwidth, November, 2009.

Case Study: Market Anticipation Window in Smartphone Ecosystem

The mobility industry (as in wireless devices, networks and applications) was and continues to be an ideal target for long term news patterning. Within this ecosystem, innovative communication technologies are changing all aspects of society with hundreds of billions of market capitalization to flow from the market losers to the winners. The mobility industry is also attractive for long term news patterning because there are large volumes of news reporting on industry competitors, buyers, suppliers, entrants, substitutes and other market forces. Wireless Applications as part of the overall mobility industry has the distinction of being the competitive space where the latest generation of smart phones are discovered and tracked.

In 2009, News Patterns created a Wireless Applications News Radar aimed at the 25,000 weekly mobility industry articles. Applications are a key component of mobility news patterning because any winning device, operating system or operator will be marked by successful user applications. As part of this News Radar, Nokia® was patterned and subsequently plotted in an ever evolving News Radar driven by changing news articles.

In early 2009, the applications News Radar clearly displayed Nokia as a device maker of high relevancy as seen in its plotted position as an anchor topic, at the center of the radar, standing as the primary competitor against the Apple iPhone®. This high relevancy, of a central position of Nokia is clearly seen in Figure 7.

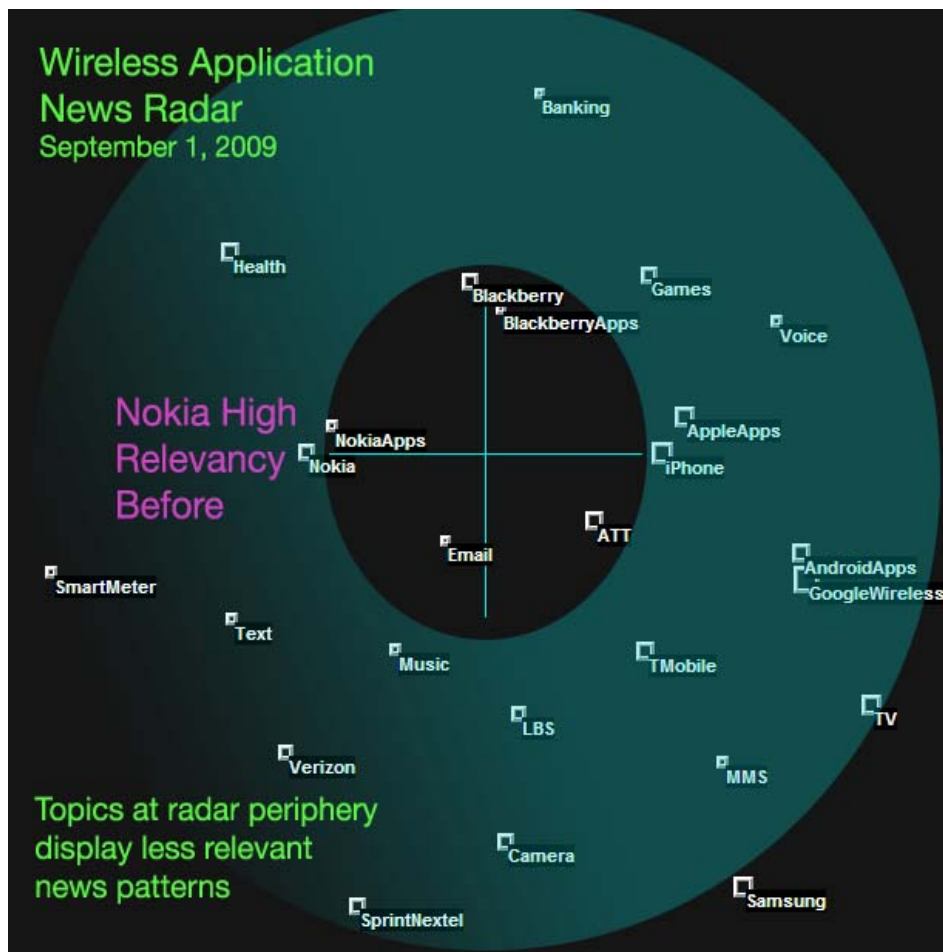


Figure 7: Wireless application industry News Radar for Sept. 1, 2009

Yet as time progressed and market developments became known through the news, the position of Nokia in the applications radar started to change. In early September of 2009, the Nokia news topic was first replaced as an anchor topic by AT&T. And by the end of October of 2009, Nokia was finally replaced by Android®, better known at that time as “Google Wireless.” Android is the mobility operating system that Google introduced that has become a major mobility ecosystem in competition with iOS® of Apple and Microsoft’s Windows Mobile®. As part the displacement of the Nokia topic at the center of the applications News Radar, Nokia also started a new pattern of decreasing industry relevancy, that ultimately resulted in Nokia

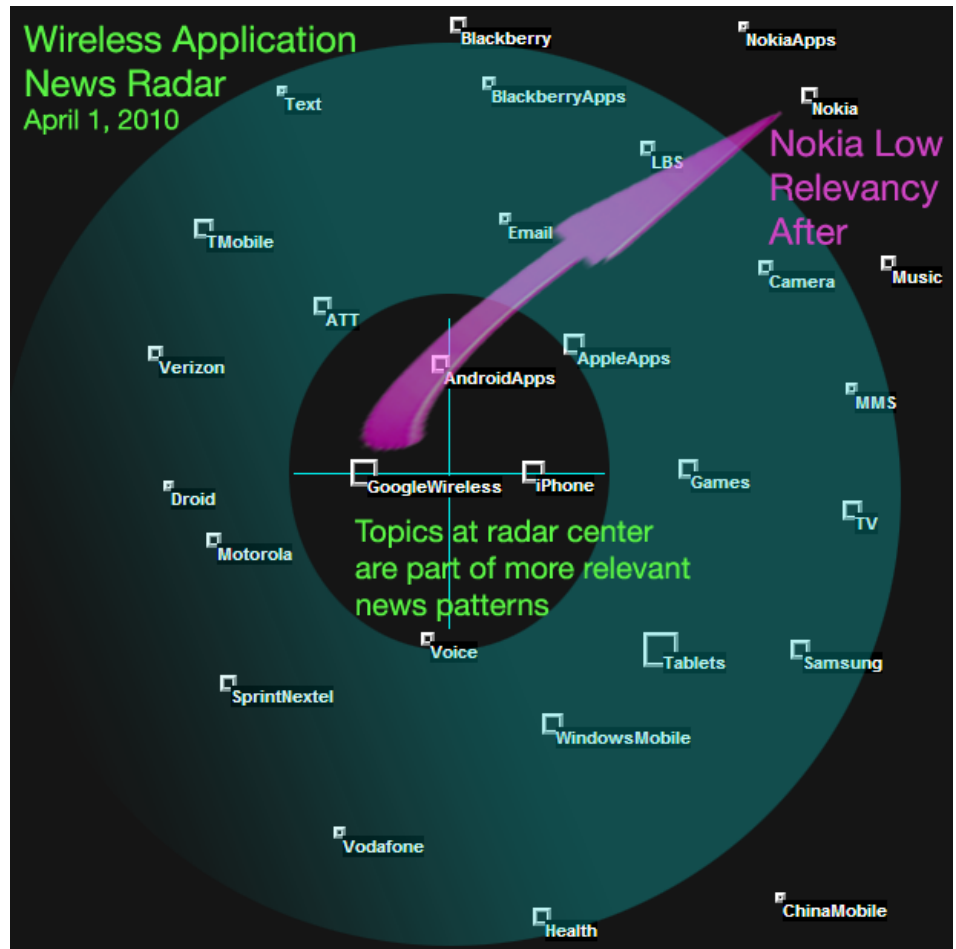


Figure 8: Wireless application industry News Radar for April 1, 2010

being “bumped” to the periphery of the News Radar by the more relevant news patterns of competitors and other mobility industry participants. Figure 8 shows the low news pattern relevancy, peripheral location of Nokia news topic on April 1, 2010.

Figure 9 plots the drastic change in news pattern relevancy that Nokia experienced between September of 2009 and April of 2010. In fact, most of the drop-off in Nokia relevancy occurred within the fourth quarter of 2009. During this time period, the swarm of mobility news content creators shifted their attention and creative efforts to iPhone, Android and other mobility topics at the expense of Nokia. No longer was Nokia perceived by the news swarm as an industry leader. This shift of news pattern relevancy of Nokia by news content creators was later shown to correlate to the actual buying patterns of Nokia phones in the marketplace.

At a very high News Pattern level, it was obvious that something drastically changed for Nokia between the end of 2009 and the beginning of 2012. Observations of the mobility applications News Radar would have led to hypotheses about the growing dominance of iPhone and Android versus Nokia. These hypotheses could be challenged on a daily basis by actual news events defining mobility competition. A value of the animated News Radar interface is that discoveries can be quickly made through the most potentially interesting patterns and their radar representations. Interesting patterns are highlighted as both static images and movements in “eye catching” ways.

In contrast to the dramatic change in Nokia news pattern relevancy, the stock market did not perceive any substantive change in Nokia between September of 2009 and April of 2010. This status-quo trend in Nokia’s stock price can also be seen in Figure 9. Figure 9 shows that if Nokia’s stock price was indexed to 100 at September 1, 2009, that same index was at 110 on April 1, 2010, thereby showing that the market actually perceived an increase in Nokia market value in stark contrast Nokia’s significant decrease in indexed news pattern relevancy from 100 to 20 over the same time period. This period of contrasting news pattern versus stock market values for Nokia is defined as the Market Anticipation Window in Figure 9.

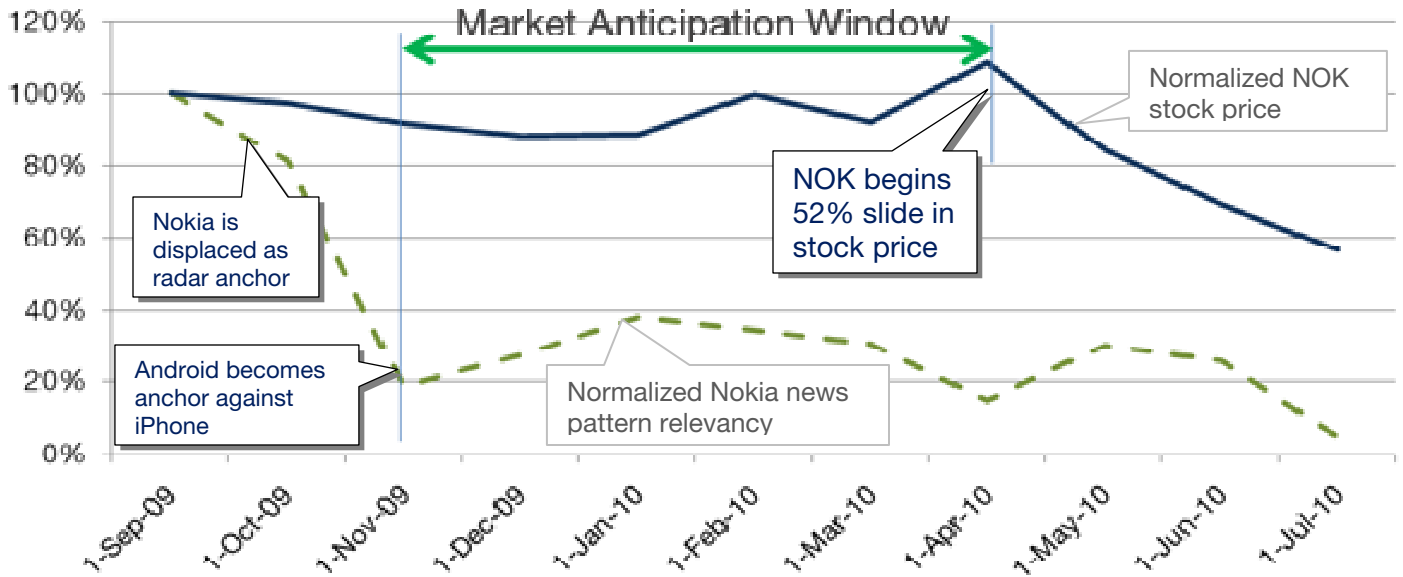


Figure 9: Time series plot of Market Anticipation Window regarding indexed Nokia news pattern relevancy and its indexed stock price.

On April 22, 2012, Reuters reported this news about Nokia:

Smartphone Competition Hits Nokia Oyj, Shares Dive; Cuts FY 2010 Profit Outlook-Reuters

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%.

Over the next two months, Nokia’s stock price declined by 52% after this news article. This decline of Nokia’s stock price was somewhat parallel in significance to the decline of Nokia news pattern relevancy, but at a time period off-set of five months. This five-month offset is seen in Figure 9 as the Market Anticipation Window. It is apparent from Figure 9 that if managers in financial services could have first recognized the new Nokia pattern of greatly decreased news pattern relevancy, then they could have investigated causes and perhaps changed their investment strategy regarding Nokia and other mobility industry participants.

Looking for Market Anticipation Windows Based on Long Term News Patterns

The preceding Nokia case study is a useful example of leveraging long term patterns in the news for market insights. Like any significant pattern that might relate to market movements, there are significant limitations. For example, if there is an insufficient news input on a continuous basis, then it is difficult to discover patterns from limited data. And it should also be remembered that no pattern is ever foolproof. Yet there are systematic advantages in applying long term news patterns to any market decision:

- ***Granular Industry Definitions Enable a Superior Comparative Context*** - News patterning starts with useful competitive industry granularity that will include competitors, suppliers, buyers, entrants, substitutes and other industry forces based on the products markets where they compete. In the case study, Nokia was compared to Apple in regard to smart-phones, excluding other Apple businesses like computers and TV. News Patterns often employs the very granular industry definitions of the Industry Building Blocks Classification System which is now at the 12,000 world wide industry definition mark. With such a refined granularity, subsequent patterning processes using news as a key input are enabling “apples to apples” comparisons.
- ***A Worldwide News Influence Captures the Best Swarm Intelligence*** – Most important markets are indeed worldwide. An innovation in Australia can quickly become a disruptive company in Spain. News patterning should enable a massive scope of news collection in the near real time, measured in hours not days. These news signals can be derived from standard news sources, blogs, RSS feeds, videos and even social media like Twitter. These continually collected news articles provide the inputs for patterning and subsequent discovery operations. Massive scope also enables a decision maker to avoid the typical pitfall of confirmation bias where one is prone to search for information that only confirms what he/she already believes.
- ***Continuous Patterning Calculations Enable the Discovery of Emerging Trends, Threats and Opportunities*** – Pattern seeking algorithms with billions of iterations upon thousands of news articles over many weeks and months can do what no human can do. They can discover potentially significant patterns in the news that might be indicative of market trends, threats or opportunities. These potentially useful patterns are made apparent to decision makers via simple text reports and interactive dynamic displays as in News Radars. Graphical displays of patterns are fast gateways to the actual news driving the patterns, thereby avoid “black-box” recommendations for which there is no explanation or rationale.
- ***Market Anticipation Windows May Suggest New or Evolved Investment Hypotheses*** – Investors make decisions based on their belief that their hypotheses of market movements are better than everyone else. In many news patterning scenarios, the changing relationships of competitors among themselves and related industry buyers, suppliers, entrants and substitutes are discovered by continuous news patterning, with useful patterns developing over many days, weeks and months. An investor’s awareness of these pattern changes creates windows of opportunity for him or her to create his or her own Alphas in their portfolios.

Conclusions

Financial managers know that discovering and learning about global information is vital for making good market decisions. Today, these financial decisions are made in torrents of world-wide news, written by thousands of conventional and nonconventional news content creators, exemplified by individuals Tweeting about company products. It is increasingly clear that there are patterns among these news flows, if only an effective technology could be applied.

In the experience of News Patterns, effective pattern discovery technology can be based on swarm intelligence, or the intelligence of colony animals like bees. News Patterns has created trend discovery networks that aim at specific companies and granular industries, that are constantly changing based on near real time news flows. By applying sophisticated pattern seeking algorithms that are based on archetypes of competitive interactions, News Patterns is able to reveal long term patterns that might be key components of Alpha creating investment strategies.

About James J. Andrus

James J. Andrus is President and founder of Netro City Design & Information Systems Inc. (News Patterns) at <http://www.NewsPatterns.com> which discovers trends in the news, where news is broadly defined to include blogs, Google Alerts, social media, and YouTube videos. He has spent the past decade working with Fortune 50 corporations, individuals and national political campaigns to discover trends among large news flows. He is a graduate of the University of Cincinnati and the Kellogg School of Management of Northwestern University. james.andrus@newspatterns.com