

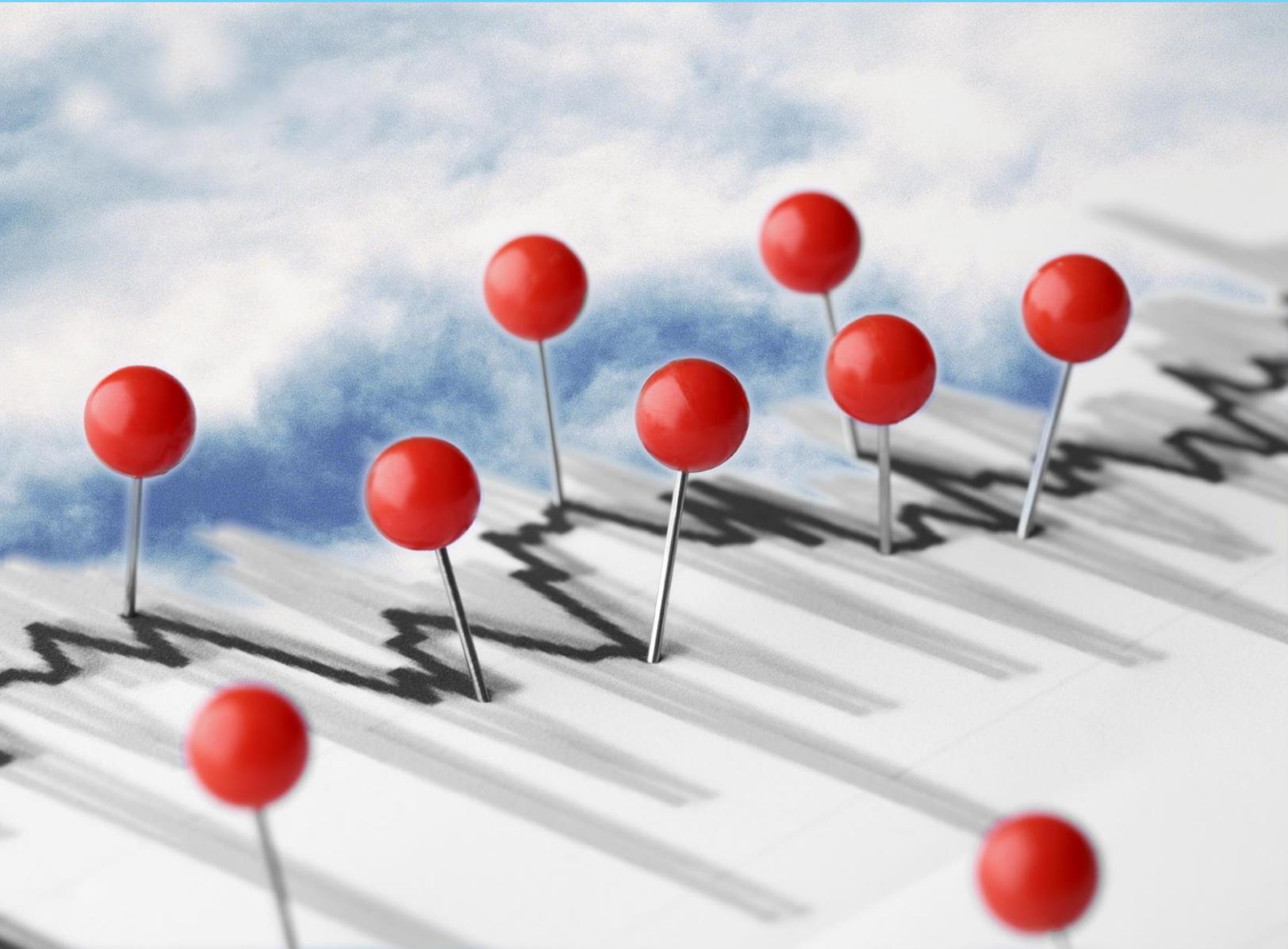
WHITE PAPER



## Weather Data vs. Weather Analytics

Why Weather Data without Analysis  
Causes Negative Returns to Businesses

Also, Strategies to Move from Raw Data to Actionable  
Intelligence from a Weather-Neutral Position



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# Weather Data vs. Weather Analytics

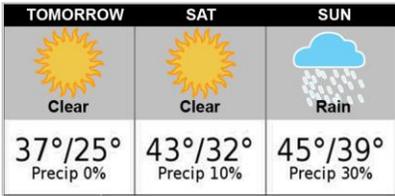
## Overview

*“It’s just the weather; how hard can it be to use it?”*  
— CEO, Large Retail Organization

As individuals, weather permeates our lives everyday. We are constantly watching, looking, evaluating, and internalizing weather forecasts to help us understand, plan, react, and schedule our lives.

- “What should I wear today?”
- “Will I be able to have my outdoor barbecue this weekend?”
- “What should I pack for my trip next week?”

We regularly look to weather forecasts to help us answer questions just like this. We’ve been doing it all our lives, and it is part of our daily routines. This is, of course, a perfectly reasonable activity for individuals who are focused on a particular location, a single event, or defined time period. While this process works just fine for individuals and consumers, it unfortunately does not translate to business and management.



“Just give me the weather data” is a request that happens all too often from business and management. One can certainly understand why that request is made, since using weather is so easily done on an individual level. In addition, weather data is both easy and inexpensive to obtain. But what appears to be “cheap and easy” is in fact the most costly approach.

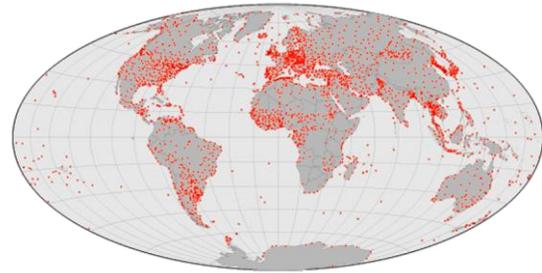
As this white paper illustrates, weather data alone is not only “messy”, but synthesizing and actioning it for a business is difficult, frustrating, and very costly. We’ll break down the challenges associated with big weather data, provide alternatives in the form of weather intelligence, and demonstrate how it can be applied to provide measurable and quantitative returns across the organization.

## Weather Data is Unclean

*“Climate is what we expect, weather is what we get.”*  
— Mark Twain

Data, by its definition, are facts or statistics collected together for analytical or procedural purposes. Weather data is no different, and the metrics commonly referred to include temperature, precipitation (rain), snowfall, barometric pressure, wind speeds, and so on. The reliability of any data set is that it is only as good as the source from which it comes. In the case of weather data, there are thousands of sources, all with their own input parameters. For both historical and forecast data, the common sources include government agencies, private enterprises, cooperative agencies, and even individuals. Given the wide variety of sources and collection methods, weather data is notoriously “unclean”.

Compounding the issue is the number of locations where weather data is available. North America alone has 9.4 million square miles, and the United States has approximately 43,000 zip codes. Suffice it to say, you can get a weather forecast and weather data for every individual one of them. Unfortunately, there is not a reliable weather station at each location, and a business would be remiss to believe that there is a singular source of clean, reliable data for each location.



**Global Weather Stations**

Most businesses have interests across multiple locations, including cities, markets, states, regions, and even countries and continents. In the case of retailers, this can top 10,000 stores, and in the case of manufacturers, it can cover the entire globe. Even many small businesses or web-based markets have customers that come from far afield. The number of locations, compounded with the type and amount of weather data a business “thinks” it needs can, and often does, quickly turn into “Big Data”. The term “Big Data” refers to data sets that are so large that they are difficult to manage, awkward to work with, and provide outputs that are not really answers. Thinking back to the simple executive request of “Just get me the weather data”, it can quickly turn into a technology teams’ nightmare, as a number of questions still need to be addressed.

First and foremost, the question that needs to be answered with *any* request for data, weather or otherwise, should be “what do we want/need it for”? In many cases, the request for weather data comes from (or to support) senior level executives who simply want to look at the weather in line with corresponding business metrics (sales, revenues, etc.). It is common for this type of request to be made in an effort that will support financial reporting processes, press releases, and business review meetings.

Once the business has given the approval to acquire weather data, there are a bevy of questions which are often not thought through prior to the “greenlight process”, but nonetheless need to be addressed during the data attainment process. These include, but are not limited to the following topics:

- Weather Data Acquisition - “How do we get it?”
- Frequency of Weather Data Updates - “Do we refresh the data? If so, how frequently?”
- Weather Data Type and Metrics - “What data do we want/need?”
- Time Range of Weather Data - “Do we want historical data, and if so, how far back? Do we want forward looking data, and if so, how far ahead?”
- Weather Locations - “What locations do we want/need?”
- Storage - “Where will we house all of the weather data, and how long will we keep it?”

If a business can get consensus on the questions above, and build processes and technological capabilities to begin gathering weather data, then congratulations – the real challenges and costs to the business are ready to begin!

## Weather Data, Unanalyzed, Provides Diminishing Returns

*"Rain, after all, is only rain; it is not bad weather."  
— The I Ching*

Many organizations get to the point of actually acquiring and housing weather data, often to the chagrin of CIO's and CFO's who are responsible for not only storing the data, but also providing the tools and technologies that enable it to be available to the enterprise.

While weather data is available to all, many employees and executives become starved for information. This is because weather data, in addition to being notoriously "unclean", has many unique challenges for evaluating and interpreting its meaning for a business. Let's presume the organization has spent the time, effort, and costs to solve the "dirty data" problem (often resolved by acquiring data from multiple sources, refreshing multiple times daily, running technological programs to identify/resolve anomalous data, etc.) and the organization now has access to "good, clean data".

The original request of "Just get me the data" often turns into the question of "What do we do with all of this data?"

The typical response is to try and make sense of it all. While this can be dangerous as it brings a subjective process to interpret objective data, it often doesn't stop folks from trying to do it anyway.

For example, if a retailer was trying to understand why umbrella sales were down yesterday, it would be logical to look at the rainfall yesterday for that location. Interestingly, it DID rain in that location. But what if it rained for the last 4 days in that location? And what if during the same week last year it rained 5 days during the same week in that same location? And what if it normally rains 4 days a week in that location? Two or more people looking at the same set of data will likely have unique perspectives rather than consistent, information-driven answers.

It's easy to draw conclusions based solely on weather data; however, businesses need to rely on intelligence and analytics which inform them what the consumer typically does in that environment. For example, a company sells more bottled water when it's hot – but what is "hot"? 85 degrees? 95 degrees? The answer depends on a number of factors beyond just knowing the temperature, such as time of year (Spring vs Summer) and location (Phoenix vs Philadelphia). Most importantly, **you can't get consumption intelligence from weather data alone**, and that is the slippery and dangerous slope that many businesses slide down.

## Aggregating Weather Data

*"We can't blame the weather EVERY month!"  
— CFO, to her Management Team*

One of the primary challenges businesses have when dealing with big data is the aggregation process. Most data that businesses are accustomed to aggregating (financials, inventory units, etc.)

can be done so with relative ease. In addition, most systems are built to handle the aggregations for the end users.

Big weather data poses a unique challenge for businesses to think through when it comes to aggregation methodologies and techniques. For example, you can't sensibly aggregate temperatures either regionally or temporally (would you gain by "averaging" the weather for Pennsylvania, which includes Pittsburgh and Philadelphia? Or for April, May, and June?). Simple averages are not the best methodology either, which will become even more evident when we discuss population weightings.

Precipitation and snowfall are "events" in that they are not constant (i.e. do not occur every day in every location). These events represent an even greater challenge from an aggregation perspective.



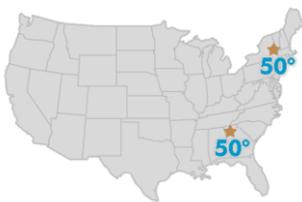
For example, if one location received 3 inches of rain over the course of a month, and it all fell on the same day, would it be appropriate to say that the average rainfall last month was .10 inches per day (3 / 30)? Add the complexity of aggregating regionally and the difficulty increases exponentially. For example, if "Region 1" which was comprised of 3 markets, recorded 5 inches of rain over the month, but it all occurred in just one of the markets, what is the best approach to aggregate the precipitation totals?

To be certain, an aggregation methodology can be thought out, verified, developed and deployed; however, this is rarely the core competency of a traditional business and often requires resources, namely time and people. This is one of the reasons why successful businesses outsource their weather intelligence needs, so that they can focus on their core competencies rather than expecting every employee to perform their own aggregations.

## Understanding Regional Variations

*"Weather is like politics - it's all local."*  
— Anonymous

In the umbrella example above, we were focused on just one location. What if you managed more than one location? What about something like 5,000 stores across North America? The time and cost of looking at data jumps exponentially with the number of locations, as does the opportunity cost of doing your day job.



While temperature is an absolute, weather is perceived at the individual level. How we respond and react to weather is purely a function as to what we believe and feel is typical based on our own knowledge and familiarity. An individual experiencing 50 degrees in Atlanta, Georgia will behave differently from a consumer in Albany, New York. While 50 degrees, from a scientific perspective, is measured the same in both locations, the economic impact is going to be dramatically different.

Understanding regional variations is critical to deciphering the business impact of what effect each and every metric you collect will have on your consumer. Businesses often measure their success

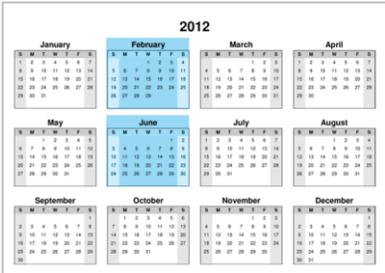
compared to the prior year, so the same weather metrics need to be available as well (in the same calendar construct, so the “First Saturday in June This Year” marries up to the “First Saturday in June Last Year”), providing additional layers of confusion to the mix. Lastly, having an understanding of “normal” weather is also advisable. The definition of “normal” is relative and, while not addressed specifically in this paper, poses a unique set of challenges in and of itself.

## Understanding Temporal Variations

*“You know what they say about Chicago:  
If you don’t like the weather, wait 15 minutes.”*  
— Ralph Kiner

The previous examples cited in this paper demonstrate some of the challenges in interpreting weather information between locations. An equally, if not more taxing analysis is to understand the temporal boundaries associated with weather.

The previous section detailed a scenario where we compared 50 degrees in Albany to 50 degrees in Atlanta, and how consumers in those markets might behave differently in the same weather. Now let’s adjust the scenario to focus solely on Atlanta. If it were 50 degrees in February, it would likely be a typical winter day, and business/consumer behavior would likely represent typical patterns from a weather perspective. However, if the same 50 degrees were measured in June, it would likely be a very cold day, and consumer purchasing patterns would be “out of sorts” to say the least. Demand for summer merchandise such as shorts, sandals, cold beverages, and fans would decline. Conversely, sales of product categories such as long sleeve tees, hot beverages (coffee), and sweatshirts would experience an increase.



Understanding and knowing temporal variations is yet another key element to trying to correlate consumer behavior and seasonal purchasing patterns with weather. The only way you are going to understand this type of intricacy on a market by market, period by period basis is to move beyond big weather data into weather intelligence.

## Addressing Population Weightings

*Fact: New York City has over 8,000,000 million people in 470 square miles,  
while the entire state of North Dakota has less than 800,000 residents  
in 70,000 square miles.*

North Dakota provides some of the most beautiful scenery in the world. From a business perspective, however, if this is not a location where measurable revenue is generated from, why focus on the weather there? Even Fargo, ND, the largest city in the state with approximately 100,000 residents, ranks as the 254<sup>th</sup> largest city in the U.S. based on the 2010 census. Weather

in Fargo on April 1, 2012 was 73F, shattering a record set in 1925. On the same day, New York City had near normal temperatures of 52F. While the warm temperatures in Fargo likely resulted in a spike of Spring purchases of lawn care, cold beverages, and seasonal apparel, consumer purchasing in New York City eclipsed Fargo simply based on the fact that more economic activity takes place there given the size of the population.

The point here is businesses need to focus on the locations that matter, and that *includes* weather. Most business managers understand this concept from a revenue perspective, so when they look at a roll-up of total sales, they understand the locations which are driving it. With big weather data, you need to do the same, and weight the weather accordingly based on where demand is coming from. This can be a challenging and costly activity.

In fact, it is all too common for managers to simply look outside their business at the headquarters level and project the same weather across the operational spectrum. This is commonly referred to as the “New York Effect”, and is an equally dangerous proposition as it assumes all locations are equal.

## The Forecast Being “Wrong” Isn’t Necessarily “Wrong for Business”

*“Here’s a forecast for tonight: Dark.”*  
 — George Carlin

While the quote above from the late comedian George Carlin verifies every evening, there are many examples of forecasts being wrong. All forecasts by their nature (weather or otherwise), are projections of future conditions. Virtually all forecasts have inaccuracies; however, that is not a reason to disregard them when managing a business. For example, suppose the forecasted high temperature today in Chicago is 75F. If the actual high temperature comes in at 77F, does that make the forecast accurate or inaccurate? From a business perspective, it simply does not matter. What matters, and what businesses should focus on, is how that will impact demand for a particular product or service.

Recall at the beginning of this article it was noted that, as individuals, we are constantly watching, looking, evaluating, and internalizing weather forecasts and weather data to help us understand, plan, react, and schedule. In the scenario above, we are doing all of those actions based on a forecast of 75F. The reality that the actual temperature verified at 77F has little to no impact on one’s actual behaviors. In the current environment where individuals have access to weather forecasts 24/7 on TV, radio, web, phones, tablets, etc., we respond and react to who and what is said on the screens in front of us.

Let’s consider a more extreme example. Suppose a hurricane is projected to make landfall in Miami, Florida in 3 days. Consumers that are under the “Cone of Uncertainty” which

**National Hurricane Center  
Forecast: 8/22/12**



**National Hurricane Center  
Forecast: 8/27/12**



covers Miami will be stocking up on supplies such as bottled water, canned goods, plywood, batteries, flashlights, and other related merchandise to protect their property and loved ones from the oncoming event. From a business perspective, *the actions and purchasing that takes place is based not on what actually occurs, but based on what the forecast suggests*. If the storm takes a turn and veers away from Miami, historical weather data will show that there was no storm, however, business results are likely going to show vastly different numbers as consumers bought on the forecast of the storm.

## Time and Expenses – You Have a Day Job

*“Management is doing things right; leadership is doing the right things.”*  
— Peter Drucker

Business management guru Peter Drucker said it best with the quote above. Businesses are established for a purpose, which typically includes providing value to their customers, generating profits, supporting a vision, and meeting the objectives of shareholders and employees.

In this article, you have read about all of the “landmines” associated with dealing with big weather data. One common theme across all of these topics is the human cost associated with managing big weather data. It takes time, money, and resources to not only define and set up, but also to keep current. Big weather data alone is often tasked to help answer any number of business questions for which it is ill-prepared, typically focused on understanding *if* weather impacted the business.

A key takeaway from this paper is that **big weather data alone does not provide the answer**. The end user still has to synthesize the data into information and conclusions. In addition, this process needs to take place on an individual user basis, and it is common that divergent conclusions are reached on the same data!

In any reasonable business enterprise, costs must be justified and expenses rationalized. In the current economic environment, this truism should be at the forefront in the minds of all employees, particularly executives.

Businesses need to focus on key activities that support their mission and objectives. The time, effort, and resources required to implement and incorporate big weather data into a business organization is typically cost prohibitive (net negative) when you consider the efforts required combined with the opportunity costs that members of the organization need to employ to achieve success.

## Strategies to Move Beyond Big Weather Data

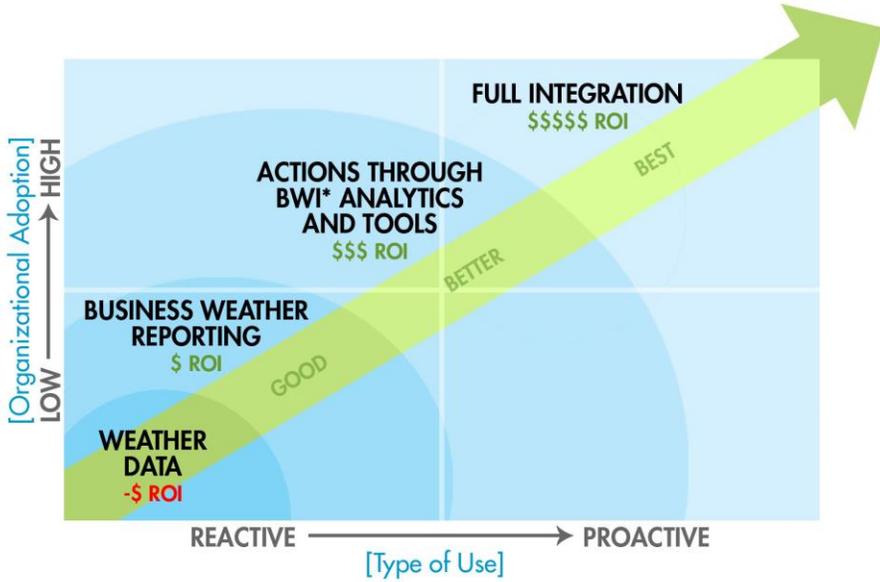
*“Among famous traitors of history one might mention the weather.”*  
— Ilka Chase

While this paper has served to provide a case against using weather data alone, it would be irresponsible to not provide an alternative for businesses seeking to accomplish their objective. While certainly businesses can spend the time and money to “build” a weather solution, virtually all businesses were not constructed with a “weather department” in the organizational plan.

At the beginning of this paper, we cited a common request from an executive who stated “Just get me the weather data” in an effort to understand if there was an impact on the business. What this executive is asking for is intelligence, or more simply, an “answer”.

To get this answer, businesses should go to the experts. Planalytics, and a number of business partners, are examples of companies who not only provide the “answers” to the question of “if” there is an impact of weather on business, but also provide the analytics and intelligence to quantify “how much”. Additionally, the nature of weather intelligence enables businesses to proactively manage the impact of weather.

Business Weather Intelligence® synthesizes all of the weather data discussed in this article and combines it with consumer demand data to understand and quantify the impact of weather on a product or service for each time and location.



\*Business Weather Intelligence®

By moving beyond big weather data and towards weather intelligence, businesses are leaving the “heavy lifting” to the experts, and allowing their organization and employees to focus on running a more effective, efficient, and profitable enterprise.

## About Planalytics

Planalytics, Inc. (<http://www.planalytics.com>) is the leading global provider of Business Weather Intelligence®. Our products and services are designed to enable companies to understand and manage the impact of weather on their business. We are not a data provider or simply a weather forecaster. Our full-service platform provides the actionable information a company needs to make essential decisions during pre-season and in-season planning, as well as in merchandise management, execution and post-season analysis. Clients such as Coca-Cola, Levi Strauss, Payless Shoesource, Starbucks, and Ace Hardware use Planalytics® Business Weather Intelligence® for improved decision-making in pre-season planning and in-season merchandise management and execution. Business Weather Intelligence® is essential in every business to support more effective financial planning, merchandise management, advertising, promotion timing and operational effectiveness.