Attribution Methods and Models: A Marketer’s Framework

By John Lovett, Web Analytics Demystified, Inc.
# Table of Contents

Executive Summary ................................................................. 3

Why Marketing Attribution? .................................................... 4
  Defining the Marketing Attribution Problem ...................... 4
  Understanding What Happens Before the Last Click ............ 4
  Is Marketing Attribution Right for Your Company? ............. 5

The Cross-Channel Marketer’s Attribution Framework ............ 7
  Step 1: Identify Your Data Sources ....................................... 7
  Step 2: Sequence Your Time Frame .................................. 7
  Step 3: Apply Attribution Models ..................................... 8
  Step 4: Conduct Statistical Analysis .................................. 8
  Step 5: Leverage Attribution to Meet Marketing Goals ....... 9

Attribution Informs Integrated Marketing Management .......... 10
  The Omni-Channel Attribution Framework ....................... 10
  Bigger Data Informs Better Decision Making .................... 10
  Using Attribution to Inform Integrated Marketing ............ 10

Conclusions ............................................................................. 11
  About the Author ............................................................... 11
  About Web Analytics Demystified .................................. 12
  About Teradata ................................................................. 12
  About Teradata Aster ........................................................ 12
Executive Summary

Last year, comScore reported that 31 percent of digital ads were delivered to but never seen by the consumer.1 Other data, cited in Rex Briggs’ book, *SIRFs-UP: Catching the Next Wave in Marketing*, shows that 40 percent of all advertising is wasted.2 These studies and others now confirm what we’ve always believed to be true: marketers are squandering opportunities and failing to reach their target audiences. Despite all the value and added insights we gain from data, times are still tough for marketers in the digital age.

This isn’t a new problem. Marketers have struggled to fully understand the impact of their efforts since the early 1900s—and the digital age has exponentially compounded the challenge of accurately calculating marketing effectiveness, by adding new communication channels and new attention-grabbing tactics that have created an incessant barrage of branding and promotions targeting the average consumer. As these consumers increasingly shift to the web, social networks and other resources during their path to purchase, marketers allocating spend using shotgun targeting or guesswork tactics are left virtually blind to the return on investment that any individual marketing asset has regarding desired outcomes.

So what’s the number-one wasted marketing-spend culprit? At least part of the problem resides in a lack of visibility into the cumulative impact of multi-touch marketing.

The solution is “Marketing Attribution.”

This paper, written by John Lovett of Web Analytics Demystified and sponsored by Teradata Aster, explores how cross-channel consumer behavior and multi-touch marketing data can be analyzed using a framework for Marketing Attribution. It addresses the following questions:

- What is Marketing Attribution and why should marketers be concerned with it?
- Why is a framework for attribution the best approach?
- How can marketers incorporate attribution models into integrated marketing management solutions?

---

1 Source: http://www.warc.com/LatestNews/News/New_online_advertising_strategies_needed.news?ID=29351
Why Marketing Attribution?

If your organization is spending money on marketing across traditional and digital channels, it has a responsibility to quantify the return on those marketing dollars. Whether it’s thousands or multi-millions of dollars, simply understanding the effect that any channel has on consumer behavior can illuminate opportunities or identify wasted marketing spend. Yet most businesses fail to quantify the impact of their marketing efforts using any systematic (let alone scientific) method. However, this isn’t the way it needs to be.

Defining the Marketing Attribution Problem

Web Analytics Demystified defines Marketing Attribution as:

The process of quantifying the impact of multiple marketing exposures and touch points preceding a desired outcome.

Marketing Attribution is by no means a new solution. Vendors have been nibbling at the attribution dilemma for years. Yet, despite years of effort, the proliferation of new digital channels and increasing reliance on a multi-channel path to purchase has created new obstacles to evaluating the impact of any single touch point. Forrester Research recently described the multi-channel attribution field as a “relatively immature market”:

Vendors have fairly immature cross-channel attribution offerings. Most continue to emphasize digital attribution but are rapidly expanding to include additional channels while also developing future marketing scenario-planning capabilities.

~ Forrester Wave: Cross-Channel Attribution Providers

However nascent this market may be, this is a multi-billion dollar problem in digital marketing alone. Forrester’s Interactive Marketing Forecast indicates that spending for digital marketing in 2012 is projected to be $41 billion dollars. And this represents only 21 percent of all marketing spend, upping the ante to $195 billion in overall ad spending in the United States. Therefore, if we can assume that at least 40 percent of this may be wasted, what can marketers do to recoup their share of this squandered $78 billion dollars?

The answer requires understanding consumer behavior by going beyond the “last click.”

Understanding What Happens Before the Last Click

To frame the issue in more simplistic terms, in Figure 1 we demonstrate “last-click” attribution, which is the most common method of allocating credit to a distinct marketing referral. In this example, the customer path to purchase resulted in exposure to four distinct marketing efforts that each resulted in a visit to a website.

In this example, on the fourth visit a conversion event occurred. Unfortunately, this is where most marketers assign 100 percent of the credit. However, this organic search referral credit is not necessarily deserving of full credit for this sale. Last-click attribution erroneously singles out that last marketing touch point and not only inflates the perceived value of that referral source, but also diminishes the contributions of all the previous marketing efforts.

Visit 1
Click on Display Advertisement
Desired Outcome = 0
CreditAttributed = 0

Visit 2
Click on Paid Search Result
Desired Outcome = 0
CreditAttributed = 0

Visit 3
Direct visit from TV Ad Campaign URL
Desired Outcome = 0
CreditAttributed = 0

Visit 4
Click on Organic Search Result
Desired Outcome = 1
CreditAttributed = 0

Figure 1: Example Customer Path to Purchase
Web Analytics Demystified first wrote about this problem in 2009 in a white paper titled “Appropriate Attribution: Addressing the Dramatic Inaccuracies Associated with Last-Based Campaign Attribution in Digital Analytics.” This work showed that inappropriate attribution provides a skewed version of the true value of multi-touch marketing influence. Evidence provided in the paper included data from Hanover Direct showing that roughly 60 percent of sales attributed to “last touch” had at least one other campaign response prior to the conversion event. Additionally, research from Microsoft’s Atlas Institute indicated that search-engine users who had been exposed to display advertising were 22 percent more likely to click and make a purchase than those who were not exposed.

Each of these examples exposes a small symptom of the problem of last-click attribution. Yet, when marketing channels proliferate and cross-channel campaigns extend from television to digital to point of sale, the problem can quickly become an epidemic.

Is Marketing Attribution Right for Your Company?

Whether you recognize it or not, you may have a Marketing Attribution problem. As we know, consumers today are empowered with information and they rely on the web and social networks for guidance when making buying decisions. Research from Teradata shows us that the average online purchase is preceded by as many as five to 10 interactions. As marketers, you need to determine which assets are contributing to the ultimate conversion event and which may be actually sapping your marketing budgets or having a negative effect on your digital impression.

Many companies are using attribution to resolve these issues by assigning partial credit to different customer touch points along the purchase path. However, diving into attribution is an endeavor that requires time, resources and technology, and shouldn’t be approached without due consideration. So, how can you determine if attribution is worthwhile for your organization to pursue?

---

Take a simple Do I need Attribution? litmus test. This test can be accomplished by doing a basic analysis of your existing website data. Derek Tangren wrote about this on the Adobe Digital Marketing Blog and offers solid advice.3

Ask yourself (or your digital analyst): What percentage of online traffic is converting on the first visit?

This question can be answered using any web analytics software solution as long as you’ve established conversion events (or goals) for that site. If you haven’t assigned conversions as events, that’s a whole different story—one that you should look into straight away. But, let’s assume that you have your conversion events tagged properly.

The next thing you want to do is to run a simple report that shows the number of conversions that occur on the first visit versus those that occur on subsequent visits. Figure 2 shows an example Custom Report created in Google Analytics that shows that 65 percent of conversions on this particular website took place on the first visit.

This example indicates that Marketing Attribution may not necessarily yield valuable insights because most consumers are converting on the first visit. However, if your data shows 50 percent or more of your visits are occurring after two or more visits, then Marketing Attribution will help you to understand how each visit (and its referral source) contributed to the conversion event.

If you’d like to run the Attribution Litmus Test on your own data within Google Analytics, you can add the Custom Report to your GA account by following this link: http://bit.ly/Attribution_litmus_test. Remember that you must have goals set up in Google Analytics for this report to generate properly.
Once you determine if attribution is right for your organization, what can you do about it? According to a study conducted by eConsultancy, only 19 percent of marketers have a framework for analyzing the customer journey across online and offline touch points. Yet, the reality of consumer behavior today illustrates that multi-channel marketing exposures and multiple digital touch points are commonplace. As such, marketers need a method for understanding their cross-channel customers in a systematic and reproducible way. Doing this will allow marketers to have a consistent and reliable mode of understanding influential factors leading up to desired outcomes.

Ultimately, this information will help marketers and business users make better decisions. Yet, arriving at these data-informed decisions requires process. Web Analytics Demystified has outlined a series of steps that comprise a framework for Marketing Attribution. By following this sequence of steps, you can systematically quantify the impact of your marketing activities on consumer behavior.

**Step 1: Identify Your Data Sources**
The first step in using an attribution framework is to identify and input your data sources. Because advanced attribution requires understanding marketing effectiveness across all channels, it means you must acquire data from each channel that potentially impacts the customer path to purchase. Typical digital channels may include: display advertising, search, email, affiliates, social media and website activity. While digital data is generally easier to collect and more robust in nature, offline data is also critical to developing a robust attribution framework. Offline channels may include: print, television, radio, direct mail, catalogs, call centers and point-of-sale or out-of-home advertising. When tracking data across these offline channels, inputs may include geography, message, products displayed, keywords or source codes and time. It’s important to gauge the relative quality of each data source and the inputs you use because some data will be more revealing than others. Some organizations apply a confidence factor as a method to weight the dependence on more reliable data sources in their attribution models.

**Step 2: Sequence Your Time Frame**
All attribution models must consider time in order to understand which marketing exposures occurred first, and also to discern the latent impact of exposure across channels. This requires that organizations sequence their data. While numerous data formats will likely go into the model, we’ve seen the greatest success when attribution data is stored and aggregated within a relational database. Businesses should avoid table joins and other reference options within the database as these methods tend to increase the total cost of ownership of an attribution solution. As an alternative, many businesses using solutions like Teradata Aster have created efficiency and cost savings by leveraging a combination of SQL and MapReduce to enable sessionization and exploration of data using standard SQL queries. Using this method, users can view queries or sub-queries for any data set to perform functions such as: PARTITION BY, ORDER BY, WINDOW or TIMESTAMP.

The ability to analyze attribution data through flexible time windows is also an important capability. While not every vendor offers this option, those that do, enable analysts to view data based on time periods that are relevant to their specific business. For example, companies with short buying consideration cycles may only need to view

---

4 Source: http://econsultancy.com/us/blog/10288-companies-struggling-to-perform-attribution-and-online-offline-measurement

**Figure 3: The Cross-Channel Marketer’s Attribution Framework**
their attribution data going back 30 days to gain a full understanding of marketing touch points. However, companies with longer sales cycles, or those in B2B environments, are likely to have a need to view 30/60/90 day time periods to fully attribute credit across all marketing exposures. The ability to customize time windows becomes critical for understanding the full impact of attribution across varied business models.

**Step 3: Apply Attribution Models**
The actual attribution models will determine how you look at your data and make determinations about which marketing channels, campaigns and touch points are effective in the context of your entire marketing mix. There are five models that are commonly used in the attribution world:

- **First click**: The first-click model requires that you attribute credit to the first marketing exposure in your sequence of events. While this method may be helpful in understanding how you’re getting customers into the initial stages of the purchase path, it’s usually a farsighted view that fails to quantify the true affect of marketing performance. For this reason, first-click models are used less frequently than their alternatives.

- **Last click**: Gauging attribution by last click is the most common method used by marketers, because it is typically the default setting for analytical tools. However, as we demonstrated earlier in this paper, last-click attribution is inherently flawed because all of the credit goes to a channel or marketing asset that is a beneficiary of the previous exposure, awareness and consideration work created by other channels.

- **Uniform**: This attribution model (sometimes also called linear) applies equal credit across all marketing exposures and touch points to arrive at a uniform distribution of credit across all channels leading to the conversion event. The Uniform model is potentially the most “diplomatic” as determinations are not made as to the value of each interaction, but merely credit the interaction itself.

- **Weighted**: The weighted attribution model requires that businesses apply logic to assign relative value to different marketing assets. While there are an infinite number of ways to do this, we recommend applying a test and learn methodology to determine what works for your business and your unique marketing mix. No weighted model will be precise until you perform analysis using actual data and evaluate in the context of what makes sense for your business. However, weighted models and associated customizations are quickly becoming a best practice in attribution modeling.

- **Exponential**: The exponential attribution model (also known as “decay”) places more value on the most recent marketing exposures or touch points. While this method favors recent events over frequency or relevance, it is a method that can be applied judiciously across all channels. While some may prefer this model because of its “political correctness,” others criticize the flaw in weighting late-stage interactions (such as search) too heavily.

Additionally, when choosing an attribution model, it’s critical to understand that any model you select will exist in perpetuity. Every business using an attribution model should insist that the model is a living entity that reflects the realities of your customers’ behavior. This means revisiting the attribution model every six months to validate its effectiveness and ensure that nothing in your business, in macro environmental factors, or in your customers’ actions has changed to the extent that it will skew the results of your model.

**Step 4: Conduct Statistical Analysis**
Data scientists conduct general queries, apply business logic, and run what-if analyses against the model after the data has been prepped, sequenced and cleansed. Agencies that specialize in attribution modeling, such as Razorfish, have an advanced analytics team comprised of data scientists that attack the data. They’re looking for correlations to identify if users are exposed to marketing assets A>B>C, are they likely to take action D? They also explore the data for anomalies that might clue them into things that people don’t expect, such as ending up at outcome Z, as well as work at identifying specific segments of unique and profitable behavior. These types of analyses can be conducted with the help of an external agency or vendor, via your own team of data scientists, or at much smaller scale using in-house analytical resources. The goal of this statistical analysis is to look for interesting trends in the data, to solve specific business problems, to answer questions about consumer behaviors, and/or to decide which channels within your marketing mix are performing.
It is also worth noting, as you start to experiment with attribution, you may find that just focusing on the path data which led to conversions may not provide a full picture of how each exposure or touch point contributes to the overall conversion. For example, if a display exposure is present as the last touch point prior to conversion in all the path data of converted customers, one may be tempted to attribute a significant portion of the credit for conversions to display exposures. However, if the path data of non-converting customers also show display exposure as the last touch, then it could suggest that a display exposure does not have a significant impact on conversions. Thus, it is important to gather path data of those who convert as well those who do not convert (generally with equal samples) and use techniques such as a logistic regression model to understand how much each exposure and touch point contribute to ultimate conversion.

A logistic regression model predicts the probability of a conversion on a given visit as a function of prior exposures and touch points in a customer’s purchase funnel. The weights that one derives from such models may indicate that an email click-through has a higher impact on conversion versus a display exposure, and so on. These models can allow one to estimate the decay rates of prior exposures and touch points, so that an analyst can validate which attribution model fits the data best (for example, first click or last click, or uniformly or differentially weighted attributions). For more information on applying such models, one should consult Li and Kannan (2012), a report publication of the Marketing Science Institute.

**Step 5: Leverage Attribution to Meet Marketing Goals**

Of course, the ultimate goal in using an attribution framework is to make better decisions that impact your marketing efforts. These decisions can be strategic, such as deciding to invest in a new social media channel, discontinuing use of a non-performing affiliate partner, or reallocating budget to highly successful channels. But an attribution model can also play a major role in making daily life marketing decisions such as choosing which keywords to bid on during a specific campaign, who should receive an email promotion, or where to place that out-of-home billboard to attract the most attention. Attribution allows you to move beyond last click where search plays a dominant role, to a more effective way of analyzing marketing effectiveness. When marketers only view data from a last-click perspective, most end up spending all their marketing dollars on bottom-of-the-funnel activity. Using other methods described above, provides a much better basis to allocate spend—before it’s too late and all the money is gone.

Attribution can be tactically used for omni-channel analytics, which is essential for successfully managing cross-channel marketing campaigns. Without omni-channel analytics, marketers cannot accurately determine campaign performance, that is to say, which channels have influenced the campaign’s conversions. Cross-channel analysis can enhance knowledge about individual customers to:

- Drive better personalization.
- Discover channel and product insights.

Further, attribution modeling helps you understand which channels seem to influence consumers’ purchases, whether it might be because they spend more time in a particular channel or the channel commands more attention for that consumer. Attributed conversion analysis drives this understanding, which can be used for more accurate channel personalization and better segmentation. These insights can be instantiated as profile attributes that can be used by integrated marketing management (IMM) solutions for enhanced campaign performance. In addition, channel and product performance analysis can be enhanced by further examining the consumers who convert in certain channels (for example, comparing acquisition of new consumers in search versus email in a certain campaign or discovering what products seem to drive click-throughs or sell the best).
Attribution should inform your IMM activities. Organizations that apply attribution models for use in not only strategic and tactical marketing decisions, but also as a method to fuel automated marketing technologies, will achieve greater gains from the process. But it's important to recognize that when using attribution tools it's not just the data derived from successful conversion events that becomes valuable—information gleaned from non-conversion events and interactions is also a great asset. And for most organizations, this type of interaction makes up greater than 95 percent of all interactions, thus the volume of this data is substantially greater. If you consistently find that people who convert—or those who do not—behave similarly, you can use the non-converters as a control group of sorts. A best practice when developing an attribution model is to consider a stratified sample of 50 percent converters and 50 percent non-converters to conduct analysis on both groups. This method allows you to analyze data using a matching model to tease out how past actions lead to conversions. Statistically, this can be more valid because data sets are larger and you're not using only a small sample that actually converts.

Regardless of which models you apply, the business benefit of approaching attribution as a method for IMM provides a competitive advantage. The differentiating factor resides between organizations that truly understand their customers and those that still maintain “silied” views of customer behavior across channels. Companies like Barnes & Noble and Gilt Groupe are applying Marketing Attribution as a scientific way of analyzing omni-channel customer experience. However, getting to this level of analysis often requires new data sources and new ways of thinking to spark cultural change within organizations.

The Omni-Channel Attribution Framework

Barnes & Noble uses point-of-sale data from its 1,300 stores, combined with loyalty program data, Nook® data, and website analytics to create a database of real-time customer interactions. For this bookseller, capturing the data across disparate channels—sometimes once per day, and potentially over multiple interactions per day—is the first step in understanding the customer. Yet, this data is normalized and made accessible by democratizing it across the organization so that analysts can have easy SQL access for analysis and visualization, while business stakeholders can answer the burning questions that will ultimately lead to better customer experiences. Using the Teradata Aster solution has enabled Barnes & Noble to generate models that consider specific customer attributes such as propensity to buy, affinity to the brand, loyalty and digital versus print preferences that can be used to deliver more highly targeted marketing. These factors ultimately inform attribution models in an omni-channel environment like Barnes & Noble’s to determine how to attribute credit across each of their assets.

Bigger Data Informs Better Decision Making

Gilt Groupe is a lifestyle e-commerce retailer that relies on customer data to inform decision-making. It ties website clickstream data to email, advertising and operational information to gain an understanding of how customers interact with its brand and marketing assets. For Gilt Groupe, success goes way beyond merely integrating the data, to gaining customer intelligence. This is found in pattern recognition, segmenting and optimizing for best results. Using N-Cluster analysis, the company can determine the path to purchase that customers actually followed and then determine how to best optimize the user experience. Technology from Teradata Aster allows Gilt Groupe to maintain a finger on the pulse of customer interactions and determine where its marketing dollars are most effective.

Using Attribution to Inform Integrated Marketing

In the simplest terms, both Barnes & Noble and Gilt Groupe use data to understand more about their customers. Attribution is a method that not only broadens that understanding, but also explores and scores the effectiveness of specific tactics on different customer segments. This process should ultimately feed an integrated marketing platform that both recognizes inbound customers to deliver relevant information based on their lifecycle stage in the path to purchase, and leads to outbound marketing materials that gets customers to the place you want them to be. In either case, using attribution to inform integrated marketing is a more efficient and effective way to interact with consumers across all of your marketing channels.
Conclusions

Our hope is that after reading this paper you have a better understanding of Marketing Attribution and have determined if it is something that you want to explore or, if you are already involved in such efforts, take to the next level. In either case, keep in mind that attribution is an iterative process that requires a framework for producing analysis in a systematic and comparable way. Using tools like those offered by Teradata Aster will help you to go beyond last-click analysis to truly understand the impact of your marketing efforts. Organizations that take this approach are not only quantifying data from the channels they use, but also delving into the collective psychology of what influences consumers to buy and what motivates their behaviors. Attribution can help to answer questions that were previously only addressed through attitudinal surveys and offer a level of accuracy necessary to make the best critical marketing decisions.

If you’re interested in learning how your organization can employ an attribution solution, we encourage you to reach out to Web Analytics Demystified or to Teradata Aster directly to engage with us and to develop your framework for Marketing Attribution.

About the Author

John Lovett is a veteran industry analyst and expert consultant who has spent the past decade helping organizations understand and measure their digital marketing activities. As a Senior Partner at Web Analytics Demystified, Lovett regularly consults with leading enterprises to offer strategic guidance for building innovative digital measurement programs. Prior to joining Web Analytics Demystified, Lovett was a Senior Analyst with Forrester Research, where he was responsible for analytics and optimization technologies. Currently, Lovett is the President of the Digital Analytics Association. He is also the co-founder of the Analysis Exchange program that introduces eager students to analytics by helping non-profits with mentored analysis. Lovett is the author of Social Media Metrics Secrets (Wiley, 2011). He lives in New Hampshire with his wife, three boys and yellow lab.

About Web Analytics Demystified

Companies wishing additional guidance on the topic of Marketing Attribution are encouraged to contact the Senior Partners at Web Analytics Demystified. Web Analytics Demystified has more than 25 years of experience helping companies choose digital analytics solutions and build strategic models for deployment within the enterprise. Its staff of former Forrester and Jupiter Research analysts has literally written the book on digital reporting and analysis. The organization provides strategic guidance on analytics to some of the world’s best-known brands.

Contact Web Analytics Demystified by calling John Lovett at (603) 262-5636, or visit www.webanalyticsdemystified.com.
About Teradata

Teradata is the world’s largest company focused on integrated data warehousing, big data analytics, and business applications. Our powerful solutions portfolio and database are the foundation on which we’ve built our leadership position in business intelligence and are designed to address any business or technology need for companies of all sizes.

Only Teradata gives you the ability to integrate your organization’s data, optimize your business processes, and accelerate new insights like never before. The power unleashed from your data brings confidence to your organization and inspires leaders to think boldly and act decisively for the best decisions possible. Learn more at Teradata.com.

About Teradata Aster

The Teradata Aster Discovery Platform is the market-leading discovery platform for big data analytics. This discovery platform for big data analytics embeds SQL, MapReduce, and statistical processing for deeper insights on structured and multi-structured data types to deliver iterative analytic discovery capabilities with breakthrough performance and scalability. The Teradata Aster solution utilizes Aster’s patented SQL-MapReduce® to parallelize the processing of data and applications and deliver rich analytic insights through the simplicity of SQL and business intelligence (BI) tools. This SQL integration makes Teradata Aster analytics easy enough for business analysts, but powerful enough for the most sophisticated data scientists in any organization. Companies including Barnes & Noble, Razorfish, Gilt Groupe and SuperValu use Teradata Aster to deliver applications such as digital marketing intelligence, fraud detection, social network and relationship analysis, and deep information discovery. Learn more at TeradataAster.com.

Teradata, Teradata Aster logo and Teradata Aster SQL-MapReduce are registered trademarks of Teradata Corporation and/or its affiliates in the U.S. or worldwide. Nook is a registered trademark of Barnes & Noble, Inc.