The Digital Surprise Signal
White paper

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Abstract

The Digital Surprise Signal, developed by alpha-DNA, is a systematic stock selection score designed to forecast revenue and earnings surprises for 2000+ companies based on changes in consumer demand estimated from their digital footprint trajectories. The algorithms underpinning the Digital Surprise Signal leverage alpha-DNA's proprietary organization of near real-time commercially available online consumer behavior information across multiple web Site, Search and Social platforms. The estimated change in demand is compared to market expectations for revenue to determine how likely a company is to surprise. Between 2012 and 2016, bottom-ranked stocks based on the Digital Surprise Signal have beaten revenue expectations only 36% of the time and EPS expectations only 49% of the time, versus 76% and 78% for Revenue and EPS respectively for top-ranked stocks. A market-neutral portfolio of liquid stocks based on the Digital Surprise Signal produced low double digit annual returns with an attractive Sharpe ratio during that period.

About alpha-DNA

alpha-DNA was founded in 2014 with the primary goal of leveraging real-time digital information within scalable consumer analytics frameworks to improve high value financial decisions. alpha-DNA client engagements span across hedge funds, private equity firms, banks, market research and strategy consulting firms, all with the primary focus on assessing digital performance of companies/brands and translating that into forward looking topline growth acceleration expectations. The predictive power of alpha-DNA algorithms has been developed and refined over a wide range of businesses covering Large, Mid, Small, Micro, Nano Cap public companies and private Small & Medium Enterprises.

alpha-DNA's founding principals have deep experience in customer analytics, having led global analytics & research organizations in Fortune 500 companies, specializing in consumer credit, insurance, payments, retail, and e-commerce.

Introduction

The web, by its very nature, creates real-time and comprehensive data about online consumer behavior. Digital behavior is fundamentally correlated with online and offline consumer demand, both in B2C and B2B contexts. Customers not only buy products and services online, but also compare, research, seek support, recommend, and review them, extending the applicability of online behavior into the offline world. Consumer demand is a primary driver of revenue, and sharp changes in consumer demand manifest in a company's revenue performance, but market expectations lack contemporaneous company-specific fundamental data during the course of the fiscal quarter; new fundamental data from digital sources can better "predict the present" and identify trajectory changes.

Digital Data

alpha-DNA collects multiple types of digital performance measures, from multiple commercially and publicly available data sources. The data is broad-based and includes various data types across web site, search and social platforms. Data is sourced from multiple providers for the same type of data to reduce noise, and data sources are continuously re-evaluated and appropriately re-weighted over time. In terms of scale, on a monthly basis alpha-DNA tracks more than 75 billion digital consumer interactions to hone in on change in velocity across businesses.
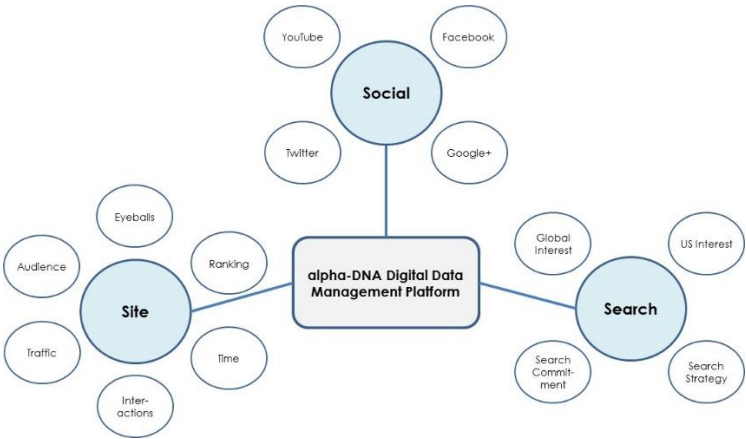

Digital Bureau

alpha-DNA defines digital identities for over 2000 companies and all of their brands by building, maintaining and updating a proprietary Digital Bureau of companies and brands. Entity definitions for a company and brand need to be updated continuously, often times manually, and cannot be bought off the shelf. Raw digital data is then cleaned and aggregated into time series associated with each digital entity. Furthermore, aggregating all the digital entities of all the brands owned by a company to represent a single Stock Ticker has its own weighting and algorithmic complexities. This unique dataset is a key component of the Digital Signal's value.
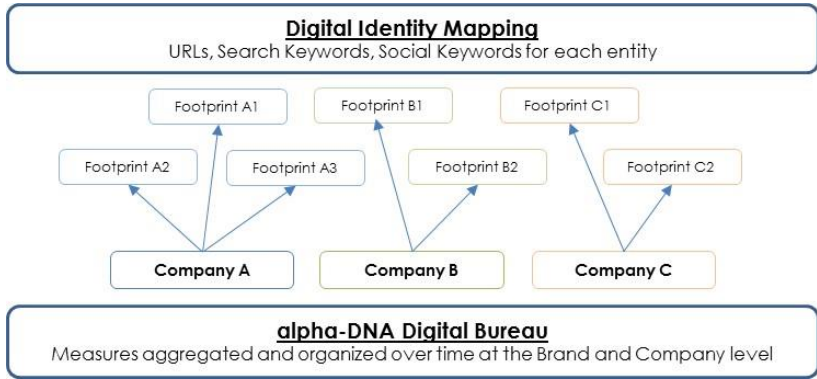
Digital Performance

alpha-DNA has developed a proprietary scoring system to rank the 2000+ companies every month on their overall performance strength across digital platforms (site, search, social) and consumer effectiveness (penetration, engagement, popularity). A "poll of polls" approach is used to combine many different digital dimensions sourced from multiple datasets to create weighted performance scores.
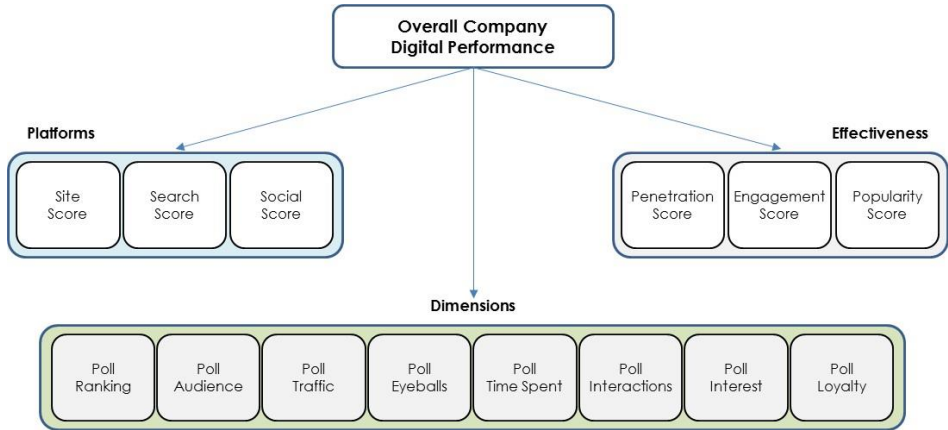

Constructing the Surprise Signal

alpha-DNA algorithms systematically establish empirical relationships between digital demand trajectories and revenue change for each of the 2000+ companies looking back 2 to 3 years in history for each Stock starting in 2011. Two different sets of heuristics are used to measure change in digital momentum for a company and underlying consumer demand:

1. Longitudinal time-series relationships between revenue and digital growth, and
2. Cross-sectional measures of digital strength for a company relative to its direct competitive peers.

More than 2400 model formulations are considered for each Stock Ticker at any given point time, from where the average of the best alpha-DNA estimates is compared against the sell side analyst consensus to create a proprietary index of a company's likelihood to beat or miss next

quarter's revenue and EPS expectations. The algorithm seeks concordance across measures created from multiple data types and sources to separate signal from noise and generate confidence in the final assessment of beat or miss.

Poll of Polls by Company
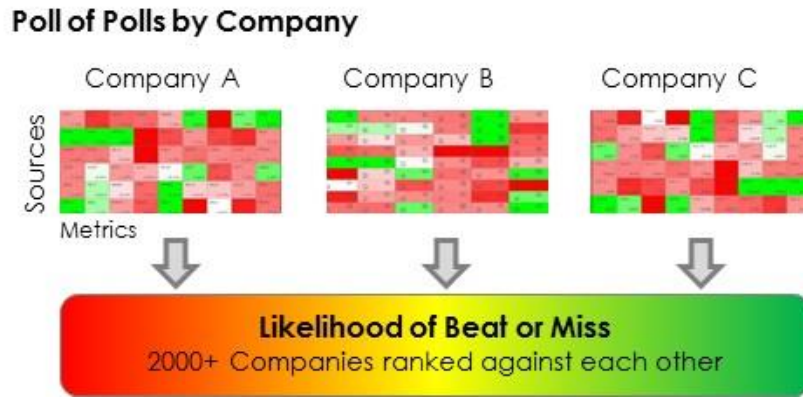
alpha-DNA's Digital Surprise Signal is rooted in fundamental customer demand analytics, and benefits from a balanced exposure to multiple data sources. This broad-based approach enables institutional investors to unlock value from a very deep data set and delivers a straightforward decision-making tool based on a diversified measure of consumer demand.

There are several challenges to overcome when building such a Digital Surprise Signal. Digital behavior continues to evolve over time – the last 15 years have seen dramatic shifts in web surfing, intelligent search, consumer reviews, blogs, and social networks. It is critical that the algorithms be able to adapt seamlessly to the ever-changing types and sources of trackable digital consumer behavior over time. Given no single source represents a pure measure of consumer demand in today's exploding landscape of digital content, the Digital Surprise Signal takes into account measures of similar types behavior from multiple datasets.

The Digital Surprise Signal went live in the second quarter of 2014, with signal delivery to live clients beginning in September 2014.

Investible universe

In order to ensure that our results were not driven by illiquid stocks, when performing our research, we restricted our universe to stocks with a minimum USD market cap of $100mm, minimum median trading volume of $1mm over the prior month, and a minimum nominal price of $4. These values were based on as-was, unadjusted data available at the time.
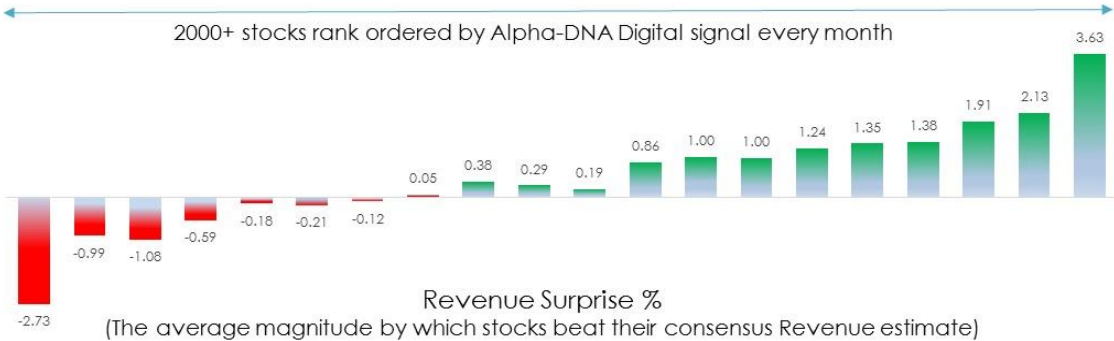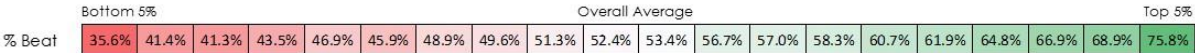
The result is a universe of approximately 2,000 U.S. names, encompassing both B2B and B2C companies but excluding financials. The total number in the universe will fluctuate slightly over time as a result of overall market liquidity and analyst coverage.
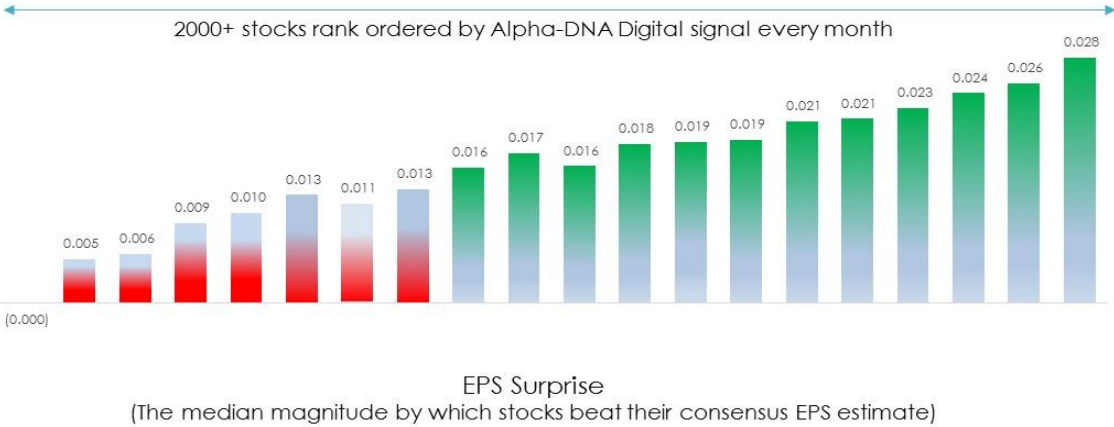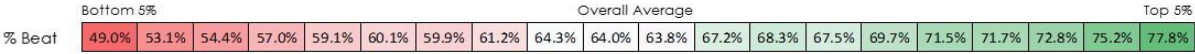
Surprise prediction – Historical performance

The Digital Surprise Signal correctly predicts both the likelihood of a revenue beat and the magnitude of revenue surprises. The bottom 5% of stocks as ranked by the Digital Surprise Signal beat consensus revenue estimates only 35.6% of the time, whereas the top 5% beat consensus estimates 75.8% of the time, with the likelihoods being largely monotonic for the intervening bins:

Odds of Revenue Beat
(The percentage of stocks that beat their consensus Revenue estimate)

	Bottom 5%								Overall Average										Top 5%
% Beat	35.6%	41.4%	41.3%	43.5%	46.9%	45.9%	48.9%	49.6%	51.3%	52.4%	53.4%	56.7%	57.0%	58.3%	60.7%	61.9%	64.8%	66.9%	68.9%	75.8%

2000+ stocks rank ordered by Alpha-DNA Digital signal every month

Revenue Surprise %
(The average magnitude by which stocks beat their consensus Revenue estimate)

Values shown: -2.73, -0.99, -1.08, -0.59, -0.18, -0.21, -0.12, 0.05, 0.38, 0.29, 0.19, 0.86, 1.00, 1.00, 1.24, 1.35, 1.38, 1.91, 2.13, 3.63

Corresponding to the Revenue Beat, the Digital Surprise Signal correctly predicts both the likelihood of an EPS beat and the magnitude of EPS surprises. The bottom 5% of stocks as ranked by the Digital Surprise Signal beat consensus revenue estimates only 49.0% of the time, whereas the top 5% beat consensus estimates 77.8% of the time, with the likelihoods being largely monotonic for the intervening bins:

Odds of EPS Beat
(The percentage of stocks that beat their consensus EPS estimate)

	Bottom 5%								Overall Average										Top 5%
% Beat	49.0%	53.1%	54.4%	57.0%	59.1%	60.1%	59.9%	61.2%	64.3%	64.0%	63.8%	67.2%	68.3%	67.5%	69.7%	71.5%	71.7%	72.8%	75.2%	77.8%

2000+ stocks rank ordered by Alpha-DNA Digital signal every month

Values shown: 0.005, 0.006, 0.009, 0.010, 0.013, 0.011, 0.013, 0.016, 0.017, 0.016, 0.018, 0.019, 0.019, 0.021, 0.021, 0.023, 0.024, 0.026, 0.028, (0.000)

EPS Surprise
(The median magnitude by which stocks beat their consensus EPS estimate)
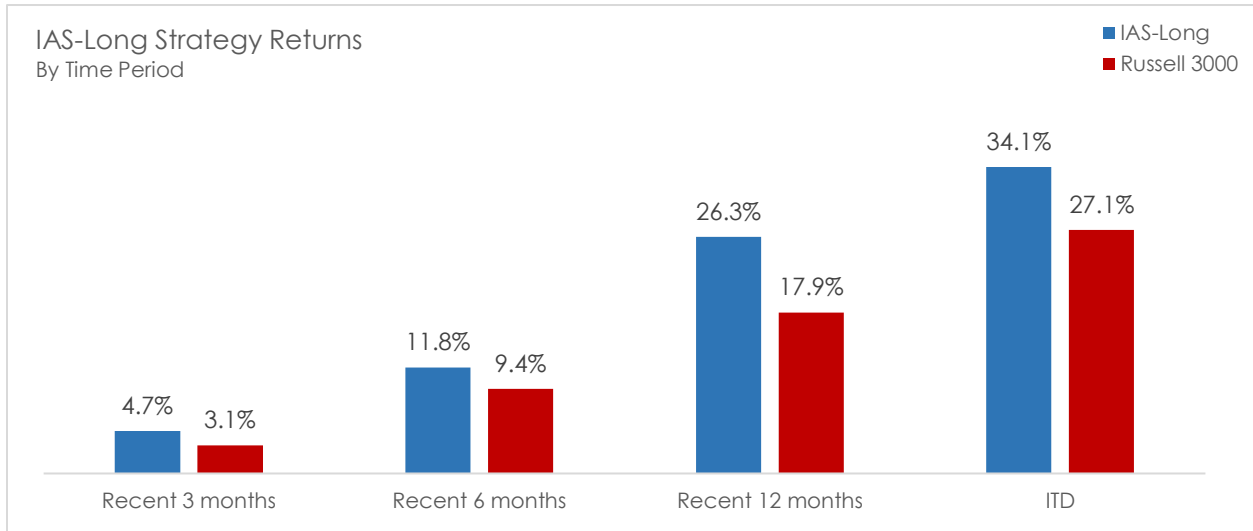
Live trading performance

Our Live Trading results provide insight in to the research's ability to find revenue trends that are not easily identified by the broader market. The results below show the Revenue and EPS Surprise percentages for the actual bullish trades placed by our investment partner in the Equity investment strategies from Inception in October 2014 to June 30, 2017. The results show that our bullish investments consistently surprised to the upside against both Revenue and EPS Forecasts. In addition, the surprise results have strengthened every year as we have expanded and improved our digital analysis capabilities.
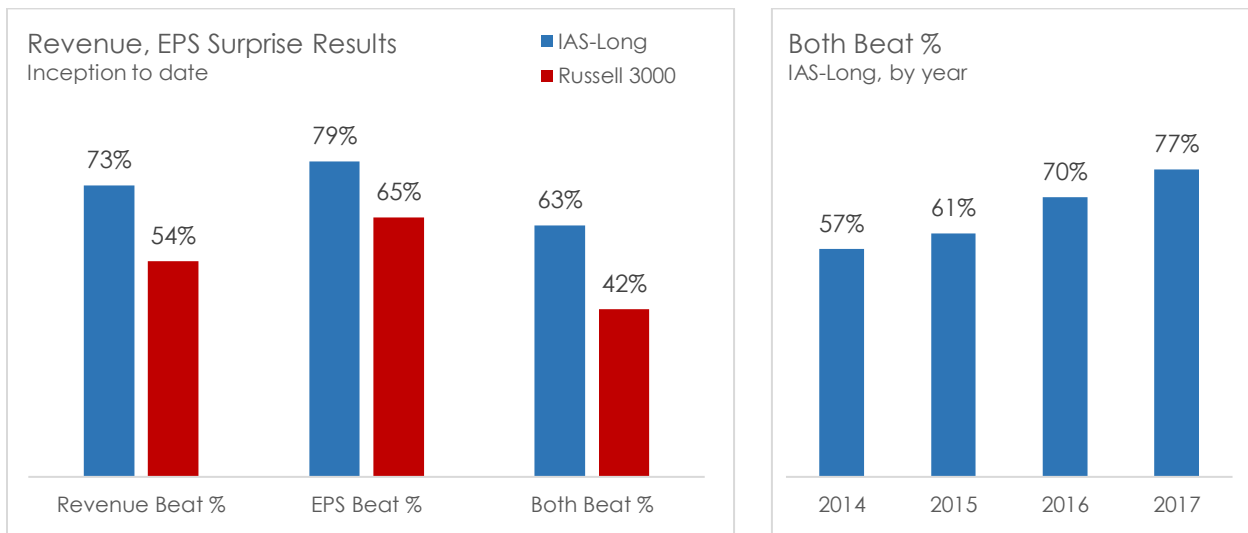
Earnings comparisons presented reflect every actual realized and unique bullish trade in the Equity strategies deployed by our investment partner using the Alpha DNA research. The two strategies are the Internet Advantage Strategy (IAS) Best Equity Picks and the Internet Advantage Strategy Equity Long/Short. A unique trade is every realized trade (ie, open and closed) from October 2014 to June 2017 that is unique based on combination of stock symbol, open date, and close date. The data presented is only included in the summary if the stock position was held the day prior to and day of earnings. The data source for EPS and Revenue forecasts is FactSet.

The returns summarized below represent the Gross returns of that strategy from October 2014 to end of June 2017.

IAS-Long Strategy Returns
By Time Period

■ IAS-Long
■ Russell 3000

Period	IAS-Long	Russell 3000
Recent 3 months	4.7%	3.1%
Recent 6 months	11.8%	9.4%
Recent 12 months	26.3%	17.9%
ITD	34.1%	27.1%

The performance figures illustrated represent the actual aggregated performance in our investment partner's client and employee accounts. Performance numbers displayed are gross returns. The returns from October 2014 to November 2015 are the returns of the bullish portion of the IAS Equity Long/Short portfolio. The returns from December 2015 to June 2017 are the returns of the IAS Best Equity Picks strategy.

All investments involve the risk of potential investment losses as well as the potential for investment gains. Prior performance is no guarantee of future results and there can be no assurance, and clients should not assume, that future performance of any of the model portfolios will be comparable to past performance.

These results should not be viewed as indicative of the advisor's skill. The prior performance figures indicated herein represent portfolio performance for only a short time period, and may not be indicative of the returns or volatility each model portfolio will generate over a long time period. The performance of the models should also be viewed in the context of the broad market and general economic conditions prevailing during the periods covered by the performance information. The actual results for the comparable periods would also have varied from the model portfolio results based upon the timing of contributions and withdrawals from individual client accounts. The performance figures contained herein should be viewed in the context of the various risk/return profiles and asset allocation methodologies utilized by the asset allocation strategists in developing their model portfolios, and should be accompanied or preceded by the model.