



# Tuning into Consumers' Digital Signals

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**Prepared by**

**Dr. Phil Hendrix, Director immr and GigaOm Pro analyst**



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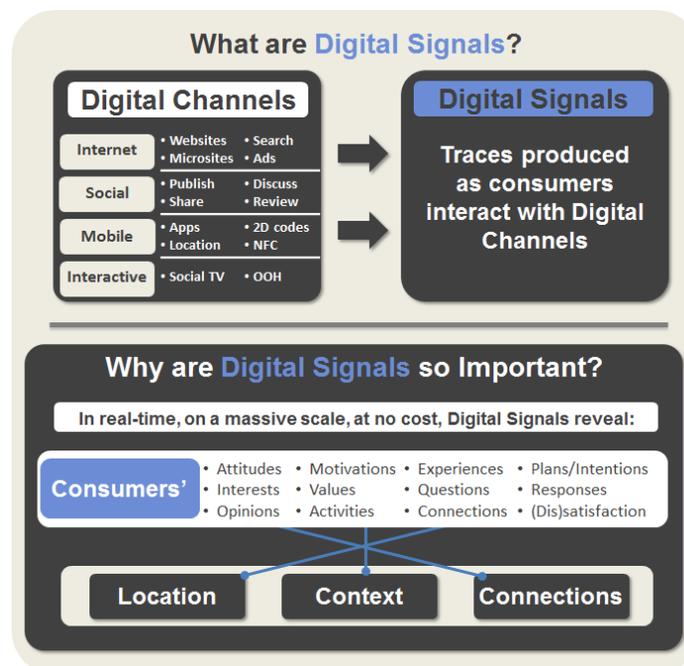
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## Introduction

What do Walmart, Nissan and Wrapido (a small restaurant in Manhattan) have in common? The world's largest retailer, the global automaker and the restaurant "known for its wraps" are all tuning in to social media and other digital channels to reach, enable and engage consumers.

- Based on customers' location and other information, Walmart is personalizing shoppers' experience, initially online but now in stores as well. With the recent acquisitions of Kosmix and OneRiot, WalMartLabs is extracting and using insights from Twitter, Facebook and other social media to tailor search results, offers, messaging and even inventory by location.
- As the first automobile manufacturer to put QR codes on the stickers of all their new 2012 vehicles, Nissan is making information available to customers at point-of-sale 24/7. For consumers with smartphones (projected to be a majority by next June), QR codes represent a powerful new interactive channel and an important source of insights for Nissan and other global businesses.
- With 80% of its business done during lunch Mon.-Fri., Wrapido recognizes the importance of driving a steady stream of diners. So when business is slow, Wrapido uses [ThinkNear](#) to extend mobile offers to nearby consumers – unlike Groupon and other "mass" daily deal providers, ThinkNear allows businesses to make offers to consumers within a defined area at "opportune times," e.g., when business is slow and conditions (weather, traffic, etc.) are optimal.

As these examples suggest, consumers are using a wide range of digital channels to connect with one another and with businesses. As consumers check-in, Tweet, post, comment, follow, like and soon "tap" (NFC tags), their interactions generate digital traces that, together with location and other metadata, can be processed and mined to improve customer experiences.



Given the enormous, rapidly expanding volume of digital traces, signals contained in the data must somehow be extracted from the noise, a process we refer to as "tuning into Digital Signals" – in many ways, this is analogous to tuning in and listening to a particular radio station from the many different radio waves on the air. Leading companies and their partners are mining the data from these interactions to find “Digital Signals” that help them better target, reach and improve the experience of customers. Since a growing proportion of consumers’ interactions with digital channels occur on “location-aware” smartphones, users’ location is an especially important Digital Signal.

Digital Signals reveal important insights about consumers, from what they're thinking and doing to their needs, interests, preferences, views (especially sentiment), plans and even the Holy Grail, intentions, expanding and delivering more fully on John Battelle’s “[database of intentions](#).” By tuning into Digital Signals, leading retailers, brands, and SMBs are gaining important insights, often in real-time, and using those insights to improve customers' experiences and differentiate their businesses from competitors. As they experience the benefits, consumers are willing to share even more with selected "trusted partners," creating a virtuous cycle that other businesses will be hard pressed to copy.

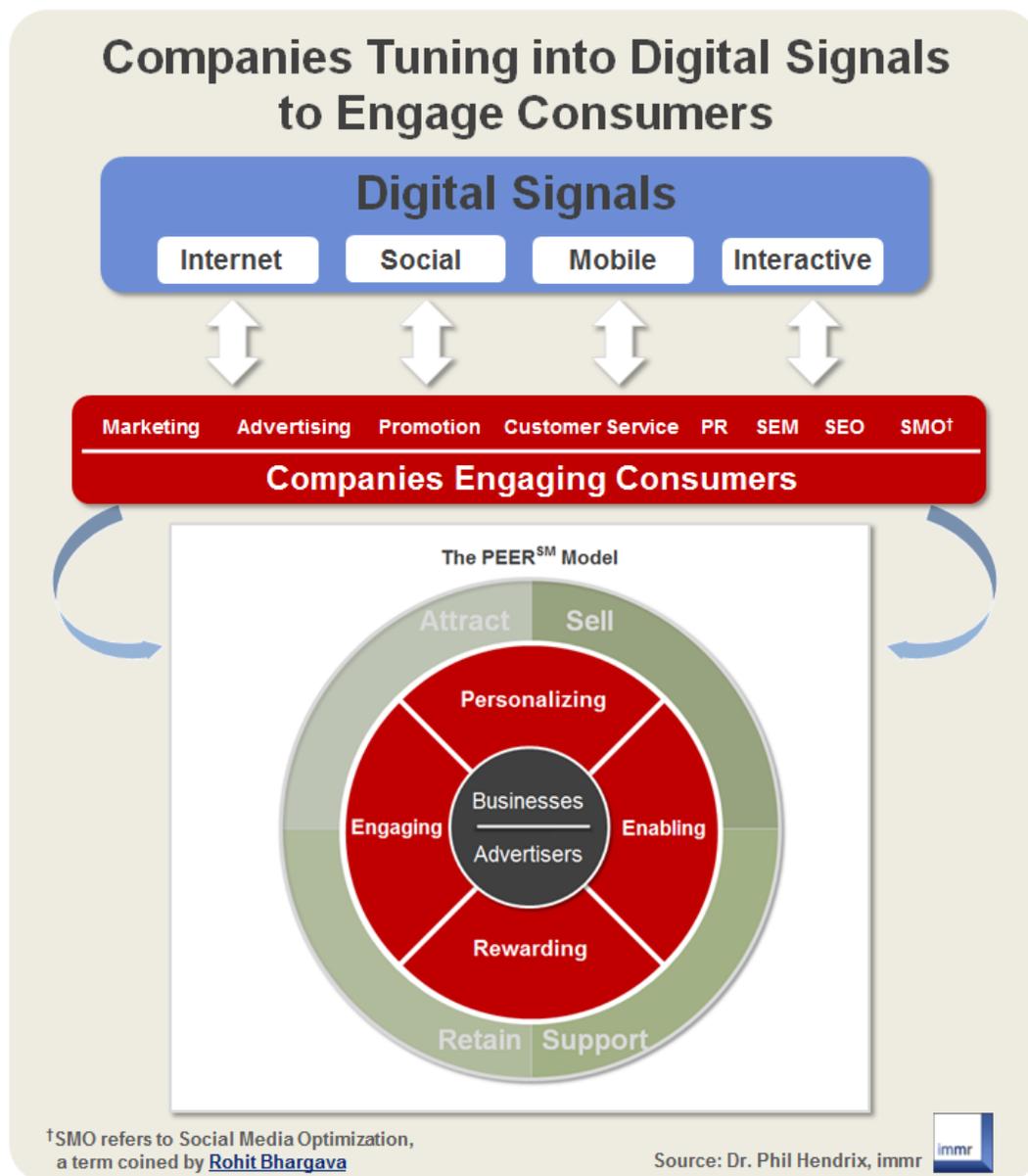
While many businesses are "listening in" on social media, few are prepared to process, much less understand and act on the enormous volume and complexity of traces generated by social media, location and other digital channels. In a [just released survey](#) by IBM of more than 1,700 CMOs, two-thirds say their organizations are underprepared to deal with “the explosion of data, social media and the proliferation of channels and devices.” Businesses are wrestling with fundamental questions, including:

- Which Digital Signals should we focus on?
- What insights and opportunities can be gleaned from Digital Signals?
- How are Digital Signals affecting our business?
- How should we respond to Digital Signals?
- How do we “channel” and use Digital Signals to reach, enable and engage consumers?

Given the importance and impact, capturing, analyzing and leveraging Digital Signals are top priorities for executives. This whitepaper outlines the status and growing significance of Digital Signals, describes challenges in harnessing these data, and outlines solutions that allow businesses to capitalize on Digital Signals in real-time. While the implications are wide-ranging, the discussion is most relevant to companies doing business with consumers and the executives in those companies responsible for achieving results with customers – e.g., CMOs, product, segment and brand managers, and principals and managers of SMBs.

## How Companies Are Leveraging Digital Signals

Innovative companies are leveraging Digital Signals to personalize, engage, enable and reward consumers, which we refer to as a PEER strategy. Highlighted below are emerging applications that suggest how innovative companies will leverage Digital Signals in the future.



## OrderSM

### Opening up Digital Channels

For many individuals, texting is preferred by a wide margin over communicating by voice. When we think of businesses, however, few are equipped to handle, much less encourage, texting. [OrderSM](#) intends to change that, creating a platform that makes it easy for consumers and businesses to text one another. As QR codes, NFC and other channels emerge, businesses should also revisit and open up existing channels, especially those used and preferred by consumers.

## SocMetrics

### Identifying Influencers

Who are the most influential consumers for your business? While Klout has developed a general measure of individuals' influence, [SocMetrics](#) takes a more nuanced approach, identifying influencers by category, e.g., food, entertainment, etc. In the future solutions will identify influencers using even more specific criteria, including sentiments (e.g., enthusiasts, critics), location, style, etc.

## AsthmaSignals making a difference

### Mashups that Combine Location, Context

Asthma is a chronic disease that affects 7 million children. Combining data on ambient conditions (pollen counts, ozone levels, etc.) with data on the patient (their location, daily schedule, etc.), [Asthma Signals'](#) "early warning system" predicts and recommends preventive actions that parents and schools should take to prevent asthma attacks in children. By combining information on an individual's history, location, condition, etc. and contextual/environmental data, new mashups will anticipate needs and provide personalized, timely recommendations and alerts to consumers.

## Driveway

### Capturing Digital Signals

A finalist in the 2011 Boston MassChallenge competition, [Driveway](#) – a new startup – tracks individuals' driving. Similar to a "credit score," Driveway intends to use this information to help consumers save money on car insurance and bring new "good drivers" to auto insurance providers.

## TotalTab

### Enabling Digital Signals

In stores, restaurants and other businesses, consumers spend a significant amount of time waiting. [TotalTab](#) plans to eliminate some of this waste by allowing customers in a bar or restaurant to close out and pay their tab, without having to wait for a server. In addition to saving customers' and employees' time, apps like TotalTab can provide data for a business' CRM.

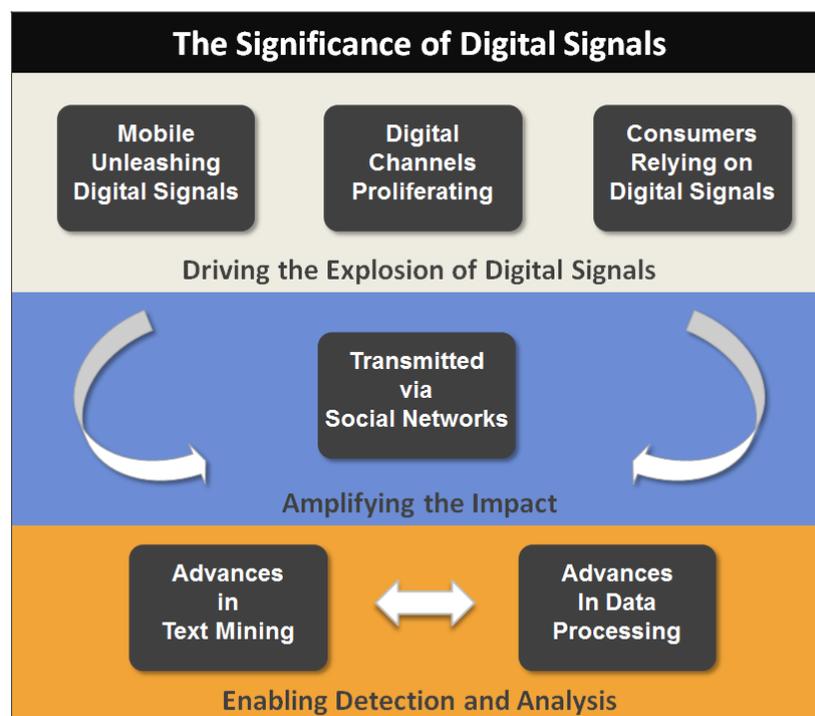
## erly

### Keeping Digital Signals

[erly](#) intends to help everyone organize their personal content around experiences, creating an experience graph. "In an experience graph, people and their content are organized around the experience that connected them. If you can remember the experience, you can find all the content associated with it... we believe that an experience graph can help connect people to each other and their vast amounts of personal data in new, unique, and valuable ways."

## Digital Signals – Ignore at your Peril

Digital Signals, in some form or another, have been around for more than a decade – consider, for instance, clickstream data. However, we are now witnessing a dramatic increase in the volume of Digital Signals, a trend that will only accelerate over the next 2-3 years. As Digital Signals spread through social networks, the volume and impact are expanded even more. Fortunately, advances in processing and analysis of text and massive quantities of data dramatically improve the ability of companies and their partners to mine and extract actionable insights from Digital Signals. In this section, we describe these forces and outline implications for businesses.



Source: Dr. Phil Hendrix, immr

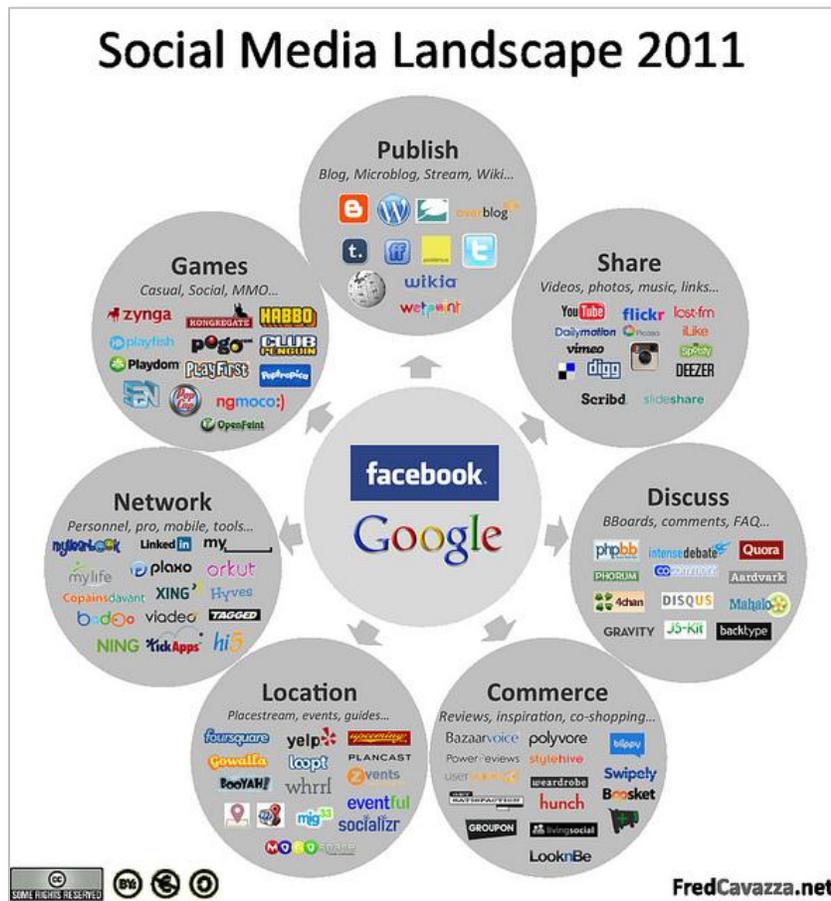
### Digital Channels Proliferating

Until recently, consumers shared their views with a small circle of friends, acquaintances and co-workers. Now, as [Andreas Weigand](#), former CTO of Amazon observed, "With nothing more than a few clicks, billions of people are digitizing and broadcasting their thoughts and emotions to the world in real-time... producing massive amounts of data."

One of the primary forces driving the enormous surge in Digital Signals is the growing number of outlets in which individuals can express and, in many cases, exchange their views. The ecosystem includes a staggering and growing number of sites:

- Prominent websites, such as Facebook, Twitter, LinkedIn, YouTube, and Flickr
- Forums like [Epinions](#)
- "How to" websites such as [eHow](#) (covering some 50 categories) and [MakeUseOf](#)
- Ecommerce websites, like Amazon, where customers post a large number of reviews on everything from books and movies to electronics and car seats
- Websites like [Spotify](#), where individuals share the music they're listening to now
- And growing by the day, a large number of specialized web sites for individuals with specific interests and needs – examples range from [CafeMom](#) ("the meeting place for Moms") to [PatientsLikeMe](#) (where individuals can discuss their symptoms and conditions with other patients).

[Fred Cavazza](#) has documented the ever expanding and evolving Social Media landscape since 2008 – his latest [summary](#), published earlier this year, includes over 100 websites in seven categories.



In addition to these "persistent" websites, a number of new mobile services and apps allow individuals at events to connect, share and network – for example, [HYVE Events](#) for conference attendees and others for concerts, sporting events, etc.

As discussed below, a growing number of websites have either mobile versions or mobile apps, making them accessible to consumers with smart phones, tablets and other mobile devices. [Recent data](#) reveal that consumers are spending more of their time with social media and mobile apps and less time on "the rest of the internet" and of course traditional media.

## Mobile Unleashing Digital Signals

Commenting on Steve Jobs' legacy a week before his death, futurist Paul Saffo [observed](#), "Before the iPhone, cyberspace was something you went to your desk to visit... now cyberspace is something you carry in your pocket." With smartphone users soon in the majority, more and more consumers are connecting to the Internet via mobile devices, enabling them to check-in via Foursquare, post "finds" on [Trover](#), and discover new restaurants on [Eater.com](#). In just the last month alone, 1.2 million mobile consumers downloaded [ShopSavvy](#), a mobile app that allows users to check availability and compare prices of products in stores. As consumers use smartphones and mobile apps, their Digital Signals paint an important mosaic of interests, behaviors and intentions, especially when broken out by location over time.

While Internet connectivity and social media have led to an explosion of Digital Signals, to borrow an old expression "we ain't seen nothing yet." With a variety of sensors – including Wi-Fi, GPS, cameras, and soon NFC – smartphones have morphed into devices capable of receiving and transmitting a wide range of Digital Signals. While location and imaging are currently the most common sensors on smartphones, NFC is quickly gaining momentum as a significant new digital channel.

- With GPS, Wi-fi and other sensors, the location of a mobile device can be determined, in many instances with a very high degree of accuracy – with the mobile user's permission, location can be shared with third-parties. Using lat/long coordinates, [GeoIQ](#) can overlay complementary data from a wide range of sources that describes even more fully context as well as current conditions, such as traffic and weather, in the surrounding area. The ability to pinpoint a consumer's location is a remarkably important development, enabling not just services such as maps and directions but spawning a whole new category of location-aware apps. Thousands of mobile apps, in categories from shopping to games, entertainment and even healthcare, are "location aware." To illustrate the possibilities, consider [Songkick](#), founded by three friends who "thought it was way too hard to find out when their favorite bands were coming to town." Dubbed the "social platform for live music," Songkick auto-detects subscribers' location, learns their preferences by scanning the music on their mobile device, and creates a personalized list of upcoming concerts in the area where the subscriber's favorite artists will be appearing. To obtain these types of personalized, "[hyper-local content and information](#)," a growing number of consumers are willing to disclose their location to third parties, including mobile app developers, publishers like the Weather Channel, and others.
- By enabling users to capture and post images to Flickr, Picasa and other photo-sharing sites, smartphones equipped with cameras have also unleashed new streams of Digital Signals. Reflecting the growing popularity of sharing photos, the startup [Instagram](#), after attracting one million users in less than three months, reached the two million mark in month four, putting it on a

faster growth path than Facebook, Twitter and Foursquare. With a smartphone camera, users can also scan barcodes and QR codes, allowing them to access information, download coupons, and trigger many other actions. Recognizing the benefits for consumers and opportunities to better utilize in-store consultants, BestBuy has placed QR codes on every item sold in its stores. While limited familiarity among consumers has slowed use, global brands like Nissan and merchants large and small are increasingly using QR codes to communicate with, support and engage consumers.

- With encouragement from Google, the rate at which credit card companies, merchants, and mobile OEMs are deploying NFC has accelerated. And it's no surprise, given the enormous potential – for example, upon entering a store equipped with NFC tags, a consumer can automatically “check-in,” allowing the retailer to individualize communications and offers, recognize and reward frequent shoppers, enable self-serve (“is this item available in a different color?”) and even allow shoppers to pay without waiting in line.

As these examples suggest, mobile devices are unleashing a flood of Digital Signals that reflect consumers’ interests, queries, actions, plans, locations and even movements. In combination with location, Digital Signals provide invaluable, real-time insight for businesses, especially for merchants and advertisers targeting consumers based on geography and proximity. Given the significance, a forthcoming whitepaper (sponsored by ATT Interactive) examines the growing importance and value of so-called “hyper-local” advertising.

## Consumers Relying on Digital Signals

In addition to using social media to stay in touch with friends, consumers are increasingly relying on reviews of products and services and other content posted by individuals – examples of these Digital Signals include ratings of hotels and destinations on TripAdvisor; customers’ comments and reviews on Amazon; answers, advice and instructions from “experts” on Quora, eHow, and MakeUseOf; data on the spending patterns within peer groups on Bundle; and many others.

Underscoring the importance of this digital “word-of-mouth,” David Armano (EVP with the PR firm Edelman Digital) coined the term “earned media.” VC Fred Wilson (principal with Union Square Ventures and investor in Twitter) elaborated on the notion in a presentation that, fittingly, has gotten nearly 40,000 views on Slideshare. Compared to “paid media” (advertising, PR, sales, etc.), Digital Signals contained in earned media are valued by consumers for the relevance, timeliness, and perceived objectivity.

For instance, restaurants trust Yelp to insure the legitimacy of reviews posted by consumers – Yelp also organizes and makes it easy for users to filter reviews by location, recency and rating and to “drill down” to better understand why a particular individual loved (or hated) the restaurant or product in question. In categories such as home maintenance and remodeling, Angie’s List, Kudzu and similar services are thriving by collecting, organizing and making it easy for consumers to find reviews of

contractors and service providers. Consumers wanting “inside information” can even use services such as [Logly](#) to get information and advice from “locals.”

Recognizing the value of Digital Signals to prospective customers, businesses and third-parties are encouraging and even incenting users to post comments and reviews. With a QR code on a placemat, for example, a restaurant can make it easy for patrons to Tweet “Just had a great meal at Joe’s.” With mobile consumers accessing more hyper-local content and offers, including flash sales, Digital Signals will continue to grow in importance, especially for location-specific and time sensitive consumer decisions.

## Digital Signals Transmitted via Social Networks

In 2009 Nissan Canada was one of the first brands to rely exclusively on social media to launch a major product – Nissan’s campaign for its enigmatic Cube, a new vehicle designed for young adults, centered around a contest in which some 100 finalists, chosen from 1,000 “people on the street,” competed to win one of 50 Cubes. Last month in the U.S. automaker Dodge employed a similar strategy, in this case hiding three of its new Journey crossovers, one per region, and providing clues online and in TV commercials as to the vehicles’ whereabouts. Since the prize in this competition was a brand new Journey, the campaign generated a great deal of interest. In its second week, Dodge’s video was viewed by some 430k individuals, making it the 10th most popular viral [video of the week](#).

The Nissan and Dodge campaigns illustrate two fundamental characteristics of Digital Signals:

- Because posts, comments, likes and other expressions are digital, they can be viewed by and shared with others, allowing them to spread, sometimes rapidly, through social networks. For instance, moved to express and share their feelings following the death of Steve Jobs, tens of thousands of individuals turned to Twitter. As word spread, within half an hour 50,000 Tweets per minute mentioned Steve Jobs – at that point, Tweets honoring Jobs accounted for [25% of Twitter’s traffic](#). Ideas spreading through social networks can follow patterns similar those of epidemics – in fact, social network analysis (SNA) uses terms such as “[contagion](#)” and tools developed in epidemiology.
- While Digital Signals can spread naturally, businesses also can use techniques such as [gamification](#) to “seed” and cultivate interest in their products and brands. For example, clients from Dunkin Donuts to Philips Lighting are working with [SCVNGR](#) to engage consumers with games that are fun to play and share. In “[Reach for the Sky](#),” a new campaign for Cathay Pacific, individuals are encouraged to take photos of clouds, add captions, and upload the photos for others to view and vote on. In a [recent study by L2](#), quantifying the digital competency of some 49 global fashion brands, Burberry, Kate Spade and Coach ranked among a handful of “geniuses.” While only one in four luxury fashion brands is even on Instagram, Burberry’s has 96,000 followers on Instagram. Geolocal leader Louis Vuitton has launched Amblers, a mobile app that allows fellow “Amblers” (including celebrities) to share information about their favorite global spots.

While these efforts and campaigns are designed, of course, to create interest, excitement, and engagement, negative incidents that occur can also spread rapidly. Just as Cathay Pacific was preparing to launch a new ad campaign, news and photos about a scandal involving a flight attendant and pilot – since relieved of their duties – spread widely via [social media](#).

Since sharing amplifies the impact, detecting, tracking and managing Digital Signals in real-time are critically important tasks for businesses. As discussed later, tracking the spread of Digital Signals by geographies is also useful, especially to manage and determine the effects of location-based campaigns.

### **Advances in Text Mining and Data Processing**

Tweets, Facebook updates, search engine queries, and many other Digital Signals consist of text – to classify the text, software must be capable of “disambiguating” entities – was the comment about “salt” referring to the spice or the movie with Angelina Jolie? – and interpreting the meaning of phrases and words. In addition to mining text to extract and classify the contents, the sheer volume of Digital Signals represents a formidable challenge for even the largest main frames. These challenges are described more fully in the next section.

Fortunately, significant [advances in text mining](#) and computing [platforms and software](#) capable of handling “big data” have made Digital Signals accessible to businesses. Vendors and solutions for mining, processing, analyzing and gleaning insights from Digital Signals are discussed in the final section.

## Challenges in Harnessing Digital Signals

Given the developments outlined above, companies large and small are attempting to capture and more fully leverage Digital Signals in their strategies and operations. In their efforts to harness Digital Signals, businesses encounter a number of significant challenges, including the sheer quantity of data and the fact that much of it is unstructured (text, images, etc.), coming from a variety of sources, with trends and relationships that are complex and difficult to discern. Fortunately, significant advances in just the last 2-3 years have solved some of these problems and mitigated others.

The ten biggest challenges are shown in the Table below, along with an assessment of the significance of each, given the current state of data, solutions and practices. Each of these is discussed more fully below.

| Challenges in Harnessing Digital Signals |   |              |
|--|---|--------------|
|  | Challenge                                   | Significance |
| Data                                     | Data Volumes = “Big Data”                   | ●            |
|  | Mix of Structured, Unstructured Data        | ◐            |
|  | Streaming Data ⇄ Volatile, Perishable       | ◑            |
| Linkages                                 | Missing Metadata (source, location, etc.)   | ◑            |
|  | Contextual Data Incomplete                  | ◐            |
|  | Disparate Data in Disconnected Silos        | ◑            |
| Relationships                            | Reach, Influence, Impact Vary               | ●            |
|  | Benchmarks Lacking                          | ◑            |
|  | Viral Effects Unpredictable                 | ◐            |
| Organization                             | Splintered Responsibilities, ad hoc Efforts | ●            |

| Key | Most Significant | ↔ |   | Least Significant |
|-----|------------------|---|---|-------------------|
|     | ●                | ◑ | ◐ | ◒                 |

Significance reflects the degree of difficulty in dealing with the challenge, given the status quo (data, solutions, and practices)

## Digital Signals = Big Data

Without question, up until recently – and still for many companies – one of the biggest challenges in dealing with Digital Signals stems from the sheer quantity of data. To appreciate the size of this problem, consider the chart below showing the number of comments, tweets, images and other Digital Signals posted in just the last 30 seconds.



Source: [PersonalizeMedia](#)

These massive amounts of data quickly bring conventional databases, data warehouses and software to a halt. Fortunately, "[data scientists](#)" have constructed new solutions, building on powerful approaches originally developed by Google and Yahoo for their search engines. While the ecosystem is still developing, a handful of vendors, including Cloudera, LexisNexis and the recent spinout from Yahoo, [Hortonworks](#), and numerous startups have gained considerable experience using such tools as Hadoop, HBase and others to "tame the fire hose." Still, as [Scott Weiss](#) (partner at [Andreessen Horowitz](#), whose investments include Platfora) pointed out, implementing these solutions requires significant investment as well as initial and on-going tuning by data scientists, who are in [short supply](#). Fortunately, a handful of vendors, including GeolIQ, are offering turnkey solutions in the form of SaaS and PaaS (software and platform as a solution, respectively).

## Mix of Structured, Unstructured Data

In the normal course of business, much of the data that companies deal with – from sales, operations, finance, HR, etc. – are structured data that fit nicely into conventional relational databases. In contrast, Digital Signals are often unstructured data – for example, text in Tweets and comments of varying length, with few set conventions; images with no identifying labels or tags; etc. Analyzing unstructured data requires that either humans or computers examine their contents and classify them in some consistent fashion – What is the Tweet about? Is the opinion expressed positive or negative? and so on. While some vendors rely on humans to examine and code text and images, most solutions now rely on sophisticated text mining algorithms capable of classifying the contents of unstructured Digital Signals with a high degree of accuracy.

[Lexalytics](#) and firms such as [Autonomy](#) (recently acquired by HP) have achieved [high accuracy rates](#). These solutions apply not just to rules – "select Tweets that mention the iPhone 4S" – but

sophisticated logic as well – "was the comment positive or negative?" While researchers continue to refine text and image mining, processing and extracting the "meaning" from unstructured data is no longer the hurdle that it was just a few years ago.

## Streaming Data

Digital Signals are also known as (continuously) streaming data. With streaming data, a critical variable is the length of time required to "process" – detect, interpret and act on – bits of incoming data. For instance, [high-frequency traders](#) process Digital Signals in milliseconds, while [real-time advertising platforms](#) process a user's location and other information to select and serve the "optimal" ad in less than a second. To a large manufacturer like GE, monitoring the performance of equipment and devices in the field, latency matters as well, particularly in its imaging and healthcare division.

While other applications aren't quite as demanding, they may still require near real-time processing of streaming data. For example, research by [bit.ly](#) found that posts and comments on both Twitter and Facebook have a very short "half-life" – after about three hours links on both networks posts "[head into obscurity](#)." Given the potential for rapid, unpredictable transmission via social networks, the ability to process streaming data in near real-time is critical. While streaming data are demanding – especially in "low tolerance" applications such as traffic, high-frequency trading, intelligence and advertising, in most applications the challenges no longer present a significant hurdle, thanks to the solutions above and advances in "[complex event processing](#)."

## Missing Metadata

In conventional database applications, requirements, procedures, quality checks and the like guarantee that data are consistent and "well documented," e.g., with known source, time stamps, valid in-range codes, etc. In contrast, the source, date, location, and other important metadata are often missing in Digital Signals. Fortunately, a number of vendors are appending metadata to Digital Signals – based on a small sample of an individual's Tweets, who they follow, etc., [Sysomo](#) can predict and append a person's gender with a high degree of accuracy.

As shown below, every Tweet contains some geographic metadata, ranging from the general area (based on ISP) to near-exact location (based on GPS). So, while incomplete, metadata is available for a growing proportion of Digital Signals. Moreover, given the volume of Digital Signals, the number of data points with metadata is usually sufficient to draw conclusions, compare results over time, etc.

| Example – Anatomy of a Tweet† |                            |                  |                  |         |               |            |            |         |      |         |
|-------------------------------|----------------------------|------------------|------------------|---------|---------------|------------|------------|---------|------|---------|
| Twitter Text                  | Metadata (about the Tweet) |                  |                  |         |               |            |            |         |      |         |
| < 140 Characters              | About the Author           |                  |                  |         | Location      |            |            |         | Time | More... |
| Text, hashtags, etc.          | Username                   | Number Followers | Number of Tweets | More... | Location Info | Place Type | Place Name | More... |      |         |
|                               |                            |                  |                  |         |               |            |            |         |      |         |
| †Raffi Krikorian, 2010        |                            |                  |                  |         |               |            |            |         |      |         |

## Incomplete Contextual Data

Individuals and even machines are often affected by their environment – weather, not surprisingly, has a big impact on the activities in which consumers engage, the products they consume and even the sentiments they express. So, to better understand Digital Signals, it is important to know something about the surrounding environment at the time a Tweet, comment or other signal is sent – was the person indoors or outdoors? Were they at a conference or a concert? In an urban or suburban area? In a market where our products have limited or extensive distribution? And similar questions. Provided the location is known, companies like GeoIQ and Factual can append significant contextual data to Digital Signals. Since companies are just beginning to append and analyze contextual data, there is much to be learned about which data are useful.

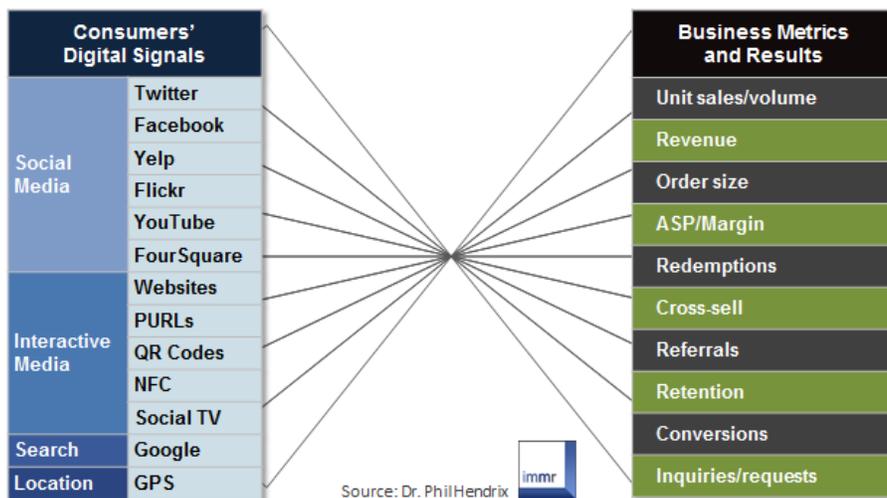
## Disconnected Data

While there are many different types and sources of Digital Signals, companies such as Gnip and Datasift are aggregating these sources and becoming, in essence, one-stop shops for data. More difficult, however, is linking data from Digital Signals to contextual data and Business Results. For a variety of reasons, few companies have successfully linked Digital Signals to Business Results: (i) vendors processing Digital Signals typically specialize in only certain "types" of data – for example, sentiment analysis; (ii) as noted earlier, data from various sources are often stored in separate silos; and (iii) Digital Signals and other data are often aggregated, masking relationships and making linkage analysis difficult.

These disconnects make it difficult to answer fundamental questions. Do more "mentions" translate into higher sales? Do negative comments foreshadow an increase in requests for customer support?

Was the campaign to attract followers successful in areas where competition is intense? etc. Using location as the "linchpin," GeoiQ is linking disparate data, enabling companies to examine and quantify the relationship between Digital Signals and Business Results at a granular level. Given the importance of this issue and the fact that relatively few companies have much experience "connecting the dots," we view this as a significant issue.

### The \$64M Question – How Digital Signals Impact Business Results



### Reach, Impact Vary

Not all Digital Signals are equal in terms of their relevance or impact – for a particular product or question, some Signals, such as comments on e-commerce sites, may be more important than others, such as Tweets. Similarly, a subset of a particular Digital Signals may be more important than the rest, varying, for example, by the influence of the contributor, time-of-day, location or other aspects. While measures of contributors' influence are available from [Klout](#) and other sources, companies are just beginning to incorporate these measures into their analyses.

Of course, until companies connect Digital Signals and Business Results, establishing the impact of various types of Digital Signals or subsets of particular Signals will be difficult. In the meantime, companies are forced to rely on "gut facts" – "acquiring additional Facebook Fans is worthwhile" – or simplified assumptions that are surely incorrect – "a tweet is just as valuable as a Facebook comment." Unable to distinguish these differences, companies are investing and allocating resources "blindly," which is clearly not a sustainable approach.

## Benchmarks Lacking

Perhaps it's no surprise that there are relatively few benchmarks against which companies can compare their results. Is a 10% increase in mentions of our newest product "good?" What if 30% of those mentions are negative? While benchmarks are beginning to emerge (see, for example a [recent study](#) of Luxury Fashion brands by the consulting firm [L2](#)), at present most companies are forced to rely on analyses and comparisons of their own data. By disaggregating results by geography and displaying results visually, GeolQ makes it easier to monitor, detect differences, and compare results over time.

## Unpredictable Viral Effects

While researchers in many disciplines are studying the problem, understanding and predicting which Digital Signals will "go viral" are largely unanswered questions. A number of experts, like [Michael Wu](#) of [Lithium](#), are studying these phenomena and developing useful insights. Vendors are also advising and helping their clients cultivate communities, strengthen ties between members, and incent members to engage and share. Still, there is much to be learned in this important area. Over time, new research on the spread of Digital Signals through networks is advancing our understanding – see, for example, [recent studies](#) by NYU professor [Sinan Aral](#) and colleague Dylan Walker. In the meantime, given the difficulties predicting viral effects, having methods for "early detection" of emerging trends is critical.

## Organizational Challenges

While some of the challenges above – especially disconnected silos of data – stem from organizational issues, an even larger challenge results from the way in which organizations view and handle Digital Signals. With just a few exceptions, in most companies responsibilities for tracking and reporting Digital Signals are splintered across various departments, from Customer Service to PR, Marketing, Operations and others. Rarely do executives have a "unified view" of the Digital Signals relevant to and impacting their companies.

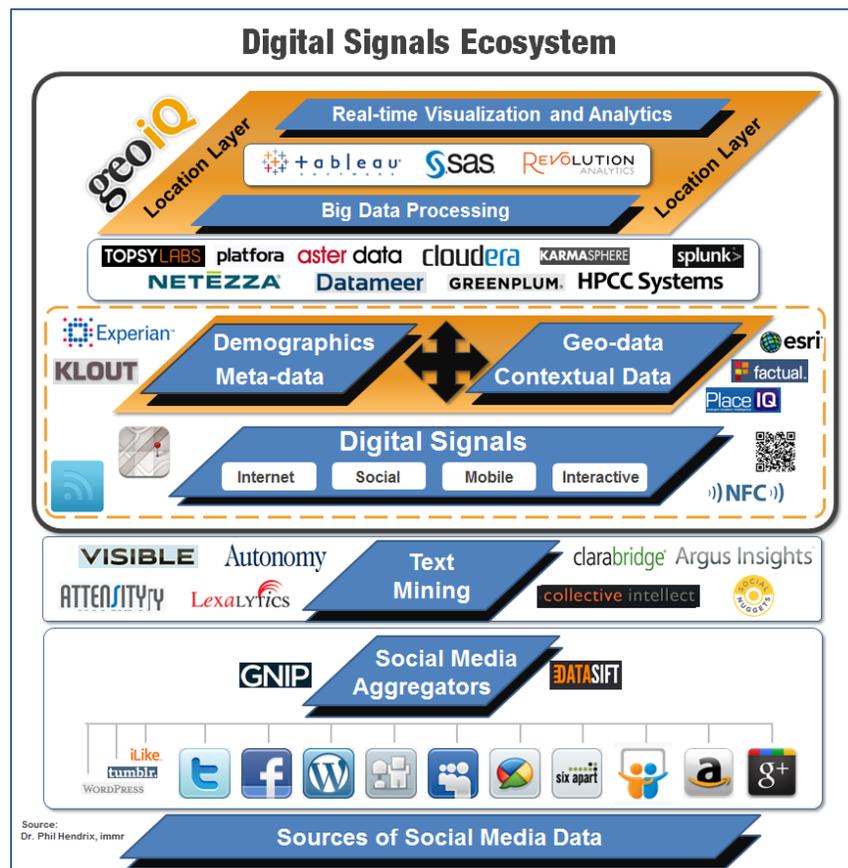
Of even greater concern, companies' efforts to manage and influence Digital Signals are often ad hoc and uncoordinated, making it difficult to track results by time or geography, much less attribute results and determine the effectiveness of campaigns and initiatives. While organizational issues can be difficult to remedy, companies like GeolQ client PepsiCo are developing dashboards that give their executives the unified view necessary to measure and manage Digital Signals. Still, for most organizations this remains a very significant challenge.

## The Digital Signal Ecosystem

The Digital Signal ecosystem consists of a complex web of companies, including the sources mentioned earlier as well as a growing number of solution providers who specialize in one or more parts of the puzzle. The summary below, while not meant to be exhaustive, shows many of the leading vendors and the primary areas in which they specialize. Given the large and growing variety of Digital Signals, data sources and solution providers, two observations are especially important for businesses to bear in mind:

- No one solution or vendor is capable of answering all aspects of the modules outlined below.
- Given the need for multiple solutions and vendors, data and analytics should be portable, readily available to any of the solutions and not restricted to a particular vendor or platform.

GeoIQ and other proponents of an open, “plug and play” architecture believe that businesses should be allowed to (i) store data on their preferred systems and connect into that data source with ease and (ii) use analytical tools like SAS, regardless of where the data reside.



While an in-depth discussion of the ecosystem is beyond the scope of this whitepaper, here is a brief overview of the main categories and vendors:

- **Data Sources** – This category includes social media sites (Facebook, Twitter, Google+, etc.), e-commerce sites like Amazon, and hundreds of other sources of Digital Signals on the Internet. Also included are mobile device operating systems (Android, Apple iOS, etc.), which can provide the location and other Digital Signals for mobile users. For a particular company, data sources would also include their websites' clickstream as well as Digital Signals from QR codes, NFC and the like.
- **Social Media Aggregators** – [GNIP](#), [DataSift](#) and others aggregate data from many social media sites.
- **Text Mining Vendors** – Vendors like Boston-based [Lexalytics](#), [Collective Intellect](#) and others extract entities (companies, brands, products), meaning and sentiments expressed in text. While it overlooks some important companies, including [SocialNuggets](#) and [Argus Insights](#), a recent [report](#) by [Gleanster](#) profiles and evaluates many of the leading companies in this category.
- **Geo-data and Contextual Data** – A number of companies have compiled extensive geo-data ([esri](#)) and contextual data ([Factual](#) and [PlaceIQ](#)). To provide a more complete understanding, [GeoIQ](#) can append these data in real-time to any geo-referenced Digital Signals (e.g., a Digital Signal associated with a location, as given by lat/long, address, ZIP, etc.).
- **Demographic and other Metadata** – Well-known in direct-marketing circles, [Experian](#) offers a wealth of demographic, financial, purchasing and behavioral profiles of consumers, while companies such as [Klout](#) and [Sysomos](#) can append information to social media on the influence and gender of contributors.
- **Big Data Solutions** – Companies in this category provide computing platforms and solutions designed to process the terabyte and petabyte-sized datasets generated by Digital Signals in near real-time. Included are vendors that support implementations of Hadoop – [Cloudera](#), [Datameer](#), [Karmasphere](#), and the recently formed [HortonWorks](#) (spin-out from Yahoo); data warehouse solution providers like [Aster Data](#), [Greenplum](#) (now part of EMC), and [Netezza](#) (acquired last year by IBM); [HPCC Systems](#) (subsidiary of LexisNexis), as well as [GeoIQ](#). For a recent review of companies supporting the Hadoop platform, see this April 2011 [report](#) by GigaOm Pro analyst [Derrick Harris](#).
- **Visualization** – Given the massive quantities of streaming data generated by Digital Signals, dynamic visualizations are proving increasingly important to display and summarize results and trends, especially compared to conventional charts and graphs. Providers of visualization tools include [Tableau Software](#) and [GeoIQ](#).
- **Advanced Analytics** – The Big Data solutions above perform many of the calculations that most applications require. For more advanced analyses, such as data mining and predictive modeling, statisticians and data scientists are turning to tools from [SAS](#) and [Revolution Analytics](#), founded in 2007 by Norman Nie, who co-invented SPSS.

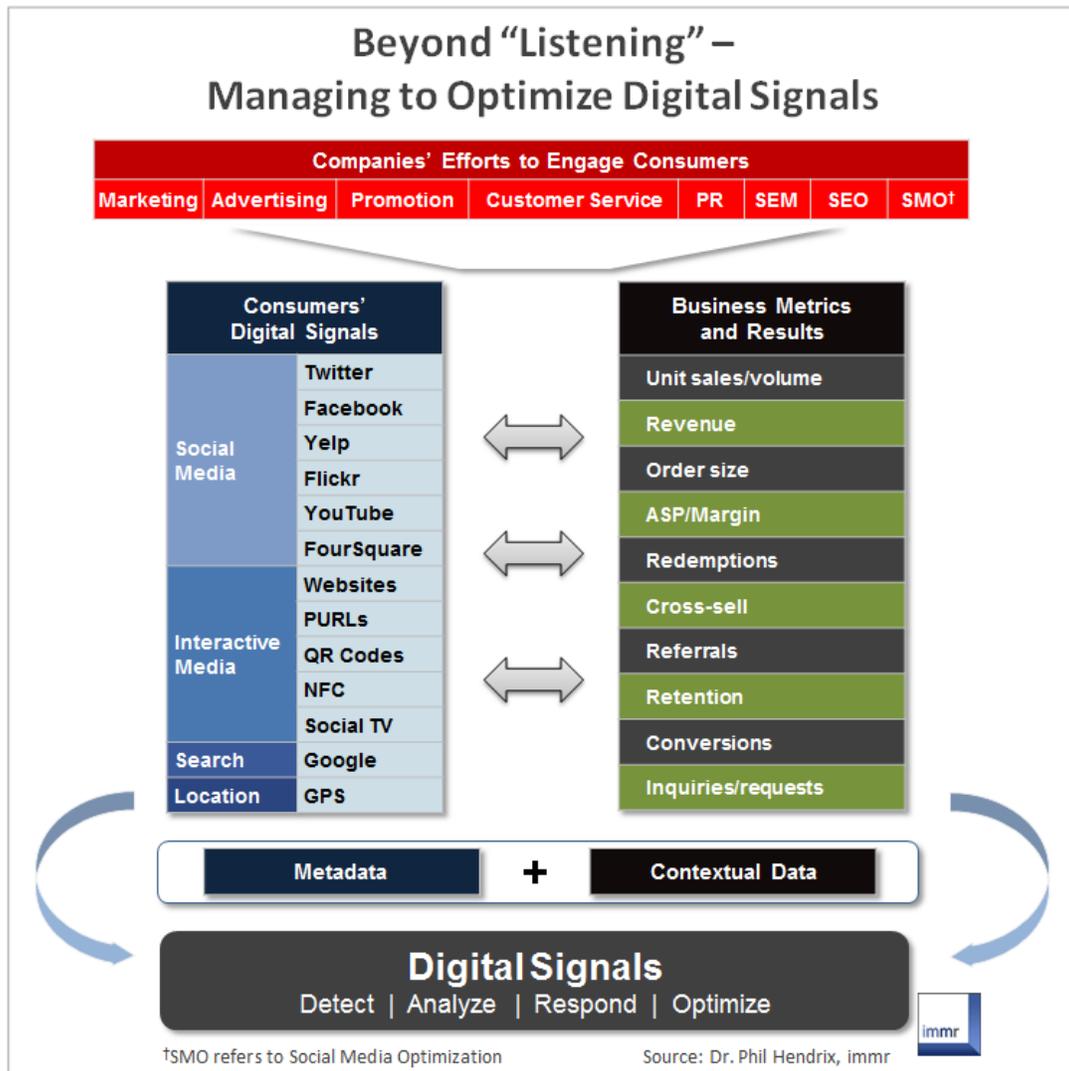
## Beyond Listening – Managing to Optimize Digital Signals

Shown on the next page is a diagram depicting how Digital Signals fit into the larger picture:

- As Digital Signals are detected, companies can “augment” and better understand them by appending and analyzing both metadata (location, time, etc.) embedded in the Signal and linking contextual data from third parties.
- As companies interpret and learn from “augmented” Digital Signals, teams can use the insights to develop new products, formulate new marketing campaigns, revise customer service policies and procedures, and in many other ways.
- As initiatives are implemented, outcomes can in turn be tracked via Digital Signals and their impact on Business Results. For example, how many consumers are scanning the QR codes on Nissan vehicles? Do increases in QR activity correlate with an increase in showroom traffic and sales?

Of course, all of the efforts to detect, measure and quantify the impact of Digital Signals are for naught unless the information is used to improve customer experiences or operations. As research by the [Altimeter Group](#) has shown, a few companies – notably Dell, Cox Cable, and others – have been early adopters of Social Media, an important subcategory of Digital Signals. These companies have integrated social media into their culture and processes. The [Dachis Group](#) has also prepared a useful summary illustrating how “[Socially Optimized Businesses](#)” are different from their counterparts.

Fewer companies are known for managing to optimize Digital Signals – some of the characteristics and capabilities that distinguish market leaders and followers are summarized in the final section.

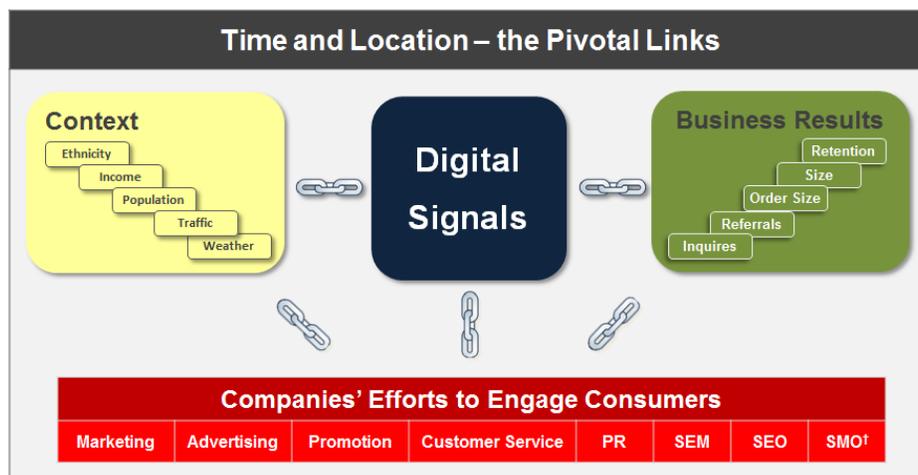


## Location – the “Linchpin”

In the diagram above arrows suggest that data from disparate sources – Digital Signals, Metadata, Contextual Data, and Business Results – are somehow linked together. A natural question is “how is this done?” It turns out that location is the key linchpin, especially for mobile users. As mentioned earlier, smart phones are location-aware, capable of reporting the user’s location based on GPS or other positioning technologies (see, for example, [Skyhook’s XPS Hybrid positioning technology](#), which combines GPS, Cell ID and nearby Wi-fi Access points to determine the location of mobile devices).

With its geo-coding capabilities, GeoIQ can link Digital Signals and data from disparate sources, even when their locations are specified in different ways (e.g., lat/long; address; ZIP codes; etc.). For example, given a geo-reference – be it lat/long, an address, or ZIP code – data from Experian and the other sources mentioned earlier can be appended to a Digital Signal. Business Results, of course, are consistently tagged with and broken out by location. As mentioned earlier, Digital Signals are “geo-referenced” to varying degrees and with varying degrees of specificity. Even when only a subset is geo-referenced – as is the case with Tweets, for instance – the volume is often sufficient within a particular area of interest – e.g., a 5-mile radius surrounding a store location – to view, summarize and verify relationships between Digital Signals and Business Results by location.

By “fusing” data based on location in real-time, GeoIQ provides a “unified view” that includes Digital Signals, Context (weather, traffic, etc.) and Business results, all tied to and displayed by common geographic areas.



## Conclusion

Key to better understanding and serving consumers, Digital Signals represent a potentially invaluable asset for businesses. However, most companies are just beginning to recognize the value and attempting to tune into Digital Signals. In doing so, companies are faced with difficult questions, such as which Signals are most useful? How do we detect, process and extract information from Digital Signals in a timely fashion? How do we align the organization to respond to Digital Signals? These are important questions and no one answer fits every company.

Companies that fail to embrace and capitalize on Digital Signals are clearly vulnerable. Some of the most common symptoms of “flying blind” are shown below.

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## Symptoms your Business is not Tuned into Digital Signals

|                                |   |
|--------------------------------|---|
| Digital Signals =<br>"Exhaust" | <ul style="list-style-type: none"> <li>▪ Key Digital Signals ignored</li> <li>▪ "Lost" in the data exhaust</li> </ul>                                 |
| All Measurement,<br>no Action  | <ul style="list-style-type: none"> <li>▪ Attention focused on measuring, reporting</li> <li>▪ Results rarely drive action</li> </ul>                  |
| Measurement<br>Silos           | <ul style="list-style-type: none"> <li>▪ Signals captured, stored in silos</li> <li>▪ No "integrated view" across the business</li> </ul>             |
| Flaw of<br>Averages            | <ul style="list-style-type: none"> <li>▪ Results reported in the aggregate</li> <li>▪ Significant variability, differences ignored</li> </ul>         |
| Insensitive<br>Measures        | <ul style="list-style-type: none"> <li>▪ Random fluctuations seen as "real"</li> <li>▪ Real changes go undetected</li> </ul>                          |
| All Signals<br>Treated Equally | <ul style="list-style-type: none"> <li>▪ Differences in influence, impact unrecognized</li> <li>▪ Results not broken out by source, impact</li> </ul> |

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To help guide businesses in their efforts to tune into Digital Signals, the diagnostic on the next page lists 10 key dimensions and highlights the differences between leading and lagging companies on these dimensions. Where should a business start? The dimensions are listed roughly in the order in which companies encounter and work through them, so we recommend working from the top down.

With new digital channels emerging, the process of tuning into and managing to optimize Digital Signals is clearly an on-going journey. Given the importance as well as the challenges associated with processing Digital Signals, the ecosystem presented above is likely to look quite different in 2-3 years. Probably the most important advice is to begin the journey, experimenting, applying and learning which Digital Signals prove most useful in serving customers and differentiating your business.

## Diagnostic

### How Tuned into Digital Signals is Your Business?

| Lagging Companies  | Key Questions   | Leading Companies                                      | Score<br>(0-10;<br>Lagging – Leading) |
|--|---|--|---------------------------------------|
| Unsure; measurement plan ad hoc                            | <b>Measures</b><br>Are we measuring (i) the most relevant Digital Signals (ii) at the right level?        | Measuring most relevant Signals at granular levels     | <input type="text"/>                  |
| Significant lag in capture, analysis, reporting            | <b>Speed – Latency</b><br>How much lag/latency is in our processing of Digital Signals?                   | Near real-time – Zero latency                          | <input type="text"/>                  |
| Detected only after trends become obvious                  | <b>Detecting Changes, Trends</b><br>Can we detect changes, trends in Digital Signals in a timely fashion? | Quickly detect meaningful changes                      | <input type="text"/>                  |
| Metadata ignored, rarely used                              | <b>Metadata</b><br>Are we leveraging Digital Signals' metadata (especially location)?                     | Metadata appended, leveraged                           | <input type="text"/>                  |
| Curious (contextual data not yet examined)                 | <b>Contextual Data</b><br>Have we appended the contextual data most relevant to our business?             | Contextual data appended, integrated                   | <input type="text"/>                  |
| Results reported in the aggregate, by standard geographies | <b>Reporting</b><br>Are Digital Signals reported by geographies tailored to our business?                 | Results broken out by geographies tailored to business | <input type="text"/>                  |
| Little coordination between initiatives, Signals           | <b>Coordination</b><br>Is the timing of marketing, SMO, other efforts coordinated with Digital Signals?   | Initiatives, Signals coordinated, linked               | <input type="text"/>                  |
| “Trust me” (Impact of various Signals unknown)             | <b>Impact – ROI</b><br>Have we quantified the impact of Digital Signals on Business Results?              | Impact of various Signals on key results quantified    | <input type="text"/>                  |
| Static, conventional charts and graphs                     | <b>Visualization</b><br>Are results displayed in a visual, intuitive manner accessible by end-users?      | Visual, interactive displays                           | <input type="text"/>                  |
| “Hope for the best” (efforts fragmented, ad hoc)           | <b>Alignment – Optimization</b><br>Have we aligned efforts and optimized investments in Digital Signals?  | Departments' efforts aligned, resources optimized      | <input type="text"/>                  |



Source: Dr. Phil Hendrix, immr

| Key | Left Behind | Lagging | Average | Leading | Tuned-in |
|-----|-------------|---------|---------|---------|----------|
|     | 0-20        | 21-40   | 41-60   | 61-80   | 81+      |

|                      |
|----------------------|
| <input type="text"/> |
| Total                |

## About GeoIQ

GeoIQ enables enterprises, marketers, retailers and public sector organizations to fuse together massive amounts of information from numerous data sources, analyze the linked data using location as the common pivot point and clearly identify trends and opportunities to drive better business decisions. Organizations across all market sectors have leveraged GeoIQ’s innovative location-based solutions to better deliver actionable information for dynamic decision making. Unlike other solutions, GeoIQ can be up and running in days. Key features of the solution are shown below.



| The GeoIQ Advantage  |   |
|----------------------|---|
| <b>Agnostic</b>      | Links data from disparate sources (including location, Social Media, Business Results and Contextual data from third-party sources) |
| <b>Complementary</b> | Works with leading text mining and sentiment analysis solutions as well as SAS and other popular data analytic tools                |
| <b>Scalable</b>      | Accommodates massive quantities (terabytes to petabytes) of streaming data  |
| <b>Low Latency</b>   | Processes data and returns results in seconds   |
| <b>User-friendly</b> | Is built around a menu-driven interface   |
| <b>Intuitive</b>     | Presents results using state-of-the-art visualizations  |

To learn how GeoiQ can help your business tune into Digital Signals, visit the [GeoiQ website](#) or contact the sales team ([sales@geoiq.com](mailto:sales@geoiq.com)).

## About the Author

Dr. Phil Hendrix is the founder and Director of [immr](#), a research and consulting firm that helps clients bring innovative new products and services to market. Phil helps clients uncover customer needs, optimize product/service features, achieve competitive differentiation and accelerate market acceptance. He is also an analyst in [GigaOm Pro](#), focusing on mobile, location and m-commerce, in particular. Recent reports include SoLoMo – Empowering Consumers and Transforming Shopping (Sept. 2011), Market Outlook for Tablets (April 2011) and Location - the Epicenter of Mobile Innovation (Feb. 2010). Before founding immr, Phil was a partner with DiamondCluster (now [PwC Advisory](#)) and a principal with Mercer Management Consulting (now [Oliver Wyman](#)). Previously, he was a professor at Emory University and the University of Michigan, where he taught courses in research, buyer behavior and marketing strategy. Phil received his PhD in Marketing from the Graduate School of Business, University of Michigan.

Phil can be reached on Twitter at [@phil\\_hendrix](#) or at [info@immr.org](mailto:info@immr.org).