Understanding Digital Advertising Attribution

Subjective metrics used to understand digital advertising effectiveness are typically insufficient to correlate spend with results. A new analytics-driven approach is emerging to help life sciences companies measure ad impact by correlating data from various online advertising modalities.

Executive Summary

Spending on digital advertising has risen each year even as TV and print advertising declines. Search, the darling of the digital world, is becoming saturated as advertisers compete for position in the finite number of searches performed each month. It is digital advertising and the rising tide of social media that will be driving business in the future.

Digital advertising deployment creates obstacles in accurate measurement of results, and vendors have a stake in promoting the technique that best favors their service. Understanding the value of digital advertising requires understanding of how value is attributed to each activity. Understanding the true worth of these channels is key to any company’s success.

Opportunity and Challenge

Digital advertising had seemed to be the answer to a marketer’s dream, providing concrete data on the number of eyeballs viewing ads and the number of people acting on them with a click. Unfortunately, the dream was short-lived, as the reality of measuring online behavior became better understood. Individuals are wary of clicking on ads because of concerns about pop-ups, security and tracking. Facing a dramatic proliferation of ads, most people have become desensitized to them.

Most important, there is no “best-practice” method of assigning value to digital advertising with a solid analytical foundation. As a result, companies that operate ad serving networks are open to accusations that their systems can be “gamed” to make their services appear to perform better. Current attribution methods provide the most value to the last click or the last ad a person viewed. They aggregate or sample data, and miss the important sequencing and timing of each person’s exposure to advertising.

What an advertiser wants to know is how digital advertising really affects the bottom line. If you spend more, do you get more? How do you know what works and what does not? Do combinations of advertising work best? How does advertising work with search and social media? The final analysis must take into account every ad, search,
tweet, etc. that a person has seen and assign a value based on the actual influence that it had on the desired outcome. Subjective measures, such as awareness, brand favorability and brand attributes, are typically insufficient to correlate spend with results.

Influencing Pharmaceutical Decisions

Online advertising of pharmaceuticals has its own challenges beyond regulatory compliance. While doctors prescribe medications, advertising to their patients can influence the brand chosen or make them aware that they may have a treatable problem in the first place. When “Googling” or searching a disease or symptom, patients are often directed to a brand site or to an information site such as WebMD where there is an opportunity for product ads to create brand awareness. The process for a patient to reach a medication decision may take weeks or months, which means there are many opportunities for advertising to affect the outcome. Since the prescription is often written in the doctor’s office rather than online, pharmaceuticals advertising is usually impression based (as opposed to per click or per acquisition). The effectiveness of each impression becomes even more critical and the analysis even more complex. Only sophisticated attribution can determine which combinations of advertising really provide a high ROI.

Doctors and health care providers (HCPs) search the Web with different goals, and their susceptibility to advertising varies. Health care providers are highly valuable as specifiers and recommenders of pharmaceutical products, so targeting them effectively has a positive impact on the business. Detailed analysis without sampling can improve insight into how to influence the decisions of this small but critical audience. Digital campaigns for top-selling pharmaceuticals often involve displaying billions of impressions per month. Big data techniques using a server farm or cloud computing enable every detail to be processed in a timely fashion. These techniques offer the precision of real-world observations without the need to estimate. They also scale across large data sets to provide results in a timely manner.

Digital Display Advertising

More than 80% of all digital ads are served by ad servers such as DoubleClick and Atlas. Content Web sites (publishers) such as CNN rent out ad slots on their pages to the ad servers. When the page is displayed, the ad server is asked for an ad to fill the slot. Advertisers buy inventory from the ad servers, which then display the ad when the page is requested.

The price can be based on impressions served, clicks or even by acquisition — only paying when the viewer buys something. Typically, however, large volume advertising or complex sales use the impression model commonly known as CPM (cost per 1000 impressions) or simply a flat rate to buy that ad space for a period of time. If the ad servers know that the ad location will be viewed more often than the number of impressions that the advertiser has bought, the advertiser’s ads will be shown on a random basis a percentage of the time.

In addition, ad networks can negotiate with other ad networks to find ads to display. Advertisers can arrange for their own ad rotation within the inventory that they have purchased. So, much like print and TV, there is no definitive proof that an ad was effective, but with digital ads there is a digital trail that can provide some insight.

Search Advertising

There is tremendous focus on search because current Web analytics show that much online traffic originates from Google, Bing and Yahoo. However, a closer look at search terms reveals that many searches are for a brand name — meaning the visitor has already been influenced some other way, possibly by an online advertisement. The most convenient way for a person to follow the ad without clicking (and hence avoiding security concerns and unwanted pop-ups) is to “Google” the brand name and click on the link. Consequently, search is given far too much credit for driving traffic to the site, especially in attribution schemes that favor the last action. Search is ubiquitous, so the fight over relevance ranking in Google has become a zero-sum game. Understanding how ads influence search is key to increasing online traffic.

Measurement: It’s All Connected

No doubt, the bulk of your site traffic comes from Google or specialized sites such as WebMD. And
much of it appears to — if you consider only the last action. But analysis shows that the process is much more involved. Banner ads on portals and ad networks drive brand awareness and drive traffic to specialized sites. Specialized sites such as WebMD provide education on diseases and direct patients to further information on the brand site. An ad that appears while a visitor is researching diseases and treatments triggers a branded search via Google. Each one of these steps is important and plays a part in the decision process. Each one involves a different cost and effort to manage. Attribution helps discover the most effective mix for your ad and search spend.

**Attribution Techniques**

There is a wide range of attribution methods in use today. Many rely on the judgment of the advertiser as to what matters most, resulting in a predetermined answer of dubious value. Even the more sophisticated methods often use sampling techniques that make their results difficult to compare against the actual numbers. Advertising activities work together, so attribution must understand the relationships between the various forms of advertising employed (see Figure 1).

**Click-through Rate**

CTR, or click-through rate, has long been the standard for Web advertising because it is easy to calculate. CTR is simply the number of clicks on an ad divided by the number of impressions served. As clicks decline and click fraud increases, this measure has become increasingly irrelevant. Studies have shown that 99% of users never click on an ad but that those that do are very likely to click again. It is estimated that as many as 20% of clicks are accidental, especially among the older age range, and Click Forensics estimated that as much as 23% of clicks were fraudulent in October 2010.

**Last Click**

Last click only counts clicks immediately before a conversion event, which eliminates credit for accidental and repeat clicks. But this method still assigns all the credit to a click and ignores all the preceding advertising. People use search for convenient navigation and click on paid search advertisements when they would otherwise have clicked on an organic link. Last click attribution overvalues clicks in general and paid search in particular. An Atlas study showed that between 93% and 95% of audience engagement with online advertising receives no credit at all when advertisers review the ROI on their campaigns because of the use of last click attribution.

**Last Impression**

Last Impression is often called Viewthrough. Doubleclick discussed this method in a 2008 paper suggesting that 100% credit should be given to the last ad seen before the conversion event. The suggested window was one month, which tends to increase the importance of digital advertising impressions. This is in the interest of ad serving companies that are paid by impression. The method still gives all the credit to a single event, which is unlikely to be the true case. There is no

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**Digital Ads: “Different Strokes” of Measurement**

<table>
<thead>
<tr>
<th>Attribution Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTR</td>
<td>Click-through rate is the number of clicks per impressions seen.</td>
</tr>
<tr>
<td>Last Click</td>
<td>The last ad clicked before the conversion event is given the full credit.</td>
</tr>
<tr>
<td>Last Impression or Viewthrough</td>
<td>The last ad that was seen before the conversion is given the credit.</td>
</tr>
<tr>
<td>Weighted</td>
<td>All ads that were seen prior to the conversion are given some credit. Typically, the first and last ads seen are given most of the credit while the ones in between get less. Often referred to as &quot;U&quot; weighting.</td>
</tr>
<tr>
<td>Regression</td>
<td>Credit is assigned based on an algorithm usually using some type of regression that considers some or all of the possible factors.</td>
</tr>
<tr>
<td>Panel</td>
<td>Outcomes are measured in experiments in advertising against a known audience and control group.</td>
</tr>
</tbody>
</table>

*Figure 1*
Different types of purchases have very different decision patterns, and a single weighting scheme cannot possibly be right for all.

**Weighted**

Most weighting schemes attempt to look at the activities of individual cookies as they progress towards a conversion (or not). Weighting schemes assign values to certain events and add them up to provide a relative measure of that item’s value. A popular weighting scheme is really an extension of “last view” and is known as “U” weighting.

For each cookie that converts, it assigns a weight to the first ad that the viewer sees, a larger weight to the last ad seen and lesser weights to the ones in between. This seems like a very rational approach, and it tends to deliver answers you would expect. Unfortunately, the results usually provide very little real insight because there is no analytical basis for choosing the value of the weights or even what should be weighted. Different types of purchases have very different decision patterns, and a single weighting scheme cannot possibly be right for all.

**Regression**

Regression attribution uses an algorithm to model the behavior of cookies. This can then be tested against the outcome of a campaign that has already been run to test the validity of the method. Any number of aspects may be used in the model. The advantage of this approach is that it actually attempts to determine the weights or importance of events analytically rather than by subjective weights assigned by the user. The algorithm does not require a control group, and it can often use the changes in campaign strategy as the basis for comparison. The drawback is that there are numerous dimensions to be considered and decisions on which ones to use tend to be subjective.
will see them and hence leave a trail. This is particularly interesting for HCP visitors. The number tends to be small so that each individual’s activity can be analyzed while retaining anonymity.

Adstrategist, a strategic partner of ours, provides a solution that builds a complete history of everything known about a person’s interaction with ads, search and the target site. Analytics utilize the third-party cookies that are already being set by ad servers rather than requiring new tagging or other forms of tracking. Every dimension of an ad impression relating to the publisher site, ad network, page, ad location, creative and time of display is recorded and used in the analysis. The approximate location of the person down to the metrocode level is also known and can be used to match online activity with off-line sales and other forms of advertising such as print and TV.

The resulting data set reveals everything known about every person that saw an ad, made a search or visited the target site. This data set is analyzed to discover the journey of each successful cookie to compare with all of the paths that lead nowhere. This is a highly effective use of big data, not just an exercise in capturing and managing data in the vague hope of finding useful insights at some point.

### Sites and Sequences
Most serious digital attribution methods concentrate on the sequence of sites where a cookie sees ads or social media along with searches and Web site visits. The ad site is important because different sites attract different demographic profiles, each with their own propensities. However, large portal sites such as Yahoo do not provide this granularity and ad networks may obfuscate the picture still further because it may be difficult to tell exactly where an ad originated. Some attribution analytics measure creative treatments as well as, or instead of, the site where the ad was seen. The “creative” served will have a specific appeal and goal, which can be used as a variable in the attribution algorithm. Different creatives will appeal differently to different demographic groups, and hence will be related to the site where they are shown.

### Page Location
Adstrategist’s proprietary research and analytical method have found that the specific page where an ad is seen is relatively unimportant except for broad areas of the site (see Figure 2). Analysis indicates that the ad location on the page is mainly important for its size and position, particularly whether it is below the fold or a banner ad.

### Reach and Frequency
The number of impressions, or touchpoints, experienced by a cookie is important. There are conflicting trends at work. Reach and frequency (R&F) is an accepted principle of off-line advertising that indicates there is an optimal number...

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<table>
<thead>
<tr>
<th>Campaign Goals</th>
<th>For example, branding, information, action, conversion.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where</td>
<td>Publisher site, ad network.</td>
</tr>
<tr>
<td>Location</td>
<td>Page, placement.</td>
</tr>
<tr>
<td></td>
<td>Ad size, ad location.</td>
</tr>
<tr>
<td>What</td>
<td>Ad type (rich media, etc.).</td>
</tr>
<tr>
<td>Creative Message/Tactic</td>
<td></td>
</tr>
<tr>
<td>How Much</td>
<td>Reach, frequency.</td>
</tr>
<tr>
<td>When</td>
<td>Recency, time spacing.</td>
</tr>
<tr>
<td></td>
<td>Attribution window.</td>
</tr>
<tr>
<td>Interactions</td>
<td>Sequencing, combinations, assistors.</td>
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</tbody>
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![Figure 2](image-url)
of times people must see an advertisement before they are “converted.” The chance of them converting rises as this number is approached. Once a person has reached the optimal number of ad views, the chances of them converting do not increase much with more viewings – so further ads are wasted cost. On the other hand, people become bored with ads, especially on Web sites. Several studies suggest that users may not even be aware of ads after a time. However, this effect tends to wear off if ads are not seen for a while, so less is more, at least for a time. What most advertisers don’t understand, or cannot calculate, is that when they buy a percentage of the inventory of an ad location, the probability of a visitor seeing an ad “N” times changes dramatically – so they usually buy too few or too many impressions to achieve the optimum R&F (see Figure 3).

Time Frame and Geography

The time frame over which attribution is considered is also important. Ad servers want advertisers to believe the window is large, because that means that ads will be valued more. The reality is that it varies with product type from days to months. Attribution analytics can reveal the relevant window for your business and your advertising goals.

The geographic location of the cookie may also play a role. TV and print advertising on local stations and papers usually direct people to a specific URL but it is common for responders to simply enter the brand into Google instead. We have found that search terms and creative treatments can work very differently in different parts of the country.

Paths

Essentially, attribution is about looking at converting and nonconverting visitor paths and deciding what made the difference.

Just looking at simplified representations of the cookie paths can offer significant insights into how cookies see ads and which sequences are most effective (see Figure 4). It is easy enough to condense the sequences by publisher sites where ads were seen but it gets more complicated when other dimensions such as creative treatments, timing, etc. are included. Nevertheless, graphical representations of the paths are the essential starting point for meaningful attribution.

One Size Fits None

Buying cycles vary widely depending on the product being purchased. The goal of the digital advertising may be to inform and persuade rather than to trigger a transaction. Pharmaceuticals advertising is frequently used for information and brand-building to help people recognize treatable conditions and understand treatment options. This type of digital advertising can have a significant impact on the business but it is more difficult to measure than direct response ads where conversion is immediate.

Reach Frequency Impressions vs. Pageviews at 50% Inventory

Source: AdStrategist Reach-Frequency Report.
Figure 3
By contrast, booking a cheap hotel room is a fairly quick decision because (a) the person needs a room and (b) price and location are the main factors. A few visits to Hotels.com and Kayak.com and a few visits to the hotel site over a few hours or days is all that is needed to make a purchase decision. The goal is to sell your room to the shopper before he or she buys from your competitor.

Contrast this with the choice of a diabetes drug, which may be a lifelong decision and involve weeks or months of research on numerous Web sites. The goal of the advertising is not a sale but a visit to a doctor who has also been influenced to favor your medication through directed advertising activities. Because the goals and time frames are very different, the attribution algorithm must be flexible if it is going to deliver meaningful results.

**Common Sense**
Simply analyzing data is not enough without an understanding of the environment and context. Results are only meaningful when compared with the goals of the campaign. Is the purpose to drive people to the site for action or a brand-building and awareness program? If the purpose of a creative is to inform, why evaluate the campaign’s click-through rate? There are many external factors that can affect the campaign. Some are available in additional data feeds (e.g., TV campaigns) but factors such as a patent expiring, a production shortage or a related article in *The New York Times* may dramatically affect the traffic viewing ads and visiting a site.

**Needle in a Haystack**
Attribution is about discovering clear relationships between digital advertising and conversions that will lead to improvement in marketing effectiveness. But it is not that simple. Advertising agencies usually run the campaign and achieve varying levels of success through experience, advice and trial and error without any analytical basis for understanding their success. Attribution algorithms that are introduced into mature campaign environments have to be looking for...
more subtle yet valuable improvements and enhance rather than compete with what is being done already.

If the goal is to bring people to the target site, it is clear that digital advertising works. If it is to perform an event such as downloading a coupon to cover co-pay, the result is less clear. Over the appropriate time period, more impressions produce more visits at a declining rate. But even that lift is small relative to the increase in impressions. Even a modest lift in prescription sales can pay for a lot of advertising, but discovering which additional impressions contributed most and in what combinations is the real challenge. Drawing meaningful conclusions when there are thousands of similar nonconverting paths for every converting path is both essential and nontrivial. Advertisers know that while specialized sites such as WebMD seem to drive the most traffic, that flow dries up without extensive advertising on ad networks and portals. Finding the correct balance is the key to maximizing the return on advertising investment.

In many campaigns, a large number of visitors arrive at the site and convert without seeing an ad or performing a search other than a branded search, which implies they were coming to the site anyway. Many attribution models go to great lengths to carefully model the cookies that see ads. In other words, they are modeling the noise with a lot of precision. This turns out to be the biggest challenge for many attribution models.

A simple segmentation of the results looks at the visitors/convertors that see ads vs. those that do not. As the number of impressions increase, the number of people that see ads will increase and some of these will visit the site and convert. So an increase in impressions will increase the number of visitors that see an ad even if the ads have no effect whatsoever. Subtracting this group provides a clearer view of the lift due to advertising. A/B testing may not be an option but there are often significant variances in ad campaigns over a few months. This is an implicit multivariate experiment that can be used to compare differences in lift with different impression volumes, sites and creative treatments to build an attribution picture that becomes more accurate with greater variances in campaigns and time.

Collecting the Data

Many solutions use tagging to track ad impressions, clicks and site activity. This involves costly effort and maintenance and typically slows the page load times. Ad agencies that are responsible for creatives are already overwhelmed by the number of tracking tags they must implement and maintain. In fact, the same data is already being collected by the ad servers and it can be obtained and analyzed to see every impression, click and on-site action that a cookie experienced. There is no additional effort for the advertiser to implement the AdStrategist solution. No risk, no cost – just benefit.

What to Do?

Even if there is a perfect attribution algorithm, there is still the problem of what to do with the results. Cookies arrive at the conversion via a series of ad exposures, searches, visits and social media in a particular sequence and timing. Attribution may correctly model that sequencing but there is little or no way to control the sequence or timing of how a cookie will see ads in the future. So attribution must not only have a way to measure its accuracy but provide useable recommendations for improvement.

Solid attribution analysis builds a picture of how advertising campaigns deliver results and provides a platform for continuous improvement. The next step is to use the predictive analytics capability to predict the outcome of digital campaigns.

Understanding the dynamics of digital advertising is an essential first step in understanding how effective it can be in your marketing mix. There are plenty of ways to guess or assign value, but a rigorous and flexible approach to attribution will enable you to find the patterns in the data that can inform smarter decisions and higher return.
Footnotes
4 Microsoft Atlas Institute, 2008, Alltel Wireless Case Study.

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