WEB ANALYTICS KICK START GUIDE

A Primer on the Fundamentals of DIGITAL Analytics

BRENT DYKES

About the Author

Brent is a respected expert in the field of web analytics, having spent the last 10 years as an analytics consultant and evangelist at Omniture and Adobe. He has worked with both large and small organizations in developing measurement strategies, performing analyses, and building digital analytics practices. Brent is the author of *Web Analytics Action Hero*, which has helped analysts and marketers to drive more action and value from their digital data. Brent has been involved in digital marketing for the past 15 years with agency experience at WPP's Blast Radius as well as client-side experience at Lands' End and Microsoft. Brent earned his MBA at Brigham Young University, where he was a Hawes Scholar. He earned his BBA (Marketing) degree from Simon Fraser University.

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Introduction

Since the advent of web browsers such as Mosaic and Netscape Navigator, which opened up the Internet to the masses, a variety of analytics tools have been used to track online traffic to web pages over the past 20 years. As this area of measurement grew, companies came to know it as web analytics. Just as the Internet has transformed dramatically over this short period of time, web analytics has also evolved in terms of the data that is collected and what can be done with it.

With companies shifting more of their marketing spend from traditional media to digital media, more people are being exposed to the numbers and metrics captured by web analytics tools. However, despite its increased prevalence in marketing and other functions, many people still suffer from a knowledge gap when it comes to web analytics. This gap can have serious consequences: Marketers and managers may overlook valuable insights that would improve business performance or misinterpret the numbers and make poor business decisions.

After I published my first book, *Web Analytics Action Hero*, I was surprised by the number of people who were still looking for help with understanding the fundamentals of web analytics. Although my book could help analysts or data-driven marketers who were already familiar with web analytics, it wasn't designed to introduce inexperienced individuals to the field of web analytics. After contemplating what insider knowledge I could share with people who were not as well-versed in this area, I decided to write a primer that could help get more people up to speed on this valuable topic.

The goal of this guide is to close the lingering knowledge gap and give anyone who is interested in learning more about web analytics a better understanding of what it is, what the essentials are, and how it can be applied successfully. This primer won't transform you into a data scientist, but it will give you the insights you need to take better advantage of your digital data and analytics resources, whether you're using Adobe Analytics, Google Analytics, or another web analytics tool.

NOTE: If you come across an unfamiliar acronym or term as you read this primer, I encourage you to check out the glossary at the end of this eBook for a potential definition.

Although I will cover both the technical and business aspects of web analytics, I wrote this eBook for a non-technical audience who at least is familiar with how the Internet works at a basic level (which means even my mother should be able to read and learn something from this primer). To give you a solid understanding of web analytics, this guide will cover the:

- Definition of web analytics
- Evolution of web analytics
- Business essentials

- Technical essentials
- Process of digital measurement

My aim is to equip you with all the fundamental concepts you need to better harness the power of this technology in your role and in your business. Before we begin your web analytics boot camp, however, I'd first like to step back and define what web analytics is.

CHAPTER 1

THE DEFINITION AND EVOLUTION OF WEB ANALYTICS

"What gets measured gets managed."

– Peter F. Drucker

So, what is web analytics? I think it's helpful to first focus on defining what analytics is. According to Wikipedia it's "the discovery and communication of meaningful patterns in data."[1] I like the simplicity of this definition because it emphasizes two important aspects: the *discovery* of insights through analysis of collected data and the *communication* of those insights to influence decisions. It's missing the overall purpose of analytics, however, which is to improve the performance of what is being measured.

With this general definition of analytics in mind, one of the key challenges in finding a suitable definition for **web analytics** today is that it is no longer just about measuring websites and online behaviors. It now extends to analyzing social, mobile, campaign, survey, competitive, and even web-influenced offline data (such as closed sales from online leads). As a result, practitioners now commonly refer to web analytics as digital analytics to better represent the broader focus beyond just the Web.

To reflect this expanded focus I define web, or digital, analytics as *the process of measuring digital initiatives and using the data to improve business performance.* Digital initiatives represent an organization's diverse investments in digital properties (websites, mobile sites, mobile apps, and so on) and channels (banner ads, paid search ads, e-mail, social media, and more). Management guru Peter Drucker

NOTE: Sometimes analysis is mistakenly interchanged with analytics. Analysis is defined as the process of examining something in detail in order to understand or explain it. Analytics is a broader category representing both the discipline and technology that enable individuals to perform analysis.

made a critical observation when he stated, "what gets measured gets managed." The driving force behind measuring your digital initiatives is to gain meaningful insights that can help you maximize the return or success of these investments. If you want to manage your digital investments, you need metrics to quantify their performance. Imagine flying an airliner without a functioning instrument panel. Doing so would make flying not only more difficult and inefficient but also infinitely more hazardous. Without relevant data and insights, you're essentially flying blind—something no organization can afford to do. Let your competition crash and burn, not your digital business.

Evolution of Web Analytics

Today, web analytics is a mainstream technology that should be familiar to most digital marketers—although perhaps not always well understood. Over the past 20 years, web analytics has evolved significantly from its simple beginnings as primarily an IT-focused tool to its current position as a core marketing technology (Figure 1). Take the time to understand the origins, major challenges, and key advancements of web analytics, and you'll have a better grasp of how the technology arrived at its current capabilities, as well as the direction it is heading.

Birth of Web Analytics (1993-1998)	Emergence of Page Tagging (1999-2004)	Growth of Web Analytics (2005-2009)	Transition to Digital Analytics (2010-present)

Figure 1: Web analytics appeared shortly after the birth of the World Wide Web and has experienced four main stages while maturing as a digital marketing technology and discipline.

Stage I: The Birth of Web Analytics (1993–1998)

As web traffic grew steadily in the mid-1990s, IT departments found they needed to monitor the performance of their corporate websites. This need fell outside of their traditional business intelligence systems that were more focused on financial and operational reporting. The first web analytics tools were based on log file analysis. When someone visits a web page, a request is made to the web server for the page's content and the web server records each request or hit in a log file. IT teams would use web analytics software to parse, or extract, useful information from these otherwise unintelligible server files. From the log files, webmasters (remember them?) could obtain basic reports on the visitor's IP addresses, referrers, pages, status codes (404 page not found errors), web browsers, user operating

systems, and so on. All of this data formed the basis of early clickstream analysis: the study of page requests to monitor web traffic patterns.

During this same time, hit counters were added to web pages, which acted like odometers showing the number of times a page was viewed. These simple counters were typically created with server-side scripts such as Perl or C (see note on page 10 on scripting). The hit counters provided only basic information on the popularity of different web pages, but they exposed people outside of the IT department to a basic web metric: page views (although they were called hit counters, they weren't really showing hits). Sharing page metrics with the general public might be superfluous, however, it was helpful information for internal stakeholders. Eventually, companies such as Webtrends and Urchin realized their log file analysis tools should focus on reports for business users and marketers, not just IT professionals.

In the beginning, web pages were primarily just text and links. A single hit represented a page being served and viewed. When images, sound, video, style sheets, and so on were added to enrich online content, however, multiple requests or hits (up to 10 or more) to the web server were required to assemble a single page. With this change hits became a worthless metric because it was based on the arbitrary nature of the page's design elements and not its actual popularity. Even though people still commonly refer to how many hits their websites receive (more likely page views or visits), you won't find the hits metric in any modern web analytics tool.

NOTE: Packet sniffing was another method that was first used for web analytics by Accrue Software in 1996. Packet sniffing solutions (software or hardware) passively collected clickstream data that was sent to and from the web server. These solutions were very IT-dependent and costly. In addition, they raised privacy concerns as they could capture everything (including passwords and credit card numbers). Despite not becoming a mainstream web analytics solution, packet sniffing has found a niche in customer experience replay with IBM Tealeaf and Cloudmeter (formerly Atomic Labs).

KEY TAKEAWAYS

- **IT teams and webmasters were the first users of early web analytics tools, which were based on log file analysis of web server requests.**

- **Other internal teams were exposed to page view counts through hit counters, which were visible odometers embedded on individual pages.**

- **Hits were no longer a relevant web metric once web pages included more than just plain text and links.**

- **As businesses experimented with their first websites they became interested in traffic volume but weren't yet using data to improve performance.**

Stage II: The Emergence of Page Tagging (1999–2004)

By the late 1990s, online marketers were accustomed to relying on reports from their IT teams to learn the traffic volumes for their companies' websites. As the Web continued to evolve, however, the log file analysis approach ran into a couple of key challenges that began to undermine its ability to provide accurate and insightful analysis of visitor behaviors.

First, different robots and search engine spiders emerged that were designed to explore and index various websites on a recurring basis. By default, web server log files captured both human and non-human interactions. Web analysts and marketers discovered that the robot and spider traffic would interfere with understanding actual human behaviors on a website, which meant they needed to constantly remove the increasing volume of non-human traffic.

Second, to streamline the online experience, ISPs (Internet service providers) and web browsers introduced the practice of caching web pages. ISPs would use proxy servers as an intermediary to cache popular pages for their user base to speed up download times. Web browsers stored a local copy of previously viewed pages on a user's computer so that they would load quickly when the individual navigated back and forth between pages. Both forms of caching meant web content was being viewed without requests being made to the web server, which lowered the volume of traffic reported by log files.

After JavaScript became the standard for client-side scripting on web pages in the late 1990s, the familiar hit counter evolved into a page tagging approach for web analytics. Rather than outwardly sharing how many page views an individual web page received, JavaScript code was used to send online data about web pages and visitors imperceptibly to a third-party web analytics vendor, which hosted all of the collected data. Rather than having to install software, analysts would access the reports through an online interface, representing one of the earliest forms of software-as-a-service (SaaS) or cloud computing. Instead of paying a one-time fee for software, companies would pay a recurring monthly fee that depended on the amount of data being collected. Marketers and other business owners still needed web developers to insert the page tags into their websites, but they were freed from depending on the IT team for batch-processed log file analysis reports.

The page tagging approach quickly grew in popularity due to several distinct advantages it offered over the log file analysis approach:

- Data collection wasn't impacted by page caching because the tags were activated by the page being viewed, not requested from the web server.

NOTE: Scripts are a series of commands that execute tasks within a program. Scripting can occur on the web server (server-side) or within the web browser (client-side). Server-side scripting (with PHP, ASP, Ruby, and the like) is used to connect the web server with databases and other systems to build dynamic HTML pages. Client-side scripting (JavaScript) adds richer functionality to web pages such as mouse rollover effects, dynamic menus, slideshows, modal windows, and responsive design for mobile devices.

- Robots and spiders could not execute JavaScript, therefore, non-human traffic was not collected so it didn't interfere with understanding actual visitor behaviors.

- Interactions or events that occurred within a single page (button clicks) after the page was already loaded could be listened for and measured.

- Information on browser versions, screen resolution, and so on was available to JavaScript executed on the page and not to the web server and its log files.

- There was more flexibility for capturing custom data on content, products, campaigns, visitors, and such site behaviors as navigation paths.

- Reports were updated on a near real-time basis and readily available through an online interface, which enabled business users to self-service reports rather than relying on the IT team to provide them.

In combination with JavaScript, page-tagging solutions relied on cookies for tracking visitors and their online behaviors. A *cookie* is a small text file that stores information related to the visitor in the web browser so that, in the future, the website can remember each user's previous activity and preferences. In the case of web analytics, cookies were used to anonymously identify visitors across multiple visits as well as understand a user's site interactions within a particular session or visit. Although cookies introduced some new challenges (see "Technical Essentials," page 67), they began the shift away from just focusing on basic traffic-related metrics, such as page views, towards better understanding the overall online experience and visitor behaviors. Some hybrid solutions emerged, but most of the leading web analytics solutions (Omniture, WebSideStory, Coremetrics) were based exclusively on page tagging.

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KEY TAKEAWAYS

- **Non-human traffic (robots and spiders) and caching problems prevented log file analysis from providing accurate reporting.**

- **The introduction of JavaScript and tracking cookies were the basis of a new page-tagging approach, which shifted away from installed software to a third-party hosted solution.**

- **Page tagging wasn't susceptible to the same issues as log file analysis and provided more robust data collection on visitors and their onsite behaviors.**

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NOTE: Today, modern robots and spiders can execute JavaScript, so bot filtering is important to getting a clearer picture of human interactions with your digital properties. Your IT team may use website monitoring tools such as Gomez or Keynote that use bots to execute pages and measure their load times. There are also many malicious bots such as spambots, which crawl websites looking for e-mail addresses for spamming purposes or adding SEO-related links to web page comments.

NOTE: If you work for a media company, you may be familiar with web audience measurement services such as ComScore Media Metrix, Nielsen Netratings, and Experian Hitwise. ComScore and Nielsen Netratings use a panel-based approach where people opt into a program to share their online activity usually in return for different rewards or incentives. Hitwise uses partnerships with various Internet service providers (ISPs) to collect its audience data. These audience measurement services then extrapolate the behaviors of the panelists to estimate the activities of the broader online population as well as the market share of different media sites. This sampled-audience approach is very different from the page-tagging approach used for web analytics and can lead to significant traffic volume disparities.

Stage III: The Rapid Growth of Web Analytics (2005–2009)

Nothing about the Internet stays the same for very long. Operating in this fast-paced, evolving environment, web analytics had to bend and adapt to a number of new measurement challenges and opportunities. The next generation of Web 2.0 technologies, such as Adobe Flash, AJAX, video, and RSS, led to more dynamic websites and forced web analytics to re-evaluate its page-view-centric approach.

Rich internet applications (RIAs) built in Flash or AJAX to provide users with a more engaging, interactive experience than static HTML-based web pages. Because these web applications were more like desktop software and the dynamic content could be changed without refreshing the entire page (asynchronously), the paradigm of the page-view metric became less relevant. In addition, the rapid growth of online video among publishers meant ad impressions shifted to the video player instead of the web page, further reducing the importance of page views. By embedding JavaScript tags in the apps and videos, web analysts could use event tracking to measure key actions (micro conversions) and milestones (percent of video viewed).

Up until the mid-2000s, web analysts were comfortable with monitoring web traffic, but their focus now shifted to measuring business outcomes. Event tracking forced web analysts and marketers to focus on business goals and fully understand what their companies were trying to achieve with these new Web 2.0 technologies. However, it also introduced implementation complexity and increased the volume of data being collected. With the page-view paradigm being less relevant, marketers turned their focus to measuring visitor engagement. While various engagement models were proposed, they proved to be highly subjective and open to interpretation. Page views refused to go away when no industry standard metric emerged; however, businesses were now accustomed to using more ratios, such as bounce rates and conversion rates, beyond just counts.

In addition to the shift in focus to measuring business outcomes, analysts were also seeking to better understand the behaviors of key visitor segments. Web analytics vendors provided various behavioral analysis features such as pathing analysis (showing the path of how visitors navigated from page to page), conversion funnels (displaying key abandonment points in an online process), and heat map overlays (revealing visually which links on a page were "hottest" and being clicked on most). Many vendors added basic segmentation features that enabled online marketers to better understand the behaviors and attributes of such pre-defined audiences as search visitors or online purchasers. Most of the early segmentation

NOTE: Measuring visitor engagement can be problematic for companies. First, there is no standard metric for engagement that all businesses can rely on. Each company has different business goals and as such will define differently what being an engaged visitor means. Even within the same organization, different groups may disagree on how to define engagement. Second, engagement measures and indices tend to be highly subjective and can often give an organization a false sense of security for how many visitors are connecting with its brand. Finally, as engagement models become more complex, they typically become less actionable as there is rarely a clear lever that marketers can use to influence the metric.

features focused on session- or visit-level segments, and early forms of visitor-based segmentation were difficult to configure and use. Despite that, the segmentation capabilities quickly became a popular tool in many analysts' toolboxes.

Growing concerns about spyware impacted web analytics in the mid-2000s as people became fearful of how cookies could be used maliciously. Most of the problems were related to third-party cookies, which are set by a different website than the domain you're visiting (to learn more about cookies see page 75). If you have ever wondered why you see the same ad from a retailer that you recently visited across multiple sites, you are seeing third-party cookies in action. Ad networks use these cookies to track visitors across websites to improve ad targeting. Web analytics packages also sometimes relied on third-party cookies for measurement purposes. Unfortunately for analysts, anti-spyware tools started deleting many third-party cookies; thus, interfering with the accuracy of tracking returning visitors (when the cookie is deleted, returning visitors will appear as new visitors and inflate visitor counts). As a result, web analytics vendors switched to a first-party cookie approach, where the cookies came from the company's own website rather than a third-party (analytics vendor). First-party cookies were deemed to be more trustworthy and not targeted for deletion by anti-spyware packages.

As web analytics continued to gain widespread adoption as a marketing technology and even introduced its own industry group (Digital Analytics Association), the industry experienced both new entrants and consolidation in the mid-to-late 2000s. For instance, in 2005 Google purchased Urchin Software, which had offered both log file analysis software and an on-demand page tagging solution. Google then re-launched the on-demand solution as Google Analytics and offered it at no cost to individuals and companies, enabling millions of bloggers and small businesses to enjoy the benefits of web analytics. Google's entry into the market represented a significant challenge to the market leaders not only on price but also in terms of compelling features such as an easy-to-use interface, simplified segmentation, and first-party cookie implementation.

Consolidation also occurred among the major players within the web analytics industry as Omniture acquired one of its chief rivals, Visual Sciences (formerly WebSideStory) in late 2007. Adobe jumped into the analytics market when it acquired Omniture for $1.8 billion in late 2009, and continued building out Omniture's solutions for digital marketers by adding content management (Day Software) and digital ad buying (Efficient Frontier). After selling off its Surfaid Analytics business in 2006, IBM returned to the web analytics space when it purchased both Coremetrics (which had bought Surfaid) and Unica in 2010. IBM proceeded to integrate these two analytics technologies into its core WebSphere

NOTE: The Web Analytics Association was founded in 2004, but in 2012 it was renamed to the Digital Analytics Association to reflect its broader focus on digital data rather than just web data. The DAA is a non-profit, volunteer-oriented industry organization that is focused on education, community, research, and advocacy.

platform. In the course of only a few years, the leading web analytics vendors went from being a group of irreverent, fast-moving startups to innovative products within well-established technology brands.

KEY TAKEAWAYS

- Web 2.0 technologies, such as Flash, AJAX, and video, required event tracking, which began to shift the focus away from page views.

- Web analysts began focusing more on measuring business outcomes and key visitor segments.

- Higher third-party cookie deletion rates due to anti-spyware software forced web analytics vendors to shift to first-party cookie implementations.

- The web analytics industry experienced a significant period of adoption, maturation, and acquisition that transformed web analytics into a mainstream marketing technology.

Stage IV: The Transition to Digital Analytics (2010 to present)

After surviving its rapid growth years, the web analytics industry could have used a moment to catch its breath. A number of recent trends have significantly affected the field of web analytics. For example, the mass adoption of social media and the increased proliferation of web-enabled mobile devices have presented new challenges for digital measurement as companies seek to understand their investments in these new areas. In an increasingly digital world, online privacy concerns have caught the attention of lawmakers, web browsers, industry associations, and businesses. New data protection measures, particularly in Europe, affect how organizations approach collecting data online. Meanwhile, a new technology in the form of tag management systems (TMS) has revolutionized how web analytics solutions are deployed and maintained. Finally, the hype around Big Data has created a business environment that is more interested in analytics in general. More and more, web data is being merged with other offline data sources (point of sale, CRM, call center) as companies build out different Big Data initiatives.

When such fast-growing social networks as Facebook, Twitter, and YouTube entered into the analytics game, they brought their own rules. Rather than giving

marketers the ability to measure their social initiatives as they wished, these social networks limited what could be tracked and instead provided their own analytics tools and APIs to companies (often for a fee). Facebook's Open Graph, for example, could provide companies with a rich level of demographic data (interests, marital status, education, and so on) that these companies wouldn't have access to within their own web analytics tool. Even though organizations were limited in how they could instrument their content on the social networks, web analytics could still be used to measure the downstream traffic and demand created by these social sites, as well as how sharing buttons and other social functionality embedded within their sites contributed to overall performance.

Increasingly more people are using mobile devices to access online content. Marketers have expanded their digital marketing efforts to embrace the influx of web-enabled mobile devices, which introduced more complexity due to the various operating systems, device capabilities, and screen sizes. Initially, mobile devices also did not support JavaScript or cookies, which severely limited identifying unique visitors and their behaviors. Modern Apple iOS and Android devices support these standard web technologies, however, allowing for richer tracking options, such as event tracking in mobile apps (similar to what was done for RIAs). Digital analysts went from primarily focusing on optimizing websites and online campaigns to analyzing mobile-specific sites, mobile apps, and other mobile marketing efforts. In addition, organizations know their customers use different devices to interact with their business, and there is growing interest in stitching together these different interactions into a single view of these customers.

While companies wanted to be able to identify, segment, and target visitors across multiple channels (online, mobile, in-store), public concerns about online privacy arose. More and more personal information was being shared on social networks, and cross-site ad targeting was increasingly being portrayed as invasive or "creepy" in the media.[3] In Europe, online privacy has been a hot topic where European Union officials have lobbied for stricter data protection legislation. The EU e-Privacy Directive or EU Cookie Law mandated in May 2011 that European websites had to seek informed consent from users before setting a cookie on their computer. Each country is then left to interpret and enforce what "informed consent" means—from a strict opt-in policy to simply having a cookie policy banner on their site. As a result, the legislation has led to significant confusion for companies and inconsistent adoption across EU nations.[4]

After lawmakers started to weigh into the matter, a number of industry initiatives emerged to allay these privacy concerns. Various marketing trade organizations introduced self-regulatory programs, including the Digital Analytics Association,

which introduced its own code of ethics for web analysts in 2010. Web browser makers proposed an opt-in Do Not Track (DNT) system, which, when enabled, would notify websites when a user didn't want to be tracked (which could be respected or ignored). Although the World Wide Web Consortium (W3C) failed to establish an agreement on the proposed DNT system, web browsers have experimented with other privacy features, such as a privacy browsing/incognito mode and tracking protection lists. The usage of these privacy features has been fairly limited so far but could be problematic for web analytics if they were more widely adopted.

The privacy landscape isn't being shaped by legislation and browser privacy features only. Digital marketers were frustrated when Google announced in October 2011, for privacy reasons, it would no longer share search terms if a visitor was securely signed into his Google account. Then, in September 2013, websites began to notice all search queries from Google were no longer being shared by the popular search engine. This keyword change significantly impaired digital marketers' insights into visitor intent and site performance for organic traffic from Google Search. It was fait accompli in April 2014 when Google announced it would also strip search queries from its paid search traffic. For digital marketers, a popular and useful source of online insights—search query data—essentially vanished. The Do Not Track and online privacy movement is still unfolding and could have a dramatic impact on the field of web analytics in the future.

While all of these factors added complexity to web analytics, one key technology emerged to help make things a little easier. A single site could have multiple tags from different technology vendors (e-mail, ad platforms, affiliates, remarketing, surveys, testing, web analytics, and so on), and it could take busy IT teams several weeks to turnaround simple JavaScript tag changes. Tag management systems (TMS) streamlined the process of deploying and managing JavaScript code by introducing a container tag that houses all of the different tags. Although tag management doesn't entirely remove IT involvement, digital marketers no longer need to bother their IT team with simple code changes. Through a user-friendly console, they can deploy new tags, remove unnecessary tags, and build rules to control how data is collected. Tag management solutions reduce IT concerns about page load performance and empower marketers to be significantly more agile with tracking the right data. Although a number of TMS startups have entered the marketplace (Ensighten, Tealium, and so on), both Adobe and Google introduced their own free tag management solutions. In July 2013, Adobe acquired a TMS vendor, Satellite, to enhance its capabilities in this key area.

NOTE: By default web analytics tools collect anonymous data on visitors. Individual visitors are recognized through a random identifier that has been assigned to them through a cookie. If you are collecting personally identifiable information (PII) such as e-mail addresses or full names in your web analytics tool's custom reports, then you are most likely violating the terms and conditions of your licensing agreement and potentially your privacy policy.

Even though marketers continue to shift dollars from traditional marketing to digital marketing, the majority of marketing spend happens in offline marketing channels. In addition, digital represents only one of multiple customer touchpoints that companies need to manage (call centers, physical stores, direct mail, and more). Organizations need to optimize their entire business, not just websites or online campaigns. Along with this shift to digital analytics, more organizations are interested in integrating both online and offline data. Adobe (formerly Omniture) has offered offline data integration for several years to its customers (metadata, external data uploads, lead generation synching). Google publically launched its new Universal Analytics platform in 2014 to better address both web and non-web data collection.

In late 2010, Big Data appeared as a popular buzzword with IT vendors and media, representing a new analytical era where data "exceeds the processing capacity of conventional database systems."[5] With the falling costs for storing data and growing piles of data being collected, organizations needed better ways to mine insights and turn data into a competitive advantage. Big Data has been characterized by the three Vs: volume, velocity, and variety. Typically, for Big Data analytics, the volume levels are in the range of petabytes of data (one petabyte equals approximately one million gigabytes).

Although the raw clickstream data in digital analytics tools can be massive for larger companies, it's usually still in the realm of terabytes for most companies (one terabyte is about one thousand gigabytes). From a velocity perspective, digital analytics is already processing digital data in real-time or near real-time. The biggest difference comes primarily in the area of variety. Digital analytics focuses on structured data (pre-defined reports and metrics), as opposed to Big Data analytics, which can handle both structured and unstructured data (survey responses, tweets, e-mail text, audio files, documents, and so on).

Various technologies drive this new analytical movement (Hadoop, MapReduce, and Hive, among others), but the important thing to remember is that clickstream data from digital analytics tools has become a common input in many Big Data projects, especially if they are marketing-related. The emphasis being placed on Big Data has widened the appeal of digital analytics because more companies are viewing data as essential to managing their business. Even though industry giants such as Adobe, Google, and IBM currently dominate the digital analytics market, more specialized analytics firms have also emerged in different niches:

- Hootsuite (social analytics)
- Chartbeat (real-time analytics)

- KISSmetrics, Mixpanel (visitor analytics)
- Conviva (video analytics)
- Localytics, Flurry (mobile analytics)
- Visual IQ, Convertro (marketing attribution)
- ClickTale (customer experience analytics)
- Optimizely (A/B testing)

With the increased focus on digital data, companies may supplement their main digital analytics solution with data and reports from these specialized vendors. Digital marketers enjoy a deeper, more diverse ecosystem of analytics providers than ever before.

KEY TAKEAWAYS

- Social and mobile marketing further expanded the focus of web analysts away from just analyzing website and online campaign performance.
- Do Not Track and other privacy measures by leading web browsers and search engines could increasingly impede a company's ability to improve its digital initiatives.
- Tag management solutions simplify the deployment of JavaScript tags, lifting the burden from IT teams and putting more control in the hands of marketers.
- Web analytics has evolved into digital analytics as it now encompasses data from a broader cross-section of digital channels.

As you can see from the table below, web analytics experienced an interesting transformation over the past 20 years. From originally focusing on such simple metrics as hits and page views, it is now moving towards understanding visitors or audiences across multiple channels and devices. It has gone from being a tool primarily used by IT professionals to an integral business system for marketers and business stakeholders. Web analytics has evolved from its software roots in log file analysis to be one of the earliest forms of cloud computing and a cornerstone of marketing decision-making. With a better understanding of the history and evolution of web analytics, you are now ready to dive into the business essentials that define how we approach these tools.

EVOLUTION STAGE	FOCUS	PRIMARY USERS	TECHNOLOGY	MAJOR VENDORS
I: Birth of Web Analytics	Hits Page Views	IT Webmasters	Log File Analysis Hit Counters	Accrue Software NetGenesis Webtrends
II: Emergence of Page Tagging	Page Views Visits	IT Web Analysts Online Marketing	Page Tagging (third party cookies) Hybrid solutions	Coremetrics NetIQ (Webtrends) Omniture WebSideStory
III: Rapid Growth of Web Analytics	Visits Visitors Events (Outcomes)	Web Analysts Online Marketing	Page Tagging (first party cookies)	Coremetrics Google Omniture Webtrends
IV: Transition to Digital Analytics	Visitors Multi -Channel Visitors Events (Outcomes)	Digital Analysts Business Analysts Marketing	Page Tagging (first party cookies) Tag Management Big Data Analytics	Adobe Google IBM Webtrends

THE BUSINESS ESSENTIALS OF WEB ANALYTICS

"There is nothing so terrible as activity without insight."

– Johann Wolfgang von Goethe

With any web analytics package, you can be easily overwhelmed by the sheer volume of metrics and reports it provides. When you layer on top of that all the powerful analysis features available within these tools and the various technical considerations that go into implementing custom aspects of these solutions, you might feel your head begin to spin. When you approach web analytics for the first time, it's both helpful and important to stay focused on how it can help you to achieve your online goals. When you use these tools strategically, most of the noise and complexity melts away into the background. That's why I'm going to start by focusing on the business essentials before even bringing up the technical essentials. By first grounding yourself in the business considerations, you'll discover the technical aspects become simply a means to an end.

Why Web Analytics Matters

Before going any further you need to appreciate why web analytics is important to your business and in particular how it can help improve your digital marketing efforts. Remember what Peter Drucker stated, "What gets measured gets managed." Without relevant data on your digital marketing investments, it will be more difficult to manage them effectively. Web analytics can benefit your marketing

"Study the past if you would define the future."

– Confucius

organization with insights into two key areas: how to *spend more efficiently* and how to *market more effectively*. Regardless of their business models, all organizations want to know how to get the biggest bang from their digital investments. Although the types of expenditures will vary by company and industry, web analytics can provide insights into the following common digital marketing areas:

- **Marketing channels**. Understand which digital marketing channels (social, display, paid search, e-mail, or others) deliver the best return on ad spend.

- **Marketing campaigns**. Learn which creative approaches and promotional tactics generate successful, cost-effective campaigns.

- **Mobile web/responsive design**. Examine how much visitors are using mobile devices to interact with your organization and how mobile-specific content contributes to success.

- **Content creation**. Discover which types of content (microsites, videos, articles, whitepapers, or others) resonate with your target audience and which offer the best return.

- **Licensed content**. Determine whether exclusive media from well-known content providers is worth the investment.

- **Partners**. See how different partner relationships (ad agencies, affiliates) and outsourced services (checkout, online chat) contribute to or detract from your overall digital success.

- **Site redesign**. Understand when your corporate website warrants a major facelift as opposed to smaller, targeted improvements.

- **Online functionality**. Discover how different onsite technologies such as personalization, self-service tools, or product ratings/reviews deliver value to your bottom line.

- **Mobile/social apps**. Evaluate whether the development costs for various social and mobile apps are worth the time and effort.

- **Onsite promotions**. Identify which promotional offers are more cost-effective than others.

- **Resource allocation**. Determine whether internal staff and external consultants are optimally deployed to meet the strategic needs of your digital business.

Beyond just spending your marketing dollars more wisely, web analytics can also help maximize your return from these investments. Insights from your web analytics tool can be instrumental in identifying high-performing visitor segments and helping to streamline your entire online user experience from the

initial landing pages through the entire conversion process. Even though most organizations have deployed a web analytics solution, only a small percentage of them have tapped into the technology's full potential. You'll discover your web analytics investment can easily pay for itself multiple times over, but only if it is aligned with one critical aspect: your business strategy.

Strategy Always Comes First

If web analytics is going to provide any value to your organization, it must be closely aligned to the key business objectives of your digital strategy. In other words, if you're not measuring the right elements and outcomes in your web analytics tool, improving the performance of your digital marketing efforts will be difficult.

All too often companies haven't clearly defined their digital strategies for various reasons. Sometimes digital initiatives have multiple stakeholders (product, marketing, sales, and more) with conflicting objectives and no single, designated owner. For some companies that operate across multiple channels (stores, call center, online) digital may not be their most important channel so their digital strategies aren't well defined. Others are so focused on the daily tactical demands of keeping all their online marketing efforts afloat, no one has time to question what the actual business goals are. Regardless of the excuse, if your business objectives are unclear or ambiguous, you will most likely end up with useless metrics and irrelevant reports. When you don't know what to measure, you end up tracking a lot of things that don't really matter to your business. Often the real challenge is not what *can* be measured, but what *should* be measured.

Ultimately, you can determine whether your digital marketing efforts are succeeding or failing only if your strategy is clearly defined and agreed upon. In smaller companies this might be a straightforward exercise, but in larger businesses it can be difficult to get different parties to agree and articulate what the actual online strategy should be. As a general rule in web analytics: You shouldn't *quantify* something before it has been *clarified* or *defined*. Many people interpret the meaning of "strategy" differently. I define it as a plan of action or initiatives to achieve a specific goal or set of objectives. Strategy connects the *vision* (the over-riding idea or dream for the long-term direction of your company) to the *tactics* (the specific low-level, executional details). Every strategy has three core components (shown in Figure 2):

"Sound strategy starts with having the right goal."

– Michael Porter

Strategy

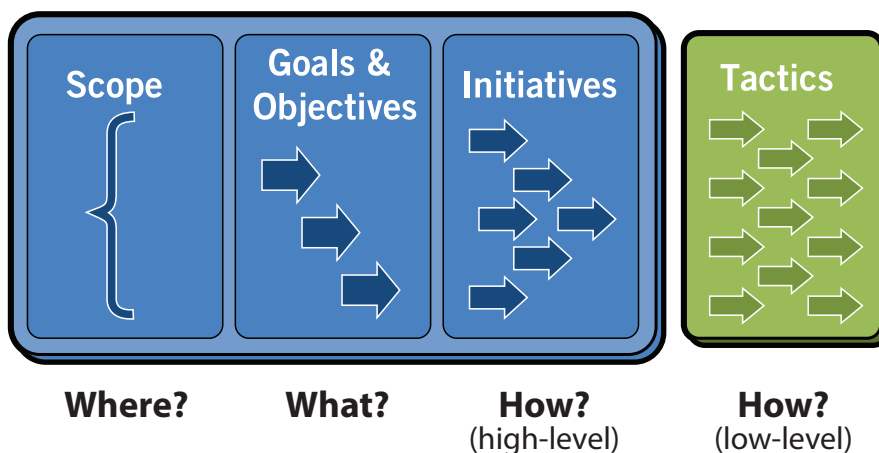| **Scope** | **Goals & Objectives** | **Initiatives** | **Tactics** |
| Where? | What? | How?
(high-level) | How?
(low-level) |

Figure 2: A strategy is composed of three key components: scope, goals/objectives, and initiatives. Once the strategy has been defined, tactics or low-level, executional details can be developed.

- **Scope** defines the boundaries of a particular strategy (the "where"). It specifies whether the digital strategy applies to a set of websites, a particular region (North America), or a specific channel (mobile).

- **Goals** (or **objectives**) are the desired aims or outcomes of the strategy (the "what"). They represent what needs to be accomplished, such as doubling annual revenue or reducing customer churn by 25%. Effective goals usually include a *target* (increase/decrease by x%) and have a *deadline* (to be completed by the end of the year).

- **Initiatives** are the high-level action plans to achieve the goals or objectives of the strategy (the "how"). Your company may have multiple initiatives that combine to achieve a single goal. For example, you might use three separate initiatives—paid search ad, display ads, and social media—to acquire new customers (the goal).

Although the scope and initiatives of a strategy are usually visible and easier to ascertain, the business goals or objectives aren't always as simple to deduce if they're not clearly stated. Properly defining them may require some investigative work. When it comes to online business goals, they are usually directly or indirectly related to **three main high-level goals**:

- Increase revenue (or profit)
- Reduce costs
- Increase customer satisfaction

Although it's useful to think in terms of these high-level business goals, it's equally important to define or clarify your actual goals. Using the wrong metrics and not evaluating the true performance of your digital initiatives is all too easy without clear goals. To illustrate why business goals influence what metrics we use, imagine I asked you about the best metric for evaluating an automobile. You might consider the following metrics:

- Fuel efficiency
- Horsepower
- Acceleration
- Torque
- Safety/reliability ratings

Rather than deciding on one of these metrics, you'd probably ask what the primary use of the vehicle would be before prescribing a specific metric. Is the automobile going to be used for daily commuting, towing a boat, or drag racing? Once you know the main purpose of the vehicle, you're better positioned to recommend the right metric(s). The same principle applies to digital measurement: To identify the appropriate metrics, you first need to understand the underlying business goals or objectives. If you always remember to clarify the digital strategy before selecting metrics, your data won't lead you astray. You'll be able to answer important business questions about your digital initiatives when your data is aligned with your digital strategy.

Remember that digital space is a very fluid, dynamic environment. It's rare that your digital strategy will have a long shelf life; therefore, you may need to periodically update your metrics and reports to ensure they're aligned with your current strategy. What answered yesterday's business questions may not be exactly what's needed for today or tomorrow's questions.

Business Goals versus User Goals

Although your organization wants to achieve certain business objectives, what visitors want to accomplish on your website may not always align directly with those objectives. If you managed a consumer electronics e-commerce site, for example, your primary goal would be to sell product and generate revenue. Individual users, however, might come to your website to accomplish various tasks that don't involve making an immediate purchase, such as researching product options, finding a store location, seeking technical support for a past purchase, or

"Know what your customers want most and what your company does best. Focus on where those two meet."

– Kevin Stirtz

BUSINESS GOALS VERSUS USER GOALS | **24**

looking at job openings. Even when the goals align and a user wants to buy from you, some conflict could still exist: Ideally you want to maximize the transaction size whereas the individual plans to spend as little as possible.

Even though user and business goals may not align perfectly, it doesn't mean you ignore what your users want to accomplish. Customer-centric organizations strive to provide a positive user experience, which often means understanding and supporting various user goals in order to achieve their own business goals. There's a symbiotic relationship between the two types of goals, and each user interaction also represents an opportunity for behavior modification. For example, someone comes to your website to read a specific article but stays longer to view other recommended content. Alternatively, a customer visits your site to pay a bill online and ends up opening a new credit card account. Online success often comes down to finding the right balance between accommodating user goals and driving the desired goals of your organization.

The main challenge with user goals is that you don't know the intent of each visitor. Web analytics focuses on understanding behavioral aspects (who, what, when, where, how) but not attitudinal ones (why). Because it's impractical and intrusive to ask each visitor the exact purpose of the visit, web analytics is used to *infer* why someone came to your website. The "art" side of web analytics involves using the web data to paint a picture of what your users are trying to achieve online. By observing certain behaviors, such as how they arrived on the site, which pages they visit, or which search terms they use, you can often deduce the user intent—with the help of some guesswork and assumptions. In the next section, I'll show you some of the metrics you can use to measure both your digital marketing success *and* the behaviors of your site visitors.

Demystifying Metrics

Once you have a clear understanding of your digital business goals, you're ready to evaluate how your digital marketing efforts are performing. When you want to assess what's happening with your digital initiatives, you start by examining either **reports** or a **dashboard** (a high-level summary of data from various reports) in your web analytics tool. The web analytics reports will provide you with all kinds of information, including traffic sources (where visitors are coming from), site content (what content they're interested in), audience characteristics (what types of visitors you have), and conversions (what your visitors are able to accomplish). Most of these reports have both a graphical element (a chart)

and a data table. Within each report you will find two key data elements that are inseparably connected and form the foundation for all measurement: metrics and dimensions.

In web analytics, a **metric** is a quantitative measurement of online activity. Metrics are always expressed as numerical values such as 3,451 page views or a 4.5% conversion rate. A **dimension** is a set of attributes that categorize the numeric results into meaningful groupings. In contrast to metrics, dimensions are always represented as textual values or words (including dates). For example, if the data dimension were countries, the dimension values would be Canada, Germany, Japan, and so on. If you were to look at a data table in a standard analytics report, you'll find the dimension values in the rows while the metric values would be located across the columns. The intersection of a dimension and a metric in the table represents one data point in the report (say, 5,120 visitors from Japan, as shown in Figure 3). Metrics and dimensions go together because metrics *measure* something (numbers), while dimensions *describe* what is being measured (text).

Sample Web Analytics Report

Countries	Visitors	Page Views
United States	13,951	45,499
Canada	9,562	34,595
Germany	7,654	29,868
Japan	5,120	23,040
Brazil	4,593	25,697
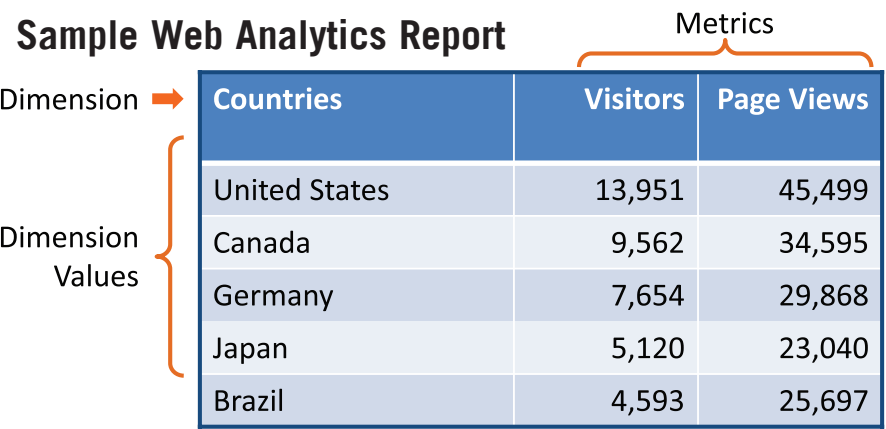
Figure 3: Metrics are the numbers found in the far-right columns of a report. Each individual row represents a separate dimension value and is text-based (e.g., Canada).

There are three main types of web analytics metrics: counts, ratios, and other calculations. A **count** is simply a number reached by counting items, and it is usually a whole number (10,008 orders). Counts are the basic building blocks for **ratios**, which are simple calculations of two amounts in order to show the relationship between them—most commonly dividing one count by another. In fact, most of the ratios used in web analytics are actually rates, which are a special form of ratio where the two amounts have different base units (page views per visit).

One of the advantages of ratios is that they compensate for fluctuations in volume, making it easier to compare the relative performance of different items. For example, campaign A generated 300 orders from 10,000 visits (3% conversion rate); whereas the smaller campaign B created only 50 orders from 1,000 visits (5% conversion rate). Even though Campaign B had a lower volume of visits it converted them at a higher rate than Campaign A (5% instead of 3%). You can't ignore the raw counts for orders (300 versus 50), but the rate is often useful in side-by-side comparisons.

The third type of metric is any kind of **mathematical** or **statistical calculation** that is not a simple ratio, which may involve multiple counts and other operations besides just division. An example of a metric that is a calculation is (Visits – Entries)/Visits. Calculations may sound intimidating; however, the vast majority of metrics you'll use in your web analytics tool will be just counts and ratios. Although calculations represent the deep-end of the web analytics pool, the shallow-end of simple counts and ratios will be more than sufficient for most business users to start deriving insights from web analytics.

"You can have data without information, but you cannot have information without data."

– Daniel Keys Moran

Must-Know Web Metrics

Web analytics relies on a set of commonly used web metrics with which everyone who consumes digital data should at least be familiar. Most of these metrics appear by default in many reports so you need to understand what they mean (and don't mean) so you can use and interpret them correctly. Just because these are must-know metrics, it doesn't mean they are essential to your business; they may not align with your unique business goals (although they could). As I cover each of these metrics (which are also summarized in the table below), I'll share common mistakes (gotchas) that could trip you up and then explain how all these metrics come together.

METRIC	TYPE	CALCULATION	PURPOSE
Page Views	Count	N/A	Indicates how much overall web content is being consumed by site visitors
Visits	Count	N/A	Reveals the popularity of your site
Unique Visitors	Count	N/A	Shows the audience reach of your site
Average Visit Duration	Ratio	See description	Indicates how much time visitors are typically spending on your site

Page Views per Visit	Ratio	Page Views / Visits	Shows how much page content each visitor is consuming during a single visit
Bounce Rate	Ratio	Single-Page Visits / Entries	Reveals how your landing pages are performing
Exit Rate	Ratio	Exits / Visits or Exits / Views Page	Highlights potential site issues that cause visitors to exit your site prematurely
Conversion Rate	Ratio	Success Event / Visitors or Success Event / Visits	Displays how effectively your website is getting visitors to do what you want them to do

Page Views

A page view (or pageview) represents an instance of a page being loaded and viewed in a web browser. From a business perspective, page views indicate how much overall web content is being consumed by site visitors. Each user will typically generate at least one page view when they visit a website unless the page tagging is set up incorrectly or the user is interacting with non-page-based content (file downloads, videos). Users can produce multiple page views for a single page if they navigate repeatedly to the same page during a visit. For many media sites, page views take on a special meaning because each page view represents an opportunity to display advertisements. You'll notice some news sites break up a single media article into multiple pages so they can increase the number of page views and subsequent ad impressions. Unless your site is dependent upon ad revenue, you typically won't want to design your site to increase page views.

The page view is the granddaddy of all web metrics. Page views have become less relevant, however, with the introduction of more interactive Web 2.0 content (Flash/AJAX apps, video players) that doesn't conform to the traditional web page paradigm. In addition, page views don't apply to tracking other onsite interactions, such as downloading files or clicking on external links. Although some people want to push this metric into retirement, it refuses to go away and is still widely used for understanding content consumption.

Gotchas

- Page views don't tell you how much of the page the user saw. You don't know if the visitor saw only the top half of the page or scrolled completely to the bottom. This metric also doesn't indicate how long individuals were on each page. A page view simply informs you that a web browser loaded the page—that's it.

- Unique page views (a related but slightly different metric) don't include repeat views of the same page by a single user during a visit. For example, if you visited the home page of a website three times during a particular visit, it would count as three page views but only one *unique* page view.

- In some cases, page views have mutated to mean *instances* of a particular action (clicks) rather than an actual page view. For example, to include these actions in standard content reports, Google Analytics uses Virtual Pageviews to track such non-page actions as clicking on an external link.

Visits

A visit encompasses all the interactions that a user has with a website during a single sitting or session. From a business perspective, visits reveal how popular your website is; the more visits, the more popular it is. During a single visit, an individual might browse several pages, view multiple videos, and perform various searches. In contrast, a visitor could simply abandon the site after seeing one page—both count as a visit. As an industry standard, most web analytics tools will terminate a visit after 30 minutes of inactivity. If a visitor stepped away from her computer to answer the phone and didn't return for an hour, her interaction with the website would count as two separate visits (one for before the phone call and another for when she returned).

Gotchas

- The visit metric doesn't convey the quality or length of the sessions. A high number of visits could hide the fact that most of those visits are ending on a single page view.

- Even though a visitor leaves the website or closes his browser, that doesn't mean the initial visit is over and another one will start when he returns to the site. If he returns to the same website within the 30-minute time window, his interactions will be counted as part of the original visit.

- Different vendors use additional criteria to define visits, which you need to be aware of if you're comparing visit counts across different systems. For example, Google Analytics ends visits at midnight or when you re-enter the site from a different campaign source. Adobe Analytics ends a visit after 12 hours of consistent activity or 2,500 image requests. This is one example of why it can be difficult to match numbers exactly from two different systems.

Unique Visitors

Unique visitors (or visitors) are the inferred users who visited a website during a specific reporting period. From a business perspective, unique visitors show the audience reach of your website. When an individual visits a website more than once during a reporting period (daily, weekly, or monthly), she will be counted as only one unique visitor. When a visitor first comes to a website, the web analytics tool uses a persistent cookie to assign her a unique, anonymous ID that will identify her if she returns to the site.

With unique visitors, we infer each unique visitor is a unique individual; however, in web analytics a single individual can be seen as multiple unique visitors or multiple people can be mistakenly viewed as a single unique visitor. In a one-to-many example, if you browse a website from a work computer, home computer, and tablet device, you'll be seen as three separate unique visitors. If you visit the same site using two different web browsers, each visit through the Firefox and Chrome browsers will be viewed as separate unique visitors. If you delete your tracking cookies between visits, you'll be seen as multiple unique visitors.

Figure 4: Each time someone visits at least once during a particular day, the individual counts as a daily unique visitor. At the weekly level, however, you should avoid adding up the daily unique visitors for the weekly total as only three different visitors visited the site during the entire week.

In a many-to-one scenario, different members of a single household may appear as one unique visitor because they visit a website from a shared computer and web browser. Although imperfect, the unique visitor metric gives you a reasonable estimation of how many distinct individuals are coming to your website. The only way to get a clearer measure of how many actual people visit your site would be to identify all individuals through authentication (visitors identify themselves when they log into your website), which wouldn't be feasible in many cases. Web analytics tools can also report how many new and returning visitors you have, which can be helpful in understanding how acquisition or retention efforts are performing.

Gotchas

- Most vendors use first-party cookies to avoid cookie rejection and deletion issues. If you're still using third-party cookies for tracking visitors, you may run into inflated visitor counts as cookies are rejected or deleted (see Cookies section on page 75).

- If your web analytics tool provides unique visitor totals for different timeframes (daily, weekly, or monthly unique visitors), these metrics are not additive. For example, you can't simply sum up the daily unique counts to arrive at the weekly unique total (same applies to adding up daily or weekly unique counts to get the monthly unique total). If you came to a website on three separate days—Monday, Wednesday, and Friday—during a particular week, you would appear in the report as three separate daily unique visitors but only as one weekly unique visitor (Figure 4). As a result, daily unique visitors only make sense in the context of a day, not a week or month.

Average Visit Duration (Average Time Spent)

Average visit duration (average time spent) is the average length of a visit or session on a particular site. From a business perspective, it indicates how much time visitors are typically spending on your site, which sounds useful but is problematic for a couple of key reasons.

First, average time spent includes only the time spent on the site for all of the pages except the visitors' exit pages. Web analytics vendors use the timestamp (a combination of date and time) of each new page request to calculate the average visit duration and time spent on each page. When you enter a landing page, for example, a timestamp indicates when you entered the page and then when you proceed to the next page; the web analytics tool subtracts the first timestamp from the second timestamp to determine how much time was spent on the previous page (the landing page). This approach is used throughout the visit to calculate the total visit duration but runs into a problem on the final exit page: There is no closing timestamp to understand how much time was spent on the last page. Single-page visits and exit pages, therefore, are excluded from the average visit duration calculations.

Second, how much time somebody spends on a website is difficult to interpret without more context. For example, if you found people were spending a long time on your site, the optimist within you might get excited because you could interpret this as a sign that your content is valuable and highly engaging. However, your

pessimist side may see the long average visit duration as visitors being unable to quickly find the right content and becoming increasingly frustrated as they scour the site for what they need. Without additional context from an onsite survey or time expectations for a particular site (we want people to stay a long time or get them in-and-out quickly), interpreting average visit duration can be difficult.

The *average time spent per page* can be a useful metric to pinpoint particular page-specific issues, but context is still important. Unless you specifically ask visitors through an onsite survey, you may never know why people are spending an inordinate amount of time on a particular page.

Gotchas

- Average visit duration doesn't include time for single-page visits (bounces) or exit pages. It can be used as a directional metric as long as you understand its limitations.

- Without additional context, you can't assume to know whether the amount of time being spent is positive or negative.

- Don't rely on just averages; look at your distribution of visit lengths to see how the average visit duration might be getting skewed by a large group of visits that is either spending a lot or a little time on your site.

Page Views per Visit

Page views per visit represents the average number of pages viewed during a visit or session. From a business perspective, it can show how engaged visitors are with your site content or at least how much page content each visitor is consuming during a single visit.

Your business goals will shape how you use and interpret this particular metric. Companies focused on lead generation will want to streamline the online application process, so reducing the average page views per visit might be important if it increases the number of leads. Media sites that are dependent on ad revenues will want to maximize the page views per visit without jeopardizing the return frequency of their visitors.

Considering page views per visit in combination with the average visit duration, you can get a sense for the typical activity levels of your visitors during a single session and compare that to what's expected by your organization. For example, if your company provides extensive editorial content online but most of the visits

are short in nature, it could point to a problem that needs to be addressed (wrong content, poor linking, bad naming convention, weak navigation).

Gotchas

- A website can be designed to artificially increase page views so this metric doesn't necessarily show visitor engagement as much as it reflects your overall design approach. For example, you can break apart content across multiple pages, which will increase page views but doesn't necessarily mean your visitors are more engaged (they might even be more annoyed than engaged).

- Without additional context and understanding of your visitors' goals, you can't assume to know whether the high page views per visit is positive or negative. Visitors could be visiting multiple pages but failing to find what they were actually looking for. In this scenario, a high page views per visit result represents frustration (negative), not engagement (positive).

- Because this metric is an average, it can hide how content is really being consumed across all visits. You should look at the distribution of pages viewed during each session to understand how your page consumption levels might be skewed. Are more of your visitors seeing only one or two pages per session, for example, or are more visitors viewing four or five pages per visit?

Bounce Rate

Bounce rate is the percentage of entering visits (entries or entrances) that are single-page visits or entering visits that leave (bounce from) the site after viewing only one page. From a business perspective, the bounce rate reveals the effectiveness of your entry pages. In other words, what kind of first impression are these pages having? Are your landing pages encouraging visitors to go deeper into your site? If a particular page has a high bounce rate of 80%, that means four out of five visitors entering the page are bouncing and not viewing any additional pages. Typically, a high bounce rate means something is wrong with the landing page, which could be due to a number of factors:

- Messaging and content that doesn't match visitors' expectations
- Poor page design or layout
- Slow loading times

- Web browser compatibility issue (perhaps it doesn't display properly in the Safari browser)

- Insufficient links to other related content

- Confusing site navigation or no search options

- Weak or hidden call-to-actions (for example, call-to-actions are placed "below the fold" of the web page where the visitor needs to scroll down to see them)

A high bounce rate can also be no fault of the actual landing page, but in fact due to a problem created by the upstream traffic source. For example, if an online campaign targeted the wrong keywords or messaged the wrong offer in its ad copy, the misalignment between the advertising and landing page would lead to a high bounce rate.

In other cases, a high bounce rate may be fully expected and represent a successful visit. For example, you would anticipate a high bounce rate on a store location page because visitors search for address information and leave when they find it. The same applies to blog posts where visitors are looking for only information that answers a specific question and nothing more. If a landing page was designed to direct visitors to external partner websites, you'd expect the page to have a high bounce rate. Although you can also calculate a site-wide bounce rate (change the denominator to visits instead of using page-specific entries or entrances), it's more commonly applied to individual landing pages where it's more actionable.

Gotchas

- Be careful with industry benchmarks for landing page bounce rates. Benchmarks can be helpful for getting oriented but they can also set unrealistic expectations (when you're far below) or lead to complacency (if you're well above). Many subtle but important factors shape differences between landing page bounce rates (product type, target audience, and so on), and it's typically best to use internal benchmarks to guide performance enhancements.

- Just because a landing page has a low bounce rate doesn't always mean it is effective. The bounce rate evaluates only whether or not the visitor is viewing at least one additional page (or interaction in some cases). There's no qualification of whether that next page is valuable or not. If a landing page is directing visitors to the wrong pages and not guiding visitors closer to conversion, then its healthy bounce rate could mask a serious problem.

- While a landing page might perform well in aggregate, it could exhibit high bounce rates for particular segments of users. For key landing pages, consider segmenting the incoming traffic to see if there are any issues for specific segments of visitors (traffic sources, geographies, browser types, new/returning visitors).

- Be aware of how different web analytics vendors may modify the standard bounce rate calculation. For example, Adobe Analytics calculates its bounce rate by dividing bounces by entries. The bounce metric is defined as a single-page visit *with no additional interactions* such as a video view or button click (form submission). Therefore, if a visitor came only to the landing page *but* interacted with it (played a video), the one-page visit wouldn't count against the bounce rate. In Google Analytics, its event tracking feature can influence or distort the bounce rate calculation. This happens when interaction events (virtual pageviews) are mixed in with page tracking. Google introduced non-interaction event tracking so that companies can select which interactions do and don't affect the bounce rate metric.

Exit Rate

Exit rate is the percentage of visits that terminate or exit on a particular page. From a business perspective, the exit rate highlights potential site issues that cause visitors to leave your site prematurely. Every visit or session ends at some point, but *when* or *where* visitors exit can be important. In the case of a multi-step process, such as making an online purchase, you don't want the majority of your visitors exiting at the second step (billing information page) in a six-step process. The exit rate is different from the bounce rate because it focuses on all visits, not just entry traffic to web pages. For example, the exit rate will include single-page visits (bounces) to a particular page as well as visitors who navigate to the page and then abandon the site.

Context is equally important when evaluating exit rates for key pages. If a web page is a logical exit point, then you would expect it to have a high exit rate. For example, an order confirmation or thank you page that is shown after a successful online purchase would have a high exit rate. When a page is an initial or transitional step in a multi-step process or multi-page content series, you expect to see some attrition from step-to-step, but an unexpectedly high exit rate may indicate a problem. For instance, a recent web design update mistakenly removes a form field option that impedes a visitor's ability to proceed forward. You might have

other key pages on your site that you'd prefer not to have a high exit rate, such as your search results page or homepage.

In some cases, it will be easy to spot the problem that is causing the high exit rate (broken links, missing content), and in other cases you may need to use onsite surveys to determine what is causing visitors to exit prematurely. Although web analytics can answer many behavioral questions (who, what, when, where, how), it can never answer attitudinal questions, such as why someone is choosing to abandon a website.

Gotchas

- Some vendors and analysts calculate the exit rate by dividing exits by page views (instead of visits) to a particular page. As a result, repeat page views during the same session can lower the exit rate (creating a higher denominator) and hide the fact that the visit still ended on the page in question. They assume that the repeat page views indicate the page is doing something positive because the visitors keep coming back to the page. However, using page views instead of visits hides the fact that the page may be central to a user experience issue; whereas using visits holds each page more accountable.

- If a page receives a significant amount of entry traffic that bounces, you may want to filter out the single-page visits to get a clearer picture of what's happening for visitors who are instead navigating to the page. Each of these audiences may have different goals, and the page may not serve the needs of both types of visitors.

Conversion Rate

Conversion rate is the percentage of visitors (or visits) that reached a particular outcome or performed a target action. From a business perspective, the conversion rate displays how effectively your website is getting visitors to do what you want them to do. Each organization's online business goals will define what it wants visitors to do and what represents a conversion (a desired action, behavior, or outcome). For retailers, a conversion is a purchase or order. For other companies, it could be an application submission, a subscription, a newsletter sign-up, a scheduled appointment, or an app download.

There has been a lot of debate over whether to use visitors or visits in the denominator of the conversion rate calculation. Proponents of the visitor metric argue:

- Companies market to individuals, therefore, visitors should be the basis for measuring the performance of websites and campaigns. Limiting conversion rates to specific user interactions, such as visits, is too short a window to judge true success.

- People move through different stages in the conversion process, and many high-cost/complex products or services require significantly more consideration (think digital camera versus toothpaste). Many visitors may only be researching options and aren't ready to convert in a single session.

On the other hand, advocates for using the visit metric as the denominator make the following counterpoints:

- Every visit represents an opportunity to persuade or convert a visitor regardless of his intent.

- Unique visitors change depending on the timeframe you're evaluating (daily, weekly, monthly, or absolute). Visit counts are additive across whatever timeframe you're evaluating and introduce no variation.

- Due to the one-to-many and many-to-one issues (see "Unique Visitors" on page 30), unique visitors don't represent actual individuals as the label implies and, therefore, are less reliable than the visit metric, which is well-defined, better understood, and more actionable.

Your decision to use visits or visitors may be decided by your web analytics tool's default settings or your company's desire to have a higher conversion rate (visit-based conversion rates will always be lower than visitor-based conversion rates). If you have the flexibility to choose visitors or visits, however, the key is to decide what's right for your particular business and then be consistent. An organization can even monitor both rates, but this comes with a tradeoff of added complexity and potential misinterpretation.

Gotchas

- You can't look at just the conversion rate in isolation; you always need to evaluate it in the context of volume. For example, your conversion rate could decrease by 10% but if the volume of visitors or visits is 100 times higher, you'll be generating significantly more overall conversions, which is more important than maintaining a higher conversion rate.

- Make sure you analyze the conversion rate over time. Conversion rates can be influenced by a variety of factors, including special offers (free shipping), seasonality, and days of week. Comparing two arbitrary time periods without proper context can lead to bad business decisions.

- Two of the most important considerations with conversion rates are transparency and consistency. At the numerator level, a conversion can represent different actions or outcomes so be clear about what's being measured and how it's being measured. If a company's two sites measure similarly named but different conversions or measure the same conversion inconsistently, it can ruin benchmarking opportunities or cause management to misinterpret the results. On the denominator level, it's equally important to be consistent about how your conversion rate is being calculated (visitors or visits).

- In most cases, visitors are coming to your site for different purposes, and it is unreasonable to expect a particular conversion rate to ever convert 100% of all visitors or visits. For example, if a number of customers are looking for technical support, they won't be interested in purchasing additional products because that doesn't necessarily match the intent of their visits. In another scenario, visitors who have already registered for newsletters aren't likely to sign up again. Subtracting different segments from your visitor or visit count may be a solution, but it also makes the conversion rate more complex and difficult to share. You may need to look at the performance of your site more holistically and consider different conversion rates based on the various visitor intents. Let your business goals steer you to conversion rates that matter.

How Web Metrics Work Together

All of these metrics share different insights into how your website and digital campaigns are performing. Although only a subset of those you'll find in web analytics tools, they provide a good baseline for beginning your journey in digital measurement.

To show how these web metrics come together to shed light on website interactions, consider an online experience as making a trip to the supermarket (Figure 5). Walking into the store entrance represents the first page view of your visit. The store greeter recognizes you from your earlier trip in the morning and clicks his stopwatch to begin tracking your current visit duration as you proceed into the store (more than 30 minutes elapsed between your two trips). Even though this is your second trip to the supermarket today, you still represent only one unique daily visitor. You don't raise the store's bounce rate on this particular trip because you remembered your backpack this time. In the morning you realized at the

store entrance you had forgotten your backpack (with your debit card) and had to race home to retrieve it before going to work.

Now you're looking for something quick, easy, and cheap for dinner. Each time you examine a product from a store shelf, a page view occurs. After looking at five frozen meals (six page views so far, including the store entrance), you decide on a particularly delicious frozen pizza. When you go to pay for the item at the checkout, you discover cash register 3 isn't accepting bank cards (broken card reader). Looking at the long lines at the other checkouts, you leave without purchasing the frozen meal, increasing the exit rate for register 3 and reducing the store's overall conversion rate. When you walk out of the building to go to the pizza place across the street, your visit ends.
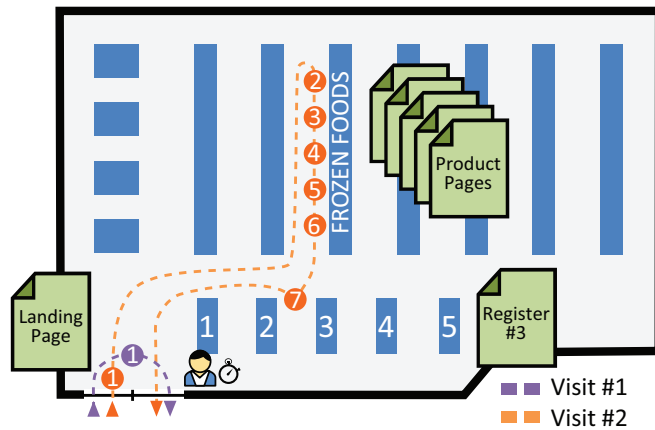
Figure 5: A visitor makes two trips (visits) to a supermarket (website), showing how web analytics measures online activity and the core metrics provide different perspectives into online behaviors.

In summary, you registered seven page views (including your wait at register 3), made no purchase (no conversion), and the store greeter timed your visit duration at 18 minutes. As the supermarket was getting busier, the store greeter was afraid he'd overlook when you actually left the building so he stopped his stopwatch when he saw you go to register 3, not factoring in the three minutes you spent in the line at the register (web analytics tools can't capture time spent on the last page of a visit).

This simplified shopping analogy illustrates how web analytics measures online activity and how all of these metrics cover different aspects of the online experience. When you combine them, the different data points provide complementary insights that can help you understand what's happening with your website and campaigns. If you look closely at these must-know metrics, they focus on three main areas:

- **Traffic volumes.** Page views, visits, and unique visitors
- **Visitor behaviors.** Page views per visit and average visit duration
- **Page-level interactions.** Bounce rate and exit rate

The remaining metric, conversion rate, stands out from the others for three reasons. First, it's the only must-know metric that is directly tied to measuring business outcomes. Second, the metric isn't uniform because the numerator of the conversion rate can be any form of success (order, subscription, application, lead), which will vary across organizations by their business goals. Third, you could have multiple conversion rates that measure different aspects of your business. Understanding the business logic behind event tracking and conversions will be critical to driving real value from web analytics.

Measuring Events and Outcomes

As campaigns, websites, and apps became more dynamic and interactive, there grew a need to measure a new type of metric beyond simple page views: the **event**. An event represents an interaction of interest that occurs during a visitor's journey through a digital property. With event tracking in web analytics, you can measure how users interact with different content elements, such as clicking or touching buttons, tabs, links, or other on-page elements. Events are tracked independently from the traditional web page or screen load. For example, you could use events to track interactions with a video player, product configurator, or online game. If you're not careful, you can track a lot of superficial interactions, as well, and the resulting minutiae won't necessarily help you improve the performance of your digital initiatives. You need to stay grounded in what's important to your business. One way to avoid problems with tracking too much is to focus on outcomes or conversions that are central to your business goals.

Digital marketing initiatives are primarily focused on influencing specific actions. When you think about the purpose of your campaigns, websites, or apps, their success will be defined by whether they encourage people to complete certain desired actions or not. For example, the key outcome of an e-commerce site is an order or purchase, which is directly related to generating sales and revenue. Even if your company doesn't sell anything online, a conversion or outcome can still be important to evaluating the success of your digital initiatives. For non-transactional sites, a desired outcome might be subscribing to an e-mail newsletter or completing an online application. Although these actions may not be directly tied to revenue or cost savings, they can represent a successful online outcome

> "You've got to think about big things while you're doing small things, so that all the small things go in the right direction."
>
> – Alvin Toffler

that ties into important business goals. Many conversions will be measured using a traditional page tracking approach (viewing a page corresponds to a key milestone or successful action), but they can also be user actions that are tracked as events (clicking or touching a specific button or link).

You can measure all kinds of outcomes online, but not all conversions are equal (Figure 6). A **macro conversion** is the main outcome that you want visitors to accomplish on your site. In other words, if your visitors could complete only one outcome, what would you like them to accomplish during their visit? These key outcomes are some of the most important metrics (counts) that you measure. If your website serves one primary purpose or goal, you will most likely have only one or two macro conversions. In large corporations, however, a single domain commonly serves multiple purposes (branding, sales, and support, for example), so different teams may have their own macro conversions. Clear, agreed-upon business goals help to ensure the business will prioritize the right outcomes, especially when focusing on a key outcome usually comes at the expense of other competing, less important outcomes.

Frequently, a visitor has to pass through several steps or stages before she can complete an important outcome. A **micro conversion** measures the actions or milestones that precede a macro conversion. The micro conversions act as leading indicators for potential macro conversions and help you pinpoint where attrition is happening in the conversion process.

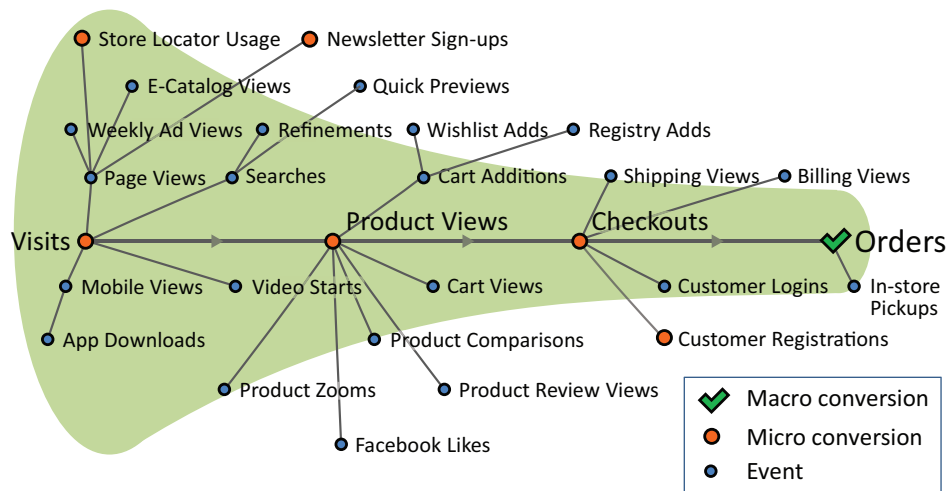Figure 6: An e-commerce site can track all kinds of interactions with event-related metrics. In this example, the macro conversion is an order or purchase. Micro conversions represent milestones in the conversion funnel process (such as visits, product views, and checkouts). Other micro conversions may be related to secondary goals (helping customers to find store locations and capturing customer data via online forms).

Sometimes the micro conversions represent actions that need to be completed in a sequential process. For example, a visitor can't buy anything if she doesn't add a product to her shopping cart. In other cases, a micro conversion might signify that the visitor has taken a step closer to a final conversion. Most customers move through a series of phases in their buying cycles:

- Awareness/Acquisition
- Research/Consideration
- Intent/Lead
- Purchase

Companies can map different user interactions to each stage in this conversion funnel process to understand how visitors are progressing toward the final key outcome.

To better understand how micro conversions contribute to a key business outcome consider the steps a potential student goes through when deciding which university to attend (Figure 7). Before he even considers what he wants to study, he sees advertisements for various programs from multiple schools (awareness). Once he's determined what he wants to study, he evaluates what each program has to offer (research/consideration). This might involve watching embedded videos about the program, viewing testimonials from recent graduates, downloading a PDF brochure, and interacting with a virtual campus tour. After reviewing the different programs, he submits admission applications to his top three schools (intent/lead). After receiving an acceptance letter from all three colleges, he makes his final choice and submits his registration (purchase).

In this example, the final registration is the macro conversion in this online process. All of the interactions in the research/consideration phase would be potential micro conversions.

NOTE: Some people treat micro conversions as simply other conversions that are not macro conversions. You need to hold them to a higher standard. Micro conversions need to be linked in some way to macro conversions (online or offline). If it looks and smells like a micro conversion but can't be associated with any macro conversions and key business goals, then it's just an event and a lower priority for your measurement efforts.

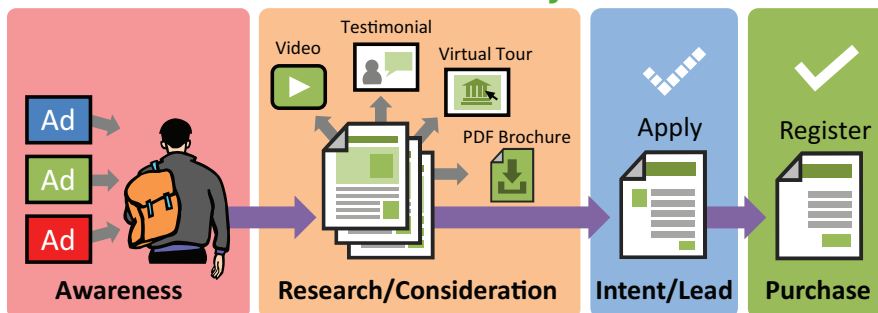## Conversion Process for University Enrollment

Figure 7: A potential student moves through several conversion stages, while an educational institution uses metrics to capture those milestones in the overall conversion process.

NOTE: For many organizations, their digital initiatives support the actions leading up to an offline macro conversion. For example, a B2B firm may use its website to generate leads of which a portion will translate into qualified sales opportunities and closed deals. Therefore, what is treated as a macro conversion online may just be a micro conversion in the overall picture of customer conversion.

"Efficiency is doing things right; effectiveness is doing the right things."

– Peter Drucker

The university's marketing team might define some of these activities as essential steps in a prospective student's decision-making journey, and others might be viewed as optional. The application submission would be a mandatory micro conversion that precedes a prospective student's decision to register. In this scenario, the university could evaluate areas where attrition is occurring in its conversion process and identify which actions are most influential in getting students to register. For example, the marketing team might find people who watch the videos are three times as likely to register, and therefore, they decide to feature the videos more prominently on key pages to drive conversions. The combination of micro and macro conversions will give you powerful insights into how your digital business is performing and help you to pinpoint areas where you can streamline or enhance your visitors' journeys to conversion.

Five Key Attributes of Effective Metrics

In web analytics, there's an unlimited supply of metrics that you can measure beyond just the must-know metrics. Focusing on misguided or ineffective digital metrics can actually hurt your business—both in terms of unresolved problems and missed opportunities. You're not looking to use metrics just for the sake of having data. You want the right metrics that will help you to steer business performance in the right direction. When you decide on which metrics to use, consider the following five criteria:

- **Simple**. Avoid overly complex metrics that are hard to capture, understand, interpret, or act on. Whatever advantages you think you're gaining from the added complexity will be lost once the metrics are shared (or is that smeared?) across your organization. If you choose metrics that are simple to understand, they're more likely to be used and not misinterpreted by different users.

- **Relevant**. Don't be distracted by interesting but irrelevant metrics. Your key metrics should be pertinent to your business goals and the *current* needs of your organization. Don't just copy your metrics from competitors. Start by clarifying your unique business objectives and then identify appropriate metrics. Just like your wardrobe, your metrics may need to be updated periodically to stay fresh and aligned with your present business strategy.

- **Timely**. If metrics are unavailable or delayed when you need them to make timely business decisions, they are useless. Fortunately, in web analytics most of the data is either real-time or near real-time. Because digital marketing

moves quickly, there's little tolerance for metrics that are always too late to the party.

- **Credible**. Ensure your organization can trust the metrics. Although you don't want the metrics to be too far from the true values (accuracy), the repeatability of the measurement (precision) might be a more important focus. The metrics need to be as complete and consistent as possible so that leaders will have confidence in the numbers. Get it right from the outset and then maintain the metric's credibility over time. If the implementation or data collection approach is ever viewed as suspect, the metrics will either never be fully embraced or they will be abandoned. No metric will be 100% clean, but definitely avoid metrics that are inherently unreliable or problematic.

- **Actionable**. If you don't know how to react when a metric significantly increases or decreases, you're probably looking at a vanity or nice-to-know metric. Actionable metrics are easier to interpret and convert into tactical responses because they directly relate to levers in your business that you control or influence. In addition, most metrics become more useful or actionable when they're applied to specific areas rather than observed at only the aggregate level.

These five criteria will steer you towards more effective metrics for measuring the performance of your digital marketing initiatives. You'll find that many of your web metrics will not meet all these standards. It's not critical that all of your metrics meet these criteria, but your essential metrics should. Being able to distinguish between metrics that are critical and superfluous separates those who get value from web analytics and those who don't.

FIVE QUESTIONS FOR EVERY KEY METRIC

When considering a metric, ask yourself:

1. Would someone outside of my immediate team easily and correctly grasp what this metric measures?

2. Which specific business goal does this metric help me measure?

3. Is there anything that could delay getting results for this metric to those who need the data?

4. Does this metric have any dependencies that could hurt its reliability?

5. If the results for this metric quadrupled overnight, what immediate actions would I take?

The Metrics Hierarchy

Between the default metrics in your web analytics tool and whatever custom tracking you've added, you'll probably have more metrics than you know what to do with. Not all metrics are equally important, however. Within the metric hierarchy, your metrics will fall into three main categories: key performance indicators (KPIs), secondary metrics, and peripheral metrics (Figure 8). While the sections that follow provide an in-depth look, the table below summarizes each category.
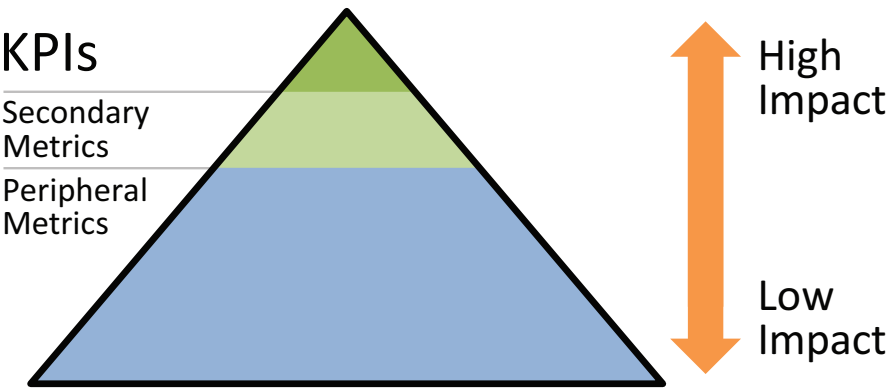
Figure 8: Metrics fall into three main categories: key performance indicators (KPIs), secondary metrics, and peripheral metrics. KPIs will be the most impactful for measuring overall business performance.

METRIC	PURPOSE	USAGE
Key performance indicators (KPIs)	Measure performance towards achieving key business goals or objectives	Always featured in executive dashboards and a primary focus in analysis presentations
Secondary metrics	Provide granular information into the essential processes, factors, or actions that influence or affect KPI performance	Rarely featured in executive dashboards but frequently used when diagnosing shifts in KPIs
Peripheral metrics	Offer additional contextual information in certain circumstances and aren't tied directly to key business objectives	Never featured in executive dashboards and used on an ad-hoc basis when relevant to a particular business question

Key Performance Indicators (KPIs)

At the top of the metrics pyramid sit Key Performance Indicators or KPIs. This acronym is often misused as a synonym for metric. Even though all KPIs are metrics, *not all metrics are KPIs*. KPIs are a special subset of high-level metrics that are used to measure performance against key organizational goals or objectives. Just like a doctor measures your blood pressure, heart rate, and cholesterol levels to evaluate your personal health, KPIs determine the health of your digital business usually from a financial or operational perspective. Many of them will measure key outcomes or macro conversions for your organization. They can be either a count (total revenue) or ratio (conversion rate). You'll want to reserve the term "KPI" for your most important metrics so it doesn't become diluted through misuse or overuse. If your business goals are unclear or fuzzy, knowing if you have the right KPIs will be difficult. That's why it's essential to clarify the business objectives before selecting any KPIs. Having the right KPIs doesn't guarantee the success of a misguided business strategy, but they will keep you informed of how much progress you're making towards your desired business goals and may influence timely adjustments to the strategy.

Within large corporations, business objectives at the enterprise level usually cascade down into lower-level goals at the department or functional group levels and so on. You will end up with key metrics that are specific to different levels: corporate, department, team, and role. Although the exact metrics may be slightly different due to the unique focus or responsibilities of each specific level, they should be aligned to your company's overall digital goals. For example, the role-specific goals and metrics for a search marketer should be aligned with those of the overall marketing team. Not all corporate-level KPIs are applicable to your digital operations, but they will influence and shape the digital KPIs. For instance, a multichannel retailer's *company-wide* revenue goals will filter down to specific *online* revenue goals.

In most situations, an organization should keep its list of KPIs lean and mean (single digits if you can manage it). In other words, you don't need or want 32 KPIs for your digital business. Even though a comprehensive collection of digital KPIs might be impressive to some, it will actually make your company more data-intensive but less data-driven. Peter Drucker once said if something is not simple, it won't work. The same philosophy applies to KPIs. Therefore, consider simplifying or consolidating your list of KPIs so you can focus on what truly matters to your company's success; reduce unneeded complexity or noise that can lead to analysis paralysis. If you ever refer to a subset of your KPIs as the

"top" or "strategic" KPIs, you have too many metrics in your KPI corral. Your top or strategic KPIs are really just your true KPIs. To begin herding your KPIs:

- **Match KPIs to current business objectives**. Businesses are dynamic, and business goals change over time. KPIs should also be updated to match the present goals. In terms of your current business objectives, evaluate if any KPIs are redundant or no longer relevant (every KPI should have a dance partner).

- **Vet the value of your KPIs**. Evaluate how much value each KPI is contributing to managing the performance of your digital initiatives. You can evaluate them on how simple, timely, credible, or actionable they are. If a KPI is not being used, determine if it needs to be enhanced, replaced, or removed.

- **Ensure KPIs are at the right level**. Your KPIs should be sufficiently high-level and tied into the overall business goals of the digital marketing organization. Sometimes esoteric, lower-level metrics are mistakenly included as KPIs (such as metrics from a particular marketing channel or digital initiative), but they can introduce noise or misalign focus.

Once you have a concise list of KPIs, business priorities can cause certain KPIs to outweigh other KPIs in importance. One business objective can be a key imperative for your organization, overshadowing other organizational goals. Just because a metric is a KPI doesn't mean it is on equal footing with other KPIs. As a result, improving performance on one high-level metric might mean sacrificing success across other key metrics. To avoid problems, it may be helpful to discuss the prioritization of the KPIs with key stakeholders and share the priorities across the organization. Regardless of whether you need to manage tradeoffs between achieving different business objectives, KPIs will be essential tools in aligning your digital marketing efforts around common goals and managing performance towards them.

Secondary Metrics

All of the metrics you remove to streamline your list of KPIs are potential secondary metrics. Just because a metric isn't a key performance indicator doesn't mean it isn't essential or valuable to your measurement efforts. In fact, your KPIs will be naked without adequate supplemental metrics that help paint a comprehensive picture of what's happening with your digital initiatives. Additional metrics are often needed to better understand or explain what's contributing to changes measured by your KPIs. **Secondary** or **supporting metrics** are the next layer of

metrics that provide more detailed information or granularity into key processes, factors, or actions that influence or affect digital performance (Figure 9).

Although these supplemental metrics may not appear in executive dashboards, they're critical instruments in diagnosing and responding to problems or opportunities. For example, tracking micro conversions occurring within the shopping process (product views, cart additions, checkouts) may be useful for optimizing KPIs such as revenue, orders, and conversion rate. If a recent website update inadvertently impeded the ability to add items to the shopping cart, a decrease in cart additions would help explain the drop in the high-level e-commerce KPIs. By their nature, secondary metrics are more narrowly focused than key performance indicators, making them very important to specialists but less important to generalists, such as executives.
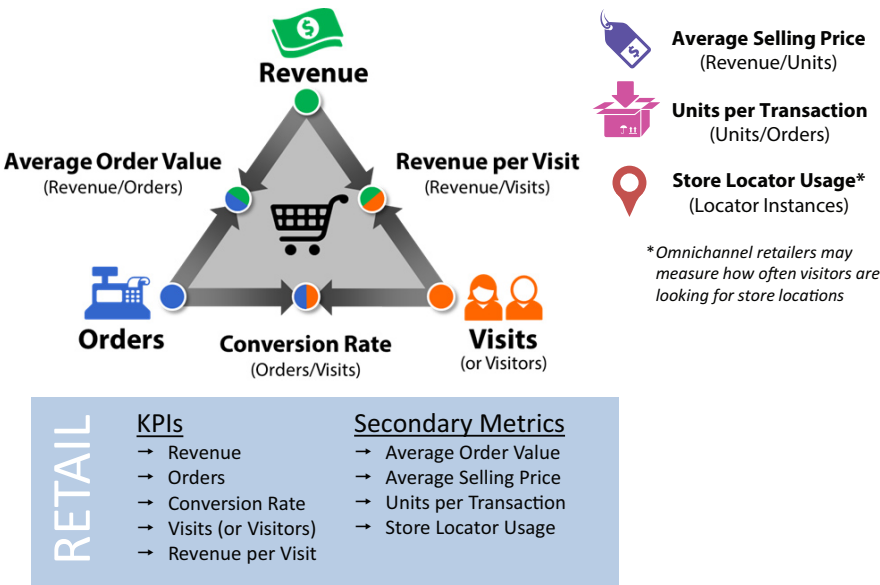
Figure 9: Each organization will have different primary and secondary metrics depending on its business model and unique business goals. The overall ecosystem of KPIs and secondary metrics complement each other and help to answer different business questions. The retail example above shows how various metrics might fall into these two categories.

Without sufficient secondary metrics to accompany and complement your KPIs, you'll be unable to adequately understand and respond to anomalies in your KPI reports. Just as much thought needs to be put into your secondary metrics as your key performance indicators. Custom tracking is often required to measure these supplemental metrics. Rather than counting what can be counted, your secondary metrics will focus on measuring what really counts or matters, which may not be readily available out-of-the-box from your web analytics tool. For

example, you may want to get deeper insights into how people are interacting with your content rather than just how many page views they're seeing. You may choose to track how often visitors are commenting on articles or sharing the articles on social media.

As you think about what secondary metrics you'll need, focus on what dependencies your KPIs may exhibit and anticipate the types of follow-on business questions your KPIs may generate. If you miss or choose the wrong secondary metrics, it can hurt your optimization efforts as much as mistakes with your key performance indicators. You can cast a wider net when selecting your secondary metrics, but don't allow them to draw attention away from your primary metrics—your *key* performance indicators.

Peripheral Metrics

The remaining metrics that aren't KPIs or secondary metrics fall into the final category in the metric hierarchy: peripheral metrics. These situational metrics offer additional contextual information that can help answer ad-hoc business questions but aren't directly tied to key business objectives. In other words, you wouldn't consider them to be as strategic or important as your secondary metrics. Whereas your primary and secondary metrics offer more high- and mid-level insights into the performance of your digital marketing initiatives, your peripheral metrics focus on low-level details that are relevant only in certain circumstances.

For example, you might measure how many times visitors view a product review, use advanced search functionality, or recommend an article to their Facebook friends. Bounce rate is another example of a peripheral metric that is limited in scope as it focuses on evaluating the stickiness of your landing pages. Additional context from these metrics can come in handy with helping to diagnose what's happening to a particular KPI or secondary metric. They will never appear in executive dashboards and will be of interest to specific teams or roles only. If peripheral metrics were ingredients in your kitchen, they would be the ones at the back of your cabinets that you use occasionally—the ones that you need to check their expiration dates before using.

Your peripheral metrics will always significantly outnumber your primary and secondary metrics. Each KPI and secondary metric can be associated with multiple counts, derivative ratios, and calculated metrics. In addition, over the years, web analytics vendors have added various metrics to keep pace with measuring all the new developments that have occurred in the fast-moving digital space. With new technologies, marketing channels, and types of content constantly emerging,

you're going to continue seeing new metrics as marketers strive to measure their investments in video, social, and mobile. As the number of metrics continues to expand, metrics are rarely retired from web analytics tools. It's up to you to astutely decide which metrics matter and which don't. Familiar web metrics, such as page views or visits, that might have been considered key performance indicators in the past are now relegated to being peripheral metrics at many organizations. In addition, shifting business priorities can knock primary and secondary metrics down a tier or two as they become less meaningful to your business.

Individually, none of your peripheral metrics will stand out as critical to your business (they should be bumped up a tier if they do), but collectively they can enrich your insights into how your digital initiatives are performing. With these low-level metrics, you need to balance the additional layers of information with the burden of the unwanted noise and complexity they can introduce. That's why it's critical to clearly identify and prioritize your primary and secondary metrics so that they remain the paramount focus and aren't cast adrift in a rising sea of peripheral metrics.

The Importance of Dimensions

While I have focused primarily on the importance of metrics to measuring digital performance, dimensions play a complementary and equally essential role. Basically, you can't have one without the other: Metrics are primarily used to count things, while dimensions add context to your metrics by enabling you to filter or group the results by different data attributes. Without a robust set of dimensions, you would be left with a shallow, non-actionable understanding of your digital business (Figure 10). If you were running an online store, you would be ecstatic if revenue suddenly went up 300% week-over-week. Without additional dimensions or breakdowns, however, you wouldn't be able to determine what led to this spike. For example, you couldn't investigate which products, campaigns, or content contributed to the increase in revenue. You would celebrate this momentary win but be unable to replicate or build upon it.

Just like you have key metrics, you also have key dimensions. Without the right dimensions you would be unable to drill into specific areas or aspects of your business to gain any useful insights. Going back to the kitchen analogy, if your ingredients are your metrics, then your dimensions are your cooking utensils. Quality ingredients mean nothing if you don't have the necessary cooking instruments to prepare your meals. Slicing and dicing your data would be impossible without adequate data attributes, groupings, and filters.

Fortunately, web analytics tools provide many dimensions out-of-the-box or with only minimal setup, such as time periods, referrers, browsers, geography, marketing channels, pages, internal search terms, and so on. In many cases, you may combine these dimensions to obtain more granular insights (country by referrer, for example). Additional custom dimensions can further

Dimensions + Metric

Country		
United States	$5,000
United Kingdom	$3,000
Japan	$2,000

Metric

Revenue
$10,000

Channel		
E-mail	$7,000
Paid Search	$2,000
Display	$1,000

Browser		
Safari	$6,000
Chrome	$4,000
Firefox	$0

Figure 10: By itself, $10,000 in revenue tells you very little. When you slice and dice the revenue by different dimensions (country, channel, browser), however, you gain deeper insights into what's happening. Breaking down one of these dimensions another level or two (perhaps drilling into countries by product categories) will shed even more insights.

enrich the insights provided by the default dimensions and cover areas that may not be captured in your web analytics tool automatically, such as video, onsite promotions, product categories, or social capabilities.

Planning and thought needs to go into the types of dimensions that are necessary for optimizing your business. Within each dimension, you want to ensure the data elements are consistent and share a similar level of granularity for making equitable comparisons. Although you can't anticipate every future business question, you can focus on having sufficient detail for areas that touch your key business goals. For example, for a media site, you might want to track article content in several ways, such as by site section (sports), sub section (baseball), page type, publish date, author, and so on.

Not being able to filter or group your digital data by the right dimensions can be as problematic as not having the right metrics. Unfortunately, if you discover you're missing a key dimension, often the only recourse is to update your web analytics implementation. Once the missing dimension is in place, you'll have it rolling forward only and not retroactively for data that has already been collected. Therefore, it is imperative that you consider both metrics and dimensions upfront as business requirements when you're determining how you'd like to assess the success of your digital initiatives.
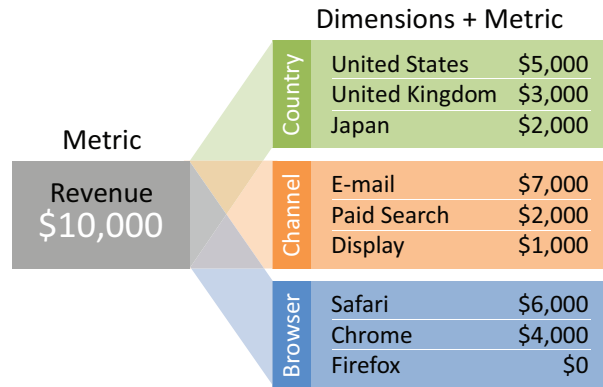
Data Tree Analogy

Another way to look at the metric hierarchy and how it ties to your business strategy is through a tree analogy (Figure 11). Before you identify any metrics or dimensions, you first seek to understand the business strategy, which can be found in the visible part of the tree. The trunk of the tree represents the primary goal or overarching mission of your organization. For the vast majority of companies, the ultimate goal is to increase revenues or profits (shareholder value). However, this overall direction is too general, and more specific strategic guidance is necessary to drive an organization forward.

The foliage or crown of the tree embodies all of the different tactics that are being worked on across your organization. The thick canopy of swaying, intertwined leaves and small branches can make it difficult to pinpoint what is strategically essential to your company. Rather than concentrating on the trunk or foliage, you must focus on the main branches of the tree, which represent the set of key business objectives that define how your organization achieves its overall mission.
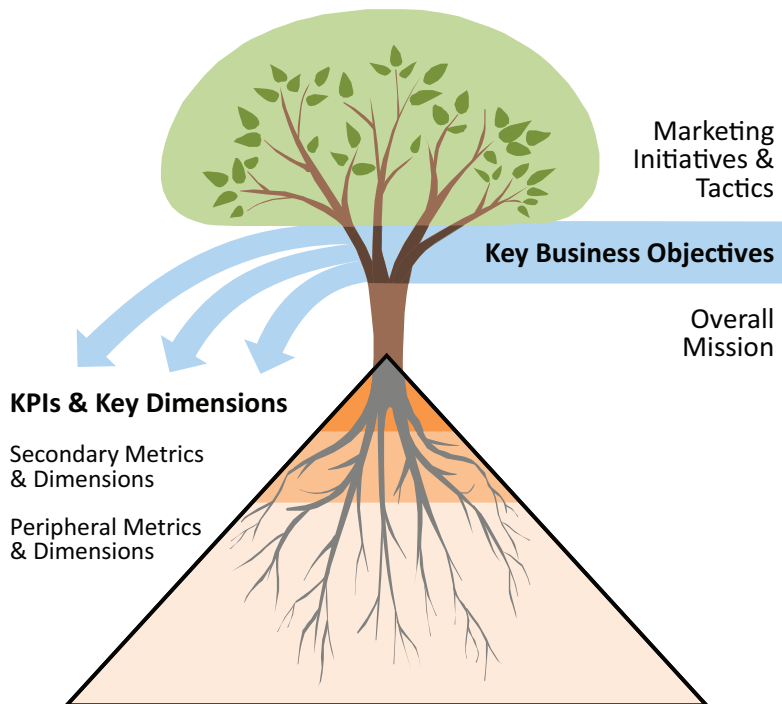

Figure 11: Your metrics and dimensions must be connected with your company's overall mission and key business objectives. A tree is only as strong as its roots, and organizations need the right set of metrics and dimensions to guide and inform their performance.

These main branches or key business goals connect all of your initiatives and tactics back to the main goal of your organization. They are neither too general nor too granular, which helps you to identify the key metrics and dimensions for your company.

Once you have a clear understanding of the key business objectives of your organization, you then focus on what's happening below the surface. The health and support of any tree is typically determined by its root system, which in this case represents the three layers of metrics and dimensions. The first roots of the tree are the KPIs and key dimensions, which are then connected to a deeper network of secondary and peripheral metrics and dimensions. While the KPIs and key dimensions provide needed nutrients and anchor the tree, the supplemental metrics and dimensions below also contribute to enriching and strengthening the overall tree. Any misalignment or break between the key business objectives and the KPIs means that the tree will not receive proper nourishment (business value or ROI) from its digital measurement efforts.

To show how these layers of metrics and dimensions work together, imagine those used by a basketball coach. The overall goal is to win basketball games (tree trunk). While it's a shared objective for all professional basketball teams and team wins would be a macro conversion, the coach can't just urge her players to simply win more games. The coach has to focus on *how to win* more games, and there are four specific focus areas (the main branches): shooting, turnovers, rebounding, and free throws.

To improve her team's shooting, the coach monitors a KPI such as *effective field goal percentage (eFG%)*, which is a calculated metric that factors in the point value of the shots being attempted (two-pointers versus three-pointers). To understand specifically which types of shots needed the most improvement, she looks at the field goal percentages (secondary metric) at different ranges from the basket (secondary dimension). If she needs more details around three-point shooting in particular, she could explore all kinds of peripheral metrics and dimensions:

- Number of three-point attempts that were open and contested
- Number of three-point shots attempted by quarter
- Three-point field goal percentage for road and home games
- Three-point field goal percentage when in the lead and when losing
- Average number of passes before made and missed three-point shots
- Average time left on the shot clock for made and missed attempts

The coach still has additional dimensions that can be applied to this data to add more color, such as the name of the player who shot, the shooter's position, the player's experience level, and so on. You can see how a rich combination of metrics and dimensions helps the coach to slice and dice exactly what's happening to determine exactly where improvements need to be made.

Similarly, a rich hierarchy of digital metrics and dimensions will enable you to monitor overall performance, evaluate how different areas are contributing to your success, and drill into additional areas as needed to pinpoint problems and seize opportunities. Your organization's digital metrics and dimensions will be influenced by its unique business goals and also by its industry or online business model. Although competing companies in the same industry won't always share the exact same underlying business goals and priorities, several similarities often create common digital KPIs and secondary metrics. These business model-specific digital metrics can be a valuable reference when determining which KPIs your business should focus on.

Five Common Digital Business Models

Today, the vast majority of companies have a website (often multiple), run online campaigns across various online channels (e-mail, display, paid search), and use a wide range of digital technologies and services. Despite many people being deeply involved in the day-to-day digital operations, I often wonder if anyone has paused long enough to ask why all these investments are being made. When determining what type of KPIs your organization should use for its digital initiatives, it can be helpful to begin with some basic questions:

- What's the main purpose of your website, app, or campaign?
- How does it contribute to the success of the overall organization?
- What business challenges are you trying to resolve?
- What do you want visitors or users to accomplish?
- What is the expected outcome?
- How do you define success?

These questions will help you to clarify what you're trying to achieve online, what's important to measure, and what's not essential (which can be equally critical). One of the fascinating things about the Internet is the wide variety of innovative business models that have emerged and will continue to appear. In some cases, if

> "Knowledge is knowing that a tomato is a fruit. Wisdom is knowing that a tomato doesn't belong in a fruit salad."
>
> – Miles Kington

you work for an industry-disruptive online start-up or an established company operating in a specialized market niche, you may need to develop a highly unique set of KPIs to measure your digital performance. However, for the vast majority of organizations their digital metrics can be aligned with at least one of five common online business models or scenarios.

1. E-commerce 🛒

Main objective: Grow online sales of products or services

Relevant industries: Retail, travel, high tech, consumer products, media (subscription-based)

Your business may sell products or services to customers through an online store or accept payments through a secure transaction process. Some companies sell merchandise exclusively online, such as Amazon, Overstock, and Backcountry. Other established "brick-and-mortar" retailers, such Walmart, IKEA, and Best Buy, use the digital channel to support both online and offline sales in their physical stores. Various consumer product companies, such as Sony, EA, and Nike, have launched their own direct-to-consumer online stores, competing indirectly and directly with their retail channel partners. For some organizations, online sales may not be central to their digital strategy (preferring to push traffic to partners) or corporate strategy (representing a small percentage of total sales).

Key Metrics

- **Revenue**. Represents the most important focus for retailers (see note).
- **Orders**. Shows how many transactions were processed.
- **Conversion Rate** (Orders/Visitors or Orders/Visits). Indicates how effective you are at converting traffic into orders.
- **Average Order Value** (Revenue/Orders). Shows on average how much customers are spending on each transaction.
- **Revenue per Visit** (Revenue/Visits). Gives you a sense for the average contribution of each visit to your revenue goals; can be useful for evaluating the quality of different traffic sources.
- **Average Selling Price** (Revenue/Units Sold). Reveals the average price point of items being sold on your site.
- **Units per Transaction** (Units Sold/Orders). Indicates how effective your site is at cross-selling products.

2. Lead Generation

Main objective: Increase number of qualified leads that result in future sales of products or services

Relevant industries: Business-to-business manufacturing and service providers, high tech, automotive, financial services, health care, education, non-profit

Your organization may not transact directly with individuals or other companies online, but you source potential leads through the digital channel by having visitors complete some kind of online form (single page or multi-step process). When your products or services are expensive (not typically paid for with a credit card) or complex in nature (multiple stakeholders, long-term commitment, technical considerations), you focus on identifying prospects online that can be converted offline. A key challenge in online lead generation is attracting quality leads in a cost-effective manner. Spending marketing dollars on low-quality leads that don't convert is a recipe for failure.

Key Metrics

- **Leads**. Represents potential prospects that are more likely to become customers than just general business inquiries. What makes a lead more qualified is subjective and unique to each business.

- **Inquiries**. Shows the number of raw business inquiries (qualified or unqualified).

- **Inquiry Conversion Rate (Inquiry Completions/Visits)**. Reveals what portion of visits end up submitting an inquiry, typically through some kind of online form.

- **Cost per Lead (Acquisition Cost/Leads)**. Indicates the marketing costs of acquiring each lead or inquiry.

- **Form Completion Rate (Inquiry Completions/Inquiry Starts)**. Shows how often an online form is completed after it's started. Can highlight inefficiencies related to online forms.

- **Micro Conversions (Downloads, Trials, Demo Views).** Reflect different key steps or milestones in the overall conversion process of becoming a qualified lead.

NOTE: Margin (profit) is a more important metric than revenue, but it requires data on the cost of goods sold to be uploaded into your web analytics tool. Although it is technically possible, very few retailers are currently uploading cost data into their digital analytics systems. In addition, many brick-and-mortar retailers are interested in how online research influences offline purchases (omni-channel behaviors). One key metric used as indicator of this type of activity is store locator usage, where a visitor uses the store locator feature to identify the proximity of a nearby retail store.

NOTE: Many lead-generation-focused companies use marketing automation tools that refer to leads as MQLs (Marketing-Qualified Leads), where their sales and marketing organizations have agreed on the criteria for what makes someone a more promising sales lead than just a general business inquiry. MQLs will fit a certain profile (job title, company size, industry) and will exhibit certain types of behavior and higher interest levels (signing up for a demo or visiting the pricing page).

NOTE: More companies are tying clickstream activity to offline conversions, such as closed sales, approved loan applications, and the like. Rather than just optimizing campaigns to drive online micro conversions, such as leads, these companies focus on maximizing offline macro conversions.

3. Advertising

Main objective: Increase content consumption and relevant audience share

Relevant industries: Media

Your firm may generate revenue from online advertisements that are shown across your various digital assets. In most cases, you will make ad revenue based on the number of ad impressions displayed, not necessarily clicked. Content providers that depend on ad revenues seek to grow their audience reach and increase ad impressions per visitor. Ad inventory has expanded from static banner ads in web pages and e-mails to interactive ads in videos and mobile content. In addition, content providers strive to form an ongoing relationship with their audiences, encouraging them to come back to their websites and apps on a frequent basis. Just like traditional media outlets, online publishers target desirable audiences that are sought after by their advertisers.

One of the main limitations is that ad revenue is not natively captured in web analytics tools and is contained within such ad serving platforms as DoubleClick or OpenX, which will require additional integration work. Digital ads may not be the primary revenue source for all companies and may just complement other online revenue streams (such as subscription revenue from pay walls).

Key Metrics

- **Unique Visitors**. Reveals the audience reach for your digital content.
- **Page Views, Video Starts, and Mobile Views**. Represents the overall level of digital content consumption. Ad impressions are often associated with each of these different content views in either a one-to-one or many-to-one basis (a page may display multiple ads) so it can serve as a proxy for ad inventory.
- **Page Views per Visit**. Provides insight into how much page content on average is being consumed during a visit.
- **Registration Rate (Registrations/Visits)**. Shows a conversion rate for how many visits are registering for e-mail newsletters, which can be a key driver for repeat traffic.
- **Video Consumption Rate (Video Starts/Visits).** Indicates what percentage of visits is consuming video content, which is a key media type that is growing in popularity at media companies.
- **Visits per Visitor (Visits/Visitors).** Shows the frequency in which visitors are consuming your digital content within a specific time period (such as visits per month per visitor).

4. Self-Service

Main objective: Reduce customer service costs and increase customer satisfaction

Relevant industries: Utilities, financial services, high tech, government, retail, travel, consumer products, automotive

Your organization may use its digital properties to provide self-service capabilities to its customers, enabling them to find relevant support information, answer burning questions, manage their own account, and so on. Online self-service reduces call center volumes by supporting customers through a more cost-effective digital channel. It can also increase customer satisfaction levels by enabling customers to more quickly find the information they need or manage different aspects of their accounts without long call wait times. In some cases, customer support may only be a secondary focus of the digital channel (for example, a technology company both sells and supports its products online).

One of the challenges in measuring the effectiveness of online customer support is you can monitor behaviors but you cannot measure attitudes or opinions. When someone exits a support article, you won't know if the content met his needs unless he informs you that it did. Web analytics must be integrated with data from online survey tools to merge behavioral and attitudinal perspectives to gain deeper insights.

Key Metrics

- **Self-Service Task Completions.** Represent key tasks or actions that were accomplished online by visitors (download a document, view a how-to video, use an onsite tool, change account information, register a product).

- **Self-Service Cost Savings [(Call Center Cost – Online Cost) x Task Completions].** Provides insights into how much is being saved by online self-service. This metric requires estimates for what it costs to process tasks through both the call center and website.

- **Support Requests per Visit.** Shows how often a visitor sought out contact information because they were unable to complete a task or answer a question. This "failure" event can be triggered when someone clicks on a Contact Us button or page in order to speak directly with a support representative.

- **Content Feedback Score [Positive Feedback / (Positive Feedback + Negative Feedback)].** Indicates how often online content successfully answers visitors' questions. This metric can only be captured if visitors are asked "Was this

content helpful?" at the bottom of each support article then click Yes or No buttons.

- **Search Effectiveness Rate (Task Completions / Searches)**. Reveals how often your internal search engine assists in helping visitors to complete key self-service tasks or actions. Onsite search is usually an essential component of most support websites or tools.

5. Informational

Main objective: Engage visitors and increase awareness for brands, products, or services

Relevant industries: Consumer products, government, non-profit

Your organization may focus on simply providing information to visitors online that builds your brand or introduces a new product or service. In these situations, you're not trying to sell anything directly to your visitors or turn them into leads that are forwarded to a sales team. You simply want visitors to engage or interact with your online content, which should then influence attitudes, behaviors, or decisions. For example, consumer packaged goods firms may focus on building awareness for new products and driving offline retail sales.

Marketers can measure various levels of engagement from simply seeing a particular web page to capturing visitor information from a newsletter registration. Some of these online interactions may be more valuable to your organization than others. For branding or information-centered digital initiatives, you must define upfront what online success is or else you'll end up focusing too much on vanity metrics that emphasize activity levels but not necessarily value creation.

Key Metrics

- **Unique Visitors.** Reveals the audience reach for your digital content.
- **Page Views, Video Starts, and Mobile Views**. Represents the overall level of digital content consumption. Alternatively, you may identify a subset of strategic content and focus on how much of this strategic content is being viewed.
- **Page Views per Visit**. Provides insight into how much content on average is being consumed during a visit.

- **Macro/Micro Conversions (Registrations, Coupon Downloads, Social Engagement, Forward to a Friend, RSS Subscriptions)**. Reflect different forms or levels of engagement, including likes, tweets, and comments, as well as more traditional downloads and registrations. The macro conversion will be the key outcome of your digital marketing efforts.
- **Registration Rate (Registrations/Visits)**. Shows a conversion rate for how many visits are registering (or connecting through Facebook) for e-mail newsletters, special offers, product availability updates, or online tool access, which can be useful in ongoing marketing efforts.

Tailor to Your Needs

For most organizations, your digital strategy should align with one of these five business models. Depending on your industry or company size, you might be a hybrid approach, leveraging more than one of these online business models. For example, financial services firms typically focus on acquiring new loan business (lead generation) and providing online account access (self-service). Your digital business will be unique as well. Although these sets of metrics may be helpful, they don't factor in elements that make your online approach unique or different. So rather than blindly adopting any industry-specific metrics, remember your KPIs must align with what's important to your particular business, not just arbitrary industry standards.

Putting Metrics to Work

You've successfully identified the KPIs and other metrics that are appropriate for your digital business (a big step), now you must use them effectively. Although you have the right instruments to measure performance, you can still stumble. If you fail to take full advantage of your metrics, you'll be underwhelmed by the lack of meaningful insights they deliver. If you misuse them, you might even feel betrayed if they inadvertently lead you astray. To get the most from your digital metrics, remember the following eight basic principles; they can help steer you in the right direction when working with metrics.

"From the errors of others, a wise man corrects his own."

– Publilius Syrus

1. To Be Meaningful, Metrics Need Comparisons

If you have nothing to measure performance against, you might as well be looking at random numbers. Yesterday, your website experienced 1,000 macro conversions. Does this cause you to celebrate or panic (maybe both)? You might have just set a new single-day record or witnessed a massive meltdown in your online conversions. Without a comparison, you will not have
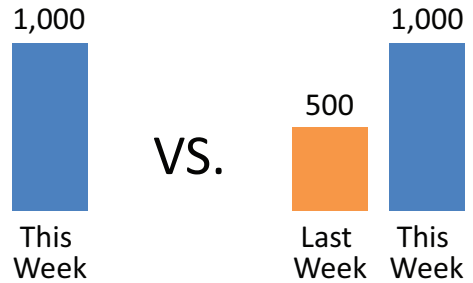

Figure 12: When compared against the previous week, a result has more meaning and context.

a standard to measure your performance against. Be sure to select fair, relevant comparisons to avoid misleading apples-to-oranges comparisons.

The element of time is a fundamental building block for comparisons and a great starting point for evaluating results. By comparing week-over-week or year-over-year performance, you can determine whether you're performing better or worse than the previous time period (Figure 12). You can perform all kinds of comparisons besides time periods, such as comparing campaigns, websites, web pages, content, and visitor segments. In addition, by establishing clear targets for your business goals, you have another yardstick (expectations) that lets you know how far you've come and how much is left to accomplish.

2. Rely More on Internal Benchmarks than Industry Indices

Human nature drives us to compare our performance against that of others, but managers don't want to learn their company is lagging on a key metric compared to industry peers. Comparing order conversion rates with other e-commerce sites might sound advantageous, but don't be fooled. Multiple factors contribute to a wide range of conversion rates: differing product categories, price points, customer demographics, stock availability/selection, discounting, and definitions of the measure. For example, comparing the conversion rates of a high-end fashion retailer with a low-end office supplies discounter makes no sense. Unless an industry index includes only a set of highly related companies (apples-to-apples), you may end up with a misleading yardstick (apples-to-oranges) that will lead to complacency or frustration.

Even if you could compare your metrics against those of your closest competitor and not generic industry indices, you would still run into differences in company-specific results due to the influence of strategy, leadership, staffing, technology investments, marketing spend, design expertise, and more. Without
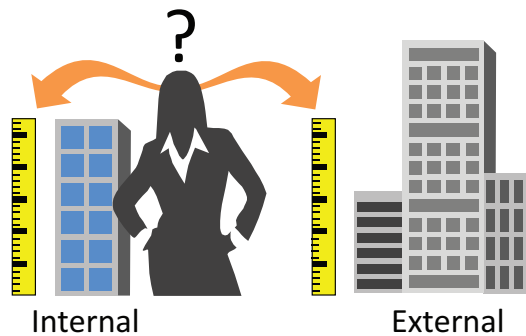

Figure 13: You're more likely to have apple-to-apple comparisons with internal benchmarks.

inside information it is difficult to isolate the influence or impact of these aspects. When you use internal benchmarks, you minimize extraneous variations because the internal factors or conditions should be relatively consistent (Figure 13). When they're not, you can easily diagnose what's changed or different. Don't be distracted by external benchmarks when internal ones can be far more productive.

3. Absolute Values Go Hand-in-Hand with Percent Change

As you monitor the fluctuations in your metrics, you're often less concerned about the actual unit difference and more concerned about the magnitude of each change. The percent change

	Week 3	Week 4	% Change
Leads	180	315	75% ⬆
Visits	12,005	11,080	8% ⬇

Figure 14: The percent change helps to convey the magnitude of the week-over-week difference.

between two comparison periods helps you appreciate its scale or relative size. For example, a week-over-week 75% increase in leads is more meaningful than knowing your weekly lead total grew from 180 to 315 leads (Figure 14). When looking at your metrics in terms of relative percentages, you're essentially building in context and adding perspective to your metrics. On the other hand, you still need the absolute values to keep your ratios and percentages grounded. Even though one of your marketing campaigns increased leads 900% week-over-week, a single lead increasing to ten leads isn't that impressive when you compare this small volume of leads to other campaigns that average 200 to 300 leads each week.

4. Trend Key Metrics Over Time

When you're evaluating your KPIs, it's important to evaluate how they trend and not just focus on a specific point in time (Figure 15). Plotting a key metric on a graph reveals the variations or movements in the metric over time. When you fixate on a particular data point, you can miss which
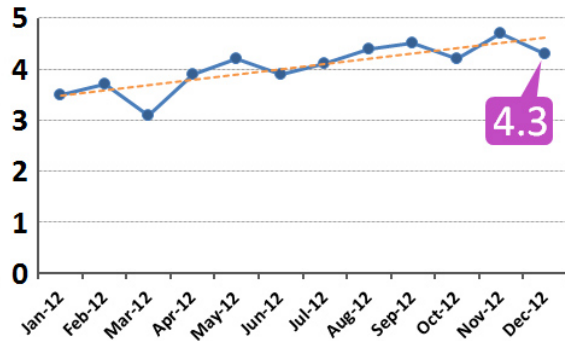

Figure 15: Trending gives you more context into what's happening with your KPIs. In this case, the number decreased in December but has been increasing steadily over the past 12 months.

direction the overall metric is heading (up, down, flat) and what cyclical patterns are occurring. Even though a metric may have dipped on a particular day, you may find it has been increasing steadily over the past 12 months. In addition, you may discover a seasonal pattern where the KPI is higher in winter months and lower in summer months. Having a broader historical understanding of how metrics are trending gives you a better perspective of when you need hold fast, monitor more closely, or immediately intervene.

5. Choose Appropriate Visualizations

How you visualize your data is crucial to obtaining meaningful insights from your metrics. Your KPIs might have important things to share about your business, but
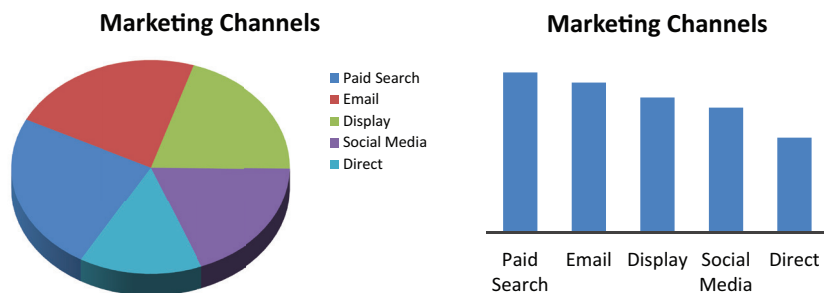

Figure 16: The bar chart (right) makes it much easier to compare the relative sizes of each marketing channel than the pie chart.

the wrong visualizations can neutralize any insights they could have provided. For data charts, substance needs to come before sizzle. It's not a beauty contest; don't be duped by slick but ineffective visualizations. The graphics need to communicate what data tables can't on their own. Amongst the many considerations in creating effective visualizations (type, color, text), one key criterion is whether the graphic supports meaningful data comparisons (Figure 16). Pie charts are extremely popular, for example, but are actually one of the weakest charts for comparing different values in all but a few situations. Make sure your metrics are matched up with the right visualizations before you judge their merit.

6. Never Settle for Just Aggregate Numbers

As you monitor KPIs across your digital business, don't get complacent with aggregate results for how your business is performing. On the surface, the total results may not differ much on a weekly or monthly basis. Beneath the surface, however, a combination of interesting shifts may be occurring that mask potential problems or opportunities. When your KPIs are evaluated
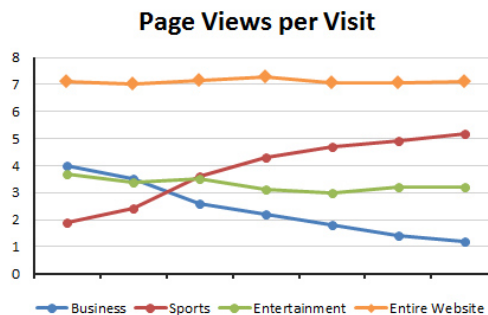

Page Views per Visit

Figure 17: The average page views per visit for the entire website is fairly flat, but examining the underlying site sections reveals different patterns.

in the context of dimensions or segments, more meaningful insights will jump out from your data (Figure 17). By comparing various items within a report (traffic sources, landing pages, and campaigns, for example), you can benchmark their performance against each other and determine what's over- or underperforming. When working with averages (time spent, page views per visit, AOV), consider evaluating the distribution of values using a histogram because the statistical mean can obscure significant patterns in the data.

7. Don't Fixate on a Single Metric

When you focus exclusively on a single metric, you are more susceptible to making poor business decisions based on the data. Think of your key metrics as flashlights. When multiple lights concentrate on the same area, you'll more clearly

see what's happening. If the area is only partially illuminated by a single flashlight, you can easily miss a crucial detail.

Page	Bounce Rate		Visits
Page A	95%		50
Page B	85%		130,000
Page C	80%		90,000

Figure 18: If you only looked at bounce rates without understanding the volume of visits, you'd mistakenly decide to focus on fixing Page A.

Similarly, if you focus solely on increasing the conversion rate of your online store, you may not realize revenue is decreasing as your conversion rate improves and your average order value falls. Rather than buying more expensive items, customers buy low-cost items that convert at a higher rate but generate lower overall sales. In another example, just because a landing page has a high bounce rate doesn't mean it needs to be fixed. If the page receives only a small number of visits, a more popular landing page with a lower bounce may be a bigger priority to fix (Figure 18). When you use a set of complementary metrics, you can evaluate success from different angles or perspectives.

8. Use Metrics to Inform, Not Justify Decisions

Ideally, you should use your metrics to shape and inform your business decisions and then analyze the results to improve future ones. However, it's still common to find decisions being made without any supporting

Figure 19: Metrics should inform future decisions and not be manipulated to justify past decisions.

data. Only when past decisions come under fire do metrics enter into the picture to selectively defend or justify the results. Even though this approach is reliant on metrics, it undermines their purpose and efficacy. They shouldn't be used to deflect accountability and bury bad results. While you may not always like what they have to share, your metrics can teach you a lot about your digital business if you're willing to embrace them and apply what you learn (Figure 19).

Web analytics doesn't need to be intimidating or difficult. At its core, web analytics can actually be quite straightforward. If it's closely aligned with your business goals, you'll have the right metrics and reports at your disposal to both monitor

and improve your digital marketing initiatives. With your new knowledge of the business fundamentals you need to succeed with web analytics, you're ready to tackle the technical essentials. Some marketers might argue they don't need to be concerned with technical considerations, but even a basic understanding can enhance the return you receive from web analytics. In the next chapter, you'll learn how data collection works and how it can be affected by factors inside and outside of your company's control.

CHAPTER 3

THE TECHNICAL ESSENTIALS OF WEB ANALYTICS
(FOR THE NON-TECHNICAL)

"Technology is nothing. What's important is that you have a faith in people, that they're basically good and smart, and if you give them tools, they'll do wonderful things with them."

– Steve Jobs

After evaluating the business aspects of web analytics and how they would apply to your specific organization, you're ready to peer behind the analytics curtain to better understand how the technology works. The goal is not to turn you into a web developer or JavaScript guru. However, a little technical knowledge can go a long way towards ensuring you get the most from your web analytics investment. Just like knowing your way around cars can help you avoid serious mechanical problems and overcharging from disreputable mechanics, familiarity with the inner workings of web analytics can empower you in three areas:

- **Better data.** You'll be able to spot mistakes or issues before they become serious problems. Often technical resources don't always fully or clearly understand the business reasons behind the measurement requests. With a little more technical knowledge, you'll be better positioned to bridge the business requirements with the technical considerations to get the right data you need.

- **Improved data interpretation.** Too often incorrect assumptions are made about what the data actually means. With a deeper knowledge of how the data is collected, you'll be in a stronger position to interpret it correctly.

Knowing what the metrics do and don't mean will reduce potential missteps based on the data.

- **Greater return.** When you don't know how the technology works, you can't fully appreciate the limitations and possibilities of what can be tracked. When you don't understand the level of effort that's required to track something, you might waste time and resources on something that could be better spent elsewhere. With some technical knowledge you'll identify creative applications for web analytics that can unlock new insights and drive greater value.

Don't be at the complete mercy of whoever is managing the technical aspects of your web analytics tool. Rather than blindly following someone else's lead, learn for yourself what goes into capturing the data you need. You may be surprised by what else you could be capturing or what slight adjustments to your online tactics suddenly open up new possibilities for richer insights. Both my undergrad and graduate degrees focused on business, not computer science or anything IT-related. I am not a technical expert, but I have striven to understand how the technologies operate. In light of the 80/20 rule (Pareto Principle), I'm going to share the 20% of technical knowledge on web analytics that derives 80% of the value. In addition, rather than focusing too much on the technical nuances of each product, I want to emphasize the universal considerations that span most web analytics systems.

Although I would encourage you to review this entire chapter, you may only be interested in the technical aspects that relate directly to your immediate business needs. As a result, I've divided this technical discussion into two main parts. The first part provides an overview of the core fundamentals of data collection for web analytics (pages 68-90), and then the second half explores a key set of technical topics that apply to common measurement scenarios (pages 90-113). I recommend reading the entire overview, and then choosing topics that are applicable to your unique digital measurement needs.

"It is a capital mistake to theorize before one has data."

– Sherlock Holmes (Sir Arthur Conan Doyle)

Data Collection Overview for Page Tagging

The first step in learning the technical basics is to grasp how data collection works. Page tagging is the most common approach and is a great starting point for understanding how most web analytics tools capture online data. Figure 20 provides a high-level overview of how data flows from your website to your web reports. At a high level, a tag is placed on each page within your website, and it

sends data to your web analytics tool. Your tool collects and processes the data, assigning it to a specific reporting container for each of your digital properties. People can then analyze a set of reports for a specific digital property.
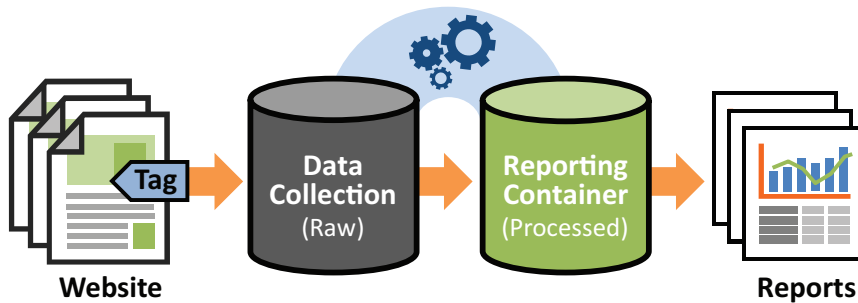

Figure 20: Data is collected via a page tag that is placed on each web page. After the web analytics system receives the raw data, it subsequently processes the data and assigns it to the appropriate reporting container for the web property. Each reporting container will have its own set of reports for the web property.

Data Collection Deep Dive

Before we examine the data collection process more closely, we need to step back and make sure you're familiar with the client/server computing model that forms the backbone of how information passes through the Internet. You might already recognize this model from your company's IT network where employees use their personal computers (clients) to access shared files and tools that are hosted on various internal servers. Similarly on the World Wide Web, each web
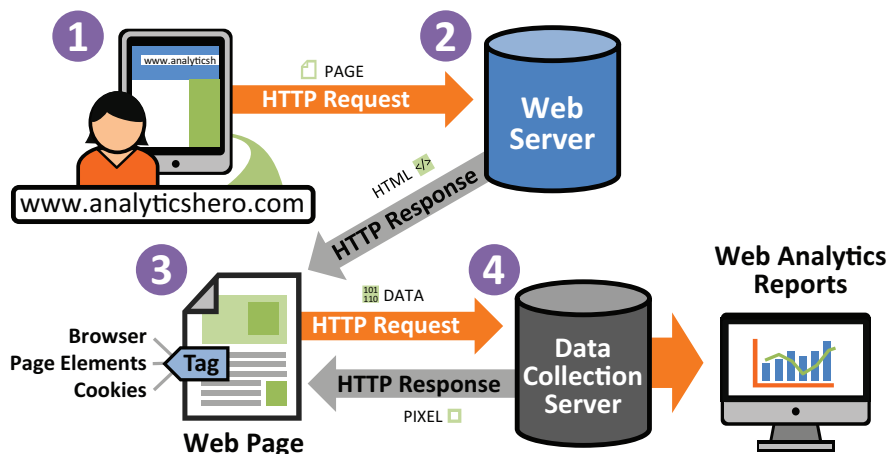

Figure 21: This diagram provides an overview of how data is collected from a single web page with a page tag.

browser (client) requests and receives files from a centralized web server or set of servers. Each request from the client requires a response from the server, as well; otherwise, the transmission process is incomplete.

To keep things simple, we'll examine how a web page is tracked using page tagging. If you understand what's happening with a single web page, you'll have a solid foundation that can serve you well across other tracking situations. Figure 21 outlines how data collection works for a single web page within this client/server environment, while the list below describes each step in the process in detail.

1. An individual enters a web page address or URL (Unified Resource Locator) into her browser to access a website, www.analyticshero.com. This human-readable domain name is converted into a unique numeric IP address (69.195.124.84) that corresponds with a designated web server for the analyticshero.com website. The web browser and web server communicate with each other through a protocol known as HTTP (Hypertext Transfer Protocol). The browser sends an HTTP request to the web server to start the process of fetching the necessary content (text, images, video, links) to assemble and render the web page for viewing. This first HTTP request is known as the **page request**.

2. The web server's role is to provide different page elements that are needed to assemble the web page. It sends those files to the web browser via an HTTP response (every request from a client coincides with a response from a server). The first item it sends the web browser is a HTML (Hypertext Markup Language) file that defines the structure and content of the page. Beforehand a small snippet of JavaScript code known as a **page tag** was pasted into this HTML file for tracking purposes. The HTML file may reference up to hundreds of different content elements (including CSS, images, and video) that the web browser must retrieve from the web server, other servers, or browser cache in the milliseconds or seconds it takes to load the page.

3. As the web browser starts to build or render the web page, it will come across the analytics JavaScript tag in the HTML, which instructs the browser to download a JavaScript library file from the web server. This library file makes it easier to distribute the same JavaScript code across multiple pages, and because it is stored in the web browser's cache memory after it is first downloaded, it loads quickly for subsequent pages. The JavaScript code executes and gathers data from the browser (referrer, screen resolution) and combines it with page-specific data (page title, page URL) and visitor-related data (if analytics cookies are present from a previous visit).

At this point, the JavaScript library file does something interesting and perhaps unexpected. It adds an image to the HTML file of the page. The browser is constantly watching for content that has not been downloaded. When it sees that the page needs an image that hasn't been downloaded, it quickly requests it (this HTTP request is often referred to as the **image request** or **hit**). The JavaScript, itself, doesn't actually send data anywhere, but takes all of the collected information that needs to be sent to the data collection server and appends it to a URL for a fabricated image request. The browser doesn't distinguish between a web server and a data collection server so it simply requests the image as a necessary element for rendering the page.

4. This image serves no purpose other than for the data to hitch a ride to the data collection server. The server captures this data and passes it to the analytics processing engine, which updates the respective web reports. Meanwhile, the server passes a transparent, 1-x-1-pixel image back to the web browser. The data collection server uses the HTTP response that contains the image to set a cookie that will uniquely identify that device going forward (if one has not already been set). This unique identifier is called the **client** or **visitor ID**.

In Figure 21's data collection flow diagram, the data was collected for a single web page. If this visitor went to another page on this same website, the same process would repeat itself on the next page load and thereafter. In the case of secure pages such as checkout or account pages, the underlying protocol would be different (HTTPS instead of HTTP) but the data collection method is the same.

Because of the dependency on JavaScript, you may wonder what happens if a visitor chooses to disable or block JavaScript in his web browser settings or if he's using an older mobile device that simply doesn't support JavaScript. In these situations, your web analytics tool may gather only basic browser-level data on visitors. In most situations, 99% of your visitors will have JavaScript enabled because aside from tagging it plays an integral role in making web pages more interactive, dynamic, and personalized.

For each web page, a browser will process the HTML code in sequential order or synchronously. The browser will not move on to the next page element (such as an image, ad, or video) until the previous page element has been loaded or processed. As a result, the placement of the page tag within the HTML code became an important consideration.

If the page tag was placed at the top of the HTML, the page had a greater likelihood of being measured but the JavaScript code could marginally impact page performance (measured in milliseconds not seconds). On the other hand, when the tag was placed at the bottom of the HTML code, the visitor might

click on a link before the page was finished loading and no data would be sent to the data collection server because the code hadn't been loaded yet. Most web analytics tools now support asynchronous loading, which allows the web browser to multitask JavaScript downloading and execution of the analytics tags in parallel with loading the visible page elements. As a result, most companies now elect to place these tags higher in the HTML code.

When it comes to data collection through the page tagging approach, it's important to know three things. First, *no tag means no data*. If a web page doesn't have the page tag in place, no data will be collected on that page. There's no way to go back in time and capture any lost data. In order for you to understand how visitors are interacting with your entire website, *every page* must have the page tag in its HTML code. Many organizations include the page tag via a global header or footer file that is referenced by default on every page.

Second, *data collection is separate from data processing*. Although the data collection happens in a matter of milliseconds, the actual processing of the raw data into meaningful reports can take much longer (usually less than four hours but up to 48 hours in some cases depending on what package you're using and the volume of data). The time difference between when the data was collected and when it appears in your reports is often referred to as **latency**. In some cases, the data may partially flow into the reports but not "finalized" until some later point in time. Page-level data can be processed quickly but visit- and visitor-level data can take longer to process. Part of the delay is due to waiting for sessions to end after 30 minutes of inactivity.

Third, *be aware of sampling*. Some web analytics vendors automatically use data sampling, where only a portion or subset of the entire potential data set is captured to speed up report processing. Statistical sampling is a widely accepted technique for extrapolating the aggregate results from a subset of data. Heavily trafficked sites may elect to sample their data in order to make the reporting more manageable or cost effective. At a high level, sampled results will usually be close to what is found with unsampled data. When you drill into specific low-level aspects of the data, however, the sampled data can provide misleading results.[6] The sampling can also interfere with marketing efforts to target specific visitors because they may fall outside the collected sample.

A Closer Look at the Image Request

Besides the page tag, which initiates everything, the image request is the main delivery mechanism for passing online data to your web analytics tool. Based on

its key role in the data collection process, it helps if you understand the general contents of the image request. You may never use a HTTP debugging tool such as Charles, Fiddler, or Firebug to evaluate the back-and-forth HTTP network traffic, but if you did you would discover some interesting information in the HTTP request (Figure 22). Only a few of the fields or HTTP headers in the request are relevant or important to data collection, and you should be aware of these key elements in the image request:

```
GET /b/ss/analyticshero/1/H.25.1T/s63417631384889?AQB=1&ndh=1&t=31%2F4
%2F2013%2020%3A3%3A22%205%20360&vmt=5041AF64&vmf=brentdykes.112.2o7.net&
ce=UTF8&ns=adamsj&pageName=homepage&g=http%3A%2F%2Fwww.analyticshero.com
%2F&r=http%3A%2F%2Fwww.google.com%2Furl%3Fsa%3Dt%26rct%...
Host: metrics.analyticshero.com
User-Agent: Mozilla/5.0 (Windows NT 6.1; WOW64; rv:21.0) Firefox/21.0
Accept: image/png,image/*;q=0.8,*/*;q=0.5
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Referer: http://www.analyticshero.com
Cookie: __utma=104800897.1345728188.1369500563.1369500563.1369951374.2;
s_vi=[CS]v1|29D075CB05012F3F-4000010C000859F3[CE]
Connection: keep-alive
```
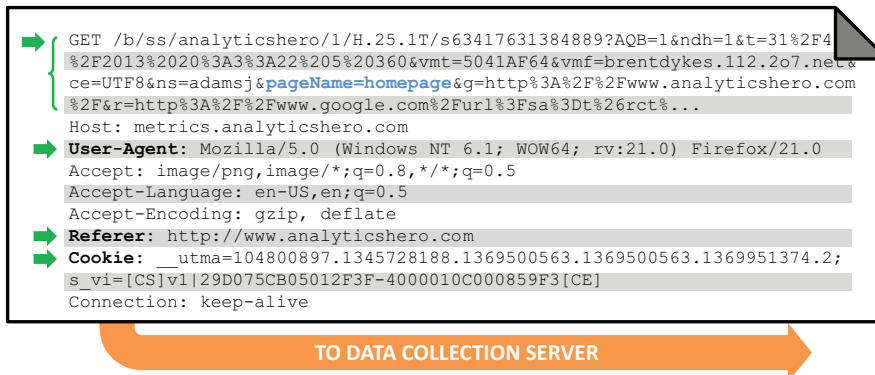
TO DATA COLLECTION SERVER

Figure 22: If you were using a HTTP debugging tool, you would see the following type of information within the HTTP request that is sent by the JavaScript tag to the data collection server. The bolded fields are HTTP headers that are relevant to web analytics.

- **Request line.** The first line of the HTTP request asks for the 1-x-1-pixel image, and it contains the data for the web reports (edited to only show a portion). Web analytics tools use either a GET or POST method, which are just different types of HTTP requests. Essentially, the request line is a long text string comprised of different name-value or key-value pairs. A name-value pair is essentially a variable with an assigned value (key1=value1). Each variable typically corresponds with a report in the web analytics tool. For example, in this sample HTTP request you'll see the pageName=homepage pairing (third line in blue), which specifies the page's name is homepage for the pages report in Adobe Analytics.

- **User-agent.** A combination of the operating system and browser information that identifies the client device for the server. Information on the web browser type and version is essential for debugging browser compatibility issues. The user-agent will also include information on the mobile device's make and model.

- **Referer**. This misspelled HTTP field shows the page from which the request was made. There are two referrers to consider, the page referrer and the

image referrer. If you're looking at the HTTP headers for an *image request,* the referrer is the page on which the request was made or the page that is being viewed by the visitor. If you're inspecting a request for a web page, the referrer is the page someone clicked to get to this page (google.com, for example, is a frequent referrer). The JavaScript collects the referring page and adds it to the information that is passed along with the image request.

Formerly, if the previous domain was a search engine, the referrer field contained the keywords used in the visitor's search. For example, if the visitor searched for "analytics" that search term would appear as part of the referrer information shared by the search engine. Unfortunately, Google decided to strip the search terms from its referrer information whenever someone clicks on an organic or paid search result. Other search engines such as Yahoo have followed Google's lead in this area.

- **Cookie**. This field lists the various cookies the browser has collected *that are associated with the domain of the request* (see Referer above). Each web analytics tool will leverage at least one cookie for tracking purposes so that it can identify a visitor across visits or sessions. In Figure 22's request, the field has a sample analytics cookie from both solutions (Google's __utma cookie and Adobe's s_vi cookie).

From this sample HTTP request, you can see that data is sent to the data collection server through a combination of the request line (created by JavaScript code), standard HTTP header fields, and cookies. Interestingly, while the Do Not Track (DNT) debate wages on and may never be formally adopted, an individual's DNT settings will actually appear in the HTTP request. When data is sent to the data collection server, the web browsers would make this information visible in the HTTP request (DNT: 1 means "no" to tracking, DNT: 0 means "yes" to tracking). The DNT option doesn't block data from going to the data collection server, it just notifies the website's owner and web analytics vendor of the user's DNT setting (opt-in, opt-out). It is then up to each vendor or company to choose how it honors the DNT setting, which was mainly directed at third-party ad targeting—not web analytics.

Even though you don't see the IP address in the HTTP headers, the data collection server knows an individual's IP address. Each computer or device is assigned a unique IP address on the World Wide Web, which is important in sending information back and forth to the right locations. Just like two-way communication through the postal service, both the sender (browser) and receiver (web server) need to have specific "mailing" addresses. If the HTTP headers represent the contents of the letter, the visitor's IP address is the sender's return address on the envelope

to the server. Web analytics tools are able to map the IP addresses of different visitors to specific physical locations such as country, state/province, and city. Although geolocation tracking has improved over the years, it can't be tied to more granular geographical coordinates such as your actual physical mailing address.

Cookie Overview

JavaScript is a major component of the page tagging approach. Without this client-side scripting language, the web browser wouldn't be able to assemble and append data dynamically to the HTTP request. However, another essential component for page tagging is the HTTP cookie. Cookies are frequently misunderstood so it is important to understand what cookies really are and what role they play in web analytics.

A **cookie** is simply a small text file that is stored in the web browser on a visitor's computer or device. Cookies were originally designed to keep track of unique visitors across a single session, and then expanded to tracking visitors across multiple visits. The HTTP protocol is stateless, meaning a web server doesn't remember a user's state or past actions as they move from web page to web page. This was a problem in the early days of e-commerce because in order for the concept of a shopping cart to work, there needed to be an easy way to record which products were being added to the cart by a user during a session.

In 1994, a Netscape engineer developed the "magic cookie" as a communication mechanism between web browsers and servers for identifying individual users.[7] Each cookie file contains a name-value pair with a parameter (__utma) and a unique alphanumeric client or visitor ID. In addition to the ID, the server may include other attributes such as when the cookie should be deleted by the web browser or whether it is only to be used for secure requests (HTTPS). The cookie isn't a program or susceptible to viruses, and typically the information within the cookie can be accessed only by the server that passed the file to the web browser.

Many people don't realize how essential cookies are to their everyday online experience. They help sites to remember your preferences between visits, verify you're still logged into the site, and track the products you've added to your shopping cart. In web analytics, cookies are equally important to businesses because they are used to calculate such metrics as visits, unique visitors, and new/return visitors. They also associate different attributes and behaviors to unique visitors for segmentation purposes. Keep in mind, all of the user data is unique

> **"C is for cookie—that's good enough for me."**
> – Cookie Monster (Sesame Street)

but anonymous so it shouldn't be tied to personally identifiable information (PII) such as an e-mail address or name.
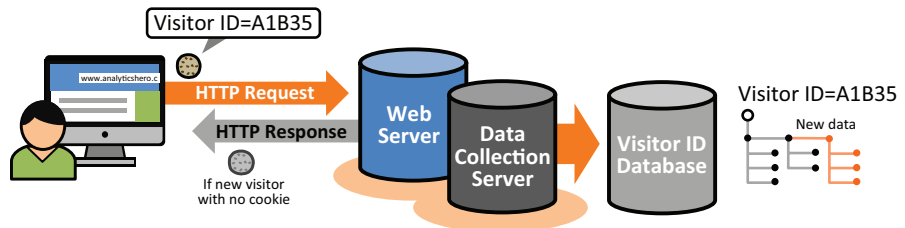

Figure 23: A unique visitor ID (or client ID) is tied to each anonymous visitor. Over time, a record of the individual's online behaviors can be tracked across multiple sessions.

Figure 23 provides an overview of the cookie exchange that happens between the web browser, web server, and data collection server. When an individual arrives on a website, the web browser checks if it has a corresponding analytics cookie file for the web domain. If the browser locates a cookie that matches the host domain, it includes the cookie's visitor ID in the HTTP request to the server (see the cookie field Figure 22's example HTTP request). The web analytics tool then links the new data for this visitor ID with other data it has already collected on this anonymous user. If the visitor is coming to the website for the first time, the individual will be assigned an analytics cookie with a unique client ID for future identification.

In terms of web analytics, you need to be aware of two major types of cookies. A **session cookie** lasts only the duration of a single session. The cookie file is stored in temporary memory by the web browser and then deleted when the browser closes. Web analytics tools rely on session cookies to monitor visit-related behaviors. A **persistent cookie**, persists until it reaches a specified expiration date, and then the web browser deletes it. Persistent cookies are saved on a user's computer or device. Web analytics tools need persistent cookies to track the multi-session behaviors of unique visitors.

Under different circumstances, a cookie can be either a **first-party** or **third-party** cookie (Figure 24). *Party* refers to the domain that set the cookie in your web browser for a particular website. If the domain you're currently visiting matches the cookie's domain, then the cookie is a first-party cookie. If the cookie is from a different domain, then the cookie is a third-party cookie. Whether a cookie is first-party or third-party is simply a matter of context. As you move from one domain to another, a cookie can change from being a first-party cookie to being a third-party cookie (or vice versa).
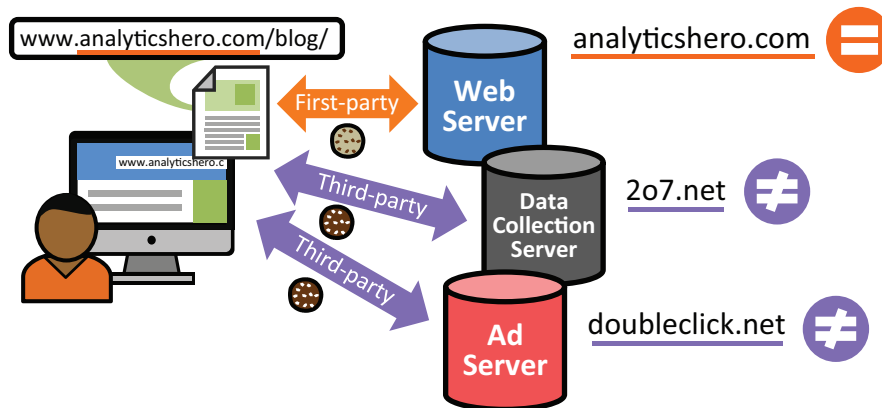
Figure 24: In this diagram, you can see the difference between first-party and third-party cookies. If the domain being visited matches the cookie's domain, then it will be a first-party cookie. Any cookies from other domains are third-party cookies.

Originally, most web analytics solutions used third-party cookies for tracking purposes. In online advertising, third-party cookies are essential to ad networks that distribute and place ads on millions of websites. Ad networks are able to monitor users across multiple domains and target specific ads based on past behavior. This cross-domain targeting capability has led to privacy concerns and prompted law makers to introduce new legislation related to privacy protection. Anti-spyware software vendors deleted many cookies associated with ad networks, and popular web browsers are beginning to block third-party cookies by default.

When the third-party cookie deletion rates started to rise, leading web analytics solutions shifted to first-party cookies. Most visitors will not delete first-party cookies because doing so will generally degrade their online experience (no login status, no preferences, no recommendations).

One of the main advantages of using third-party cookies for web analytics is that a single visitor can be tracked across multiple domains that were all owned or tied to a single company. For various reasons, such as organic growth, acquisitions, organizational changes, and partnerships, many organizations have their web content spread across multiple domains. Even though the web content may appear as a unified experience across a single website to online visitors, they could actually be traversing across several different domains during a single visit. For example, an online forum or e-commerce store might be hosted on a partner's domain that is branded to look as though it is part of the company website.

First-party cookies can apply to subdomains of a root domain. For example, a first-party cookie set for the root domain, *example.com*, can be a first-party cookie for all its subdomains such as *blogs.example.com* and *store.example.com*. If your

site is comprised of several different root domains (example.com, sample.com), however, then a single first-party cookie can't be used to track unique visitors across multiple domains. With a first-party cookie implementation, when a visitor moves from domain to domain the individual will appear as a separate unique visitor for each domain. For many multi-domain sites, the resulting fragmentation of a single visit and visitor is an undesirable byproduct of first-party cookies.

Web analytics vendors have developed two approaches for handling cross-domain tracking (Figure 25). Some vendors use the link approach to pass the session and persistent cookie information for one domain (news.com) to the next domain (blogs. com) by appending the client ID to the links via a query string. When the visitor lands on the next domain (blogs.com), JavaScript code is used to write the information to both blogs.com's first-party session and persistent cookies to preserve the visit and visitor information across the two domains. The same process would be repeated if the visitor went to yet another root domain. This approach depends on *every* cross-domain link passing the necessary cookie information on to the next domain's first-party cookies to work properly.
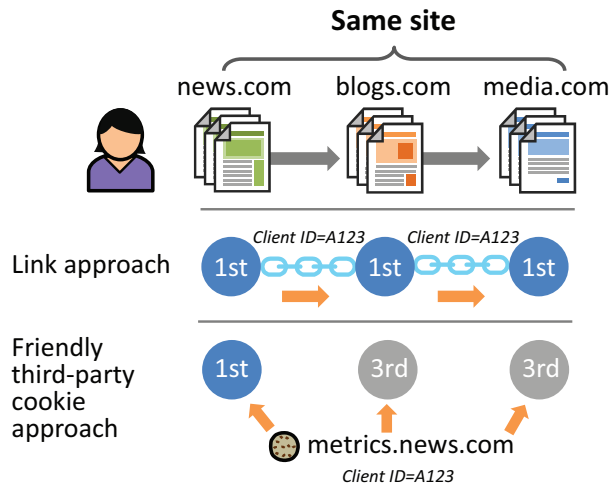

Figure 25: First-party cookies weren't designed to track visitors across multiple sites. As a result, different approaches are used to follow a visitor across a network of sites owned by a single organization. The link approach has to pass a client ID (or visitor ID) to the next domain. Friendly third-party cookies are a hybrid approach that sets a first-party cookie on the main domain but then uses that same cookie across other sites as a third-party cookie.

Alternatively, to track visits and visitors across multiple domains a web analytics tool may use the friendly third-party approach in addition to setting a first-party cookie. Concerns about third-party cookies, especially generic ones, led to the usage of "friendly" third-party cookies for cross-domain tracking. Rather than the cookie coming from an unknown or suspicious source, the cookie's origin and purpose would be more transparent. A friendly third-party cookie would ideally be set by a domain that includes a descriptive subdomain and the company's main domain (metrics.companyname.com).

The rationale was that if the cookie originated from a trusted brand or company then it wouldn't be misconstrued as spyware or adware. Depending on how aggressive web browsers become in blocking third-party cookies, this approach could fall apart. Currently, Safari will not block third-party cookies *if the domain has already set at least one cookie*. Therefore, a friendly third-party cookie will be accepted if it's associated with a root domain that has already been visited by the visitor (something that will never happen for major ad networks such as Doubleclick.net). The only caveat is the entry point now becomes an issue because the visitor won't be tracked across the domains until they've been to the root domain of the friendly third-party cookie, which may or may not be an issue for certain websites.

When you're tracking visitors via cookies, *a single individual can appear as several unique visitors*. Each web browser represents a separate client and is treated independently from other web browsers on the same computer or on other devices. As a result, a single person can be counted as separate visitors across different browsers on various devices (desktop, smartphone, tablet). The analytics cookies that track unique visitors are not shared across browsers on the same computer or across different devices. Additionally, if you have multiple domains, individuals may count as a separate visitor on each domain. This happens under two scenarios: with the link approach, the user doesn't click a tagged link to get from one domain to another, or with the friendly third-party approach, the third-party cookies are blocked. Without being able to unify all of the different cookies, your unique visitor count will be artificially inflated.

While first-party cookies may reduce rejection by web browsers, they don't eliminate cookie deletion. First-party, persistent cookies are not impervious and are still susceptible to deletion. In some cases, users may unintentionally lose their first-party cookies when they purchase a new device or reinstall software. In other cases, they may intentionally delete cookies for privacy reasons. In 2011, ComScore published the findings from two studies on cookie usage in Australia[8] and Latin America[9]. It found that 28–33% deleted their first-party cookies in a month while 37–43% deleted their third-party cookies over the same period. As a result, the unintended and deliberate deletion of cookies will inflate the number of unique visitors during a given time period. In addition, analyzing *unique* visitor behaviors across longer time periods (more than 12 months) will be less accurate.

In summary, the data collection process involves a page tag that is placed within the HTML code of a web page. When the web browser attempts to render the page, the JavaScript code collects and sends data to the web analytics solution via an image request. Cookies are an integral part of the data collection process

and are used to uniquely identify returning visitors. Now that you understand how the data flows into a web analytics tool, the next question is how the data should be organized for consumption.

Reporting Architecture

A key step in the deployment of a web analytics solution is to plan how the data will be organized and made available to users within your organization (or partners outside your company). Before you turn on a water faucet, you need to determine how the water will be contained or stored. Web analytics tools provide flexible options for grouping your data into meaningful containers or data sets. However, without careful planning at the beginning of an implementation project, the wrong underlying structure or organization for your web data can actually interfere with or prevent your company from getting the business insights it needs.

For a smaller firm with a single web property, the reporting architecture usually isn't a significant issue. For large, complex organizations with multiple web properties and diverse stakeholder groups, however, it's a crucial consideration that can come back to bite you if it's not done properly. In other words, you might have to hit the reset button with your data collection, delaying when you can actually get the right insights you need. As a general rule, once the reporting structure has been defined it is easier to *filter* a data set for a particular slice of data than it is to *combine* separate data sets. In addition, some filters will apply to *historical data* and others will only apply to *future data*.

Each organization starts with its own unique account or company login for its web analytics tool. Within each company's account, the organization captures data on its various web properties through a series of reporting containers called **report suites** in Adobe Analytics or **views** in Google Analytics (because they were called "profiles" for several years I'll refer to them as *profile views* to avoid confusion). If your company has only one web property, it will need at least one reporting container (report suite or profile view). Each report container will have a unique ID that informs the web analytics tool where to store the corresponding data. The reporting container ID is specified in the page tag and is passed to the web analytics tool on every image request to the data collection server.

Even when you have a single web property, the data can be partitioned, or divided up, into additional containers using different filters. In most cases, an administrator for your web analytics tool can create a rule or filter that looks for certain criteria and then assigns any matching data to a filtered reporting

container. For example, a report suite or profile view could be created for the customer support section of your website (/support) so that your customer service team has specific metrics that pertain to them. When you're breaking up a web property into separate filtered containers, you still need to house them in a master container for the entire web property with no filters. Without a master container for each web property, you won't be able to refer back to a reporting container that holds the complete data set for each website.
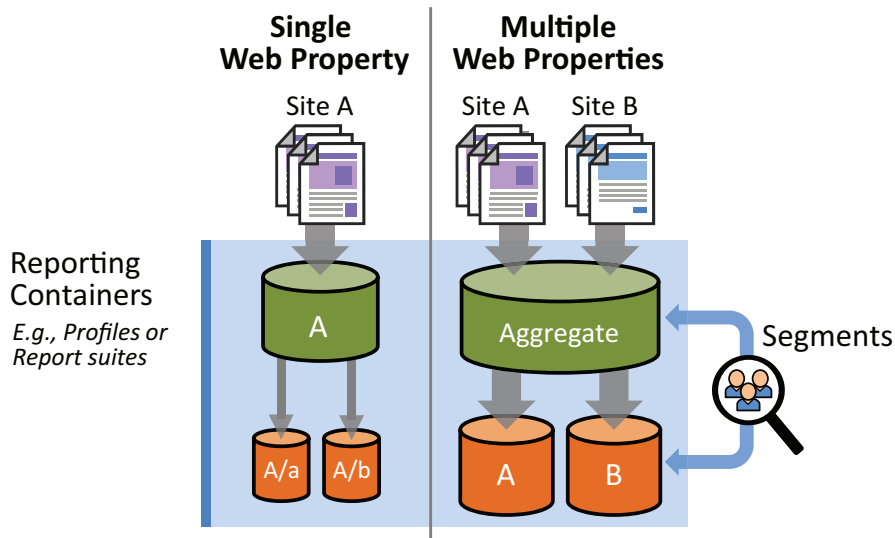

Figure 26: On the left, a single reporting container (A) can capture data for an entire domain. Additional containers can focus on specific sections (A/a and A/b). On the right, two domains can be captured in the same aggregate container and have separate containers for each individual website (A and B). Segments offers another option for isolating a subset of the data based on visits or visitors.

If your organization has more than one web property, you may want an aggregate reporting container for all your properties in addition to having separate containers for each website. In Figure 26's example, the data for Site B is sent to two reporting containers: an aggregate container (global report suite or master profile view) and a specific container for site B. The same data is replicated in both reporting containers. To create an aggregated data set, you need to employ a cross-domain tracking approach (see the previous section) to maintain a common visitor or client ID across domains.

Aggregate reporting containers are beneficial for two reasons. First, they streamline the process of reporting on multiple websites and provide more accurate reporting (Figure 27). Rather than having to tally up the results from each of your websites, the aggregate reporting container automatically combines the counts and ratios for all your included websites. In addition, an aggregate report container will have

a de-duplicated count of your unique visitors. Instead of double counting the visitors who visited two websites during a single journey, the aggregate container will only count them once.

Second, if visitors are likely to visit more than one web property during a single session, you'll be able to see their entire journey from beginning to end in an aggregate container. Without an aggregate container that spans the entire visitor journey, upstream behaviors on one website will be disconnected from subsequent actions on another site. For example, it might be valuable to know what third-party referrer, campaign, or landing page originally brought someone to a website in your network before he crossed over to make a purchase on another of your websites.
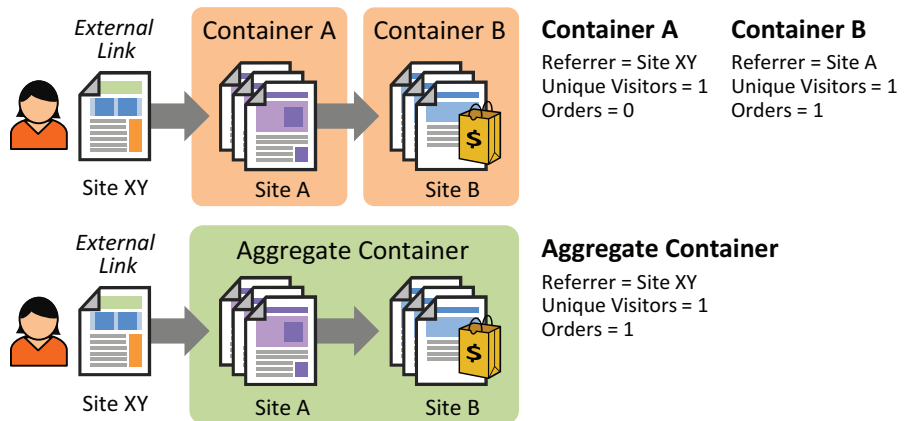

Figure 27: The reporting architecture or container structure can affect how you measure visitors and their behaviors across multiple domains. In the first example, only container B would count the order, and it would see Site A as the referrer (not Site XY). In addition, a single visitor would count as two unique visitors across the two sites. The aggregate container resolves these measurement issues.

In summary, reporting containers can be created for individual web properties, sections of websites, or aggregated combinations of web properties. Any adjustments made to a report suite or profile view are *not retroactive* and will apply to future data only. This is why the right report architecture is essential and upfront planning is needed.

In most web analytics tools, you can build visitor segments and use them as a way of filtering the data set. One advantage of using segments for filtering is they can be applied to historical data, not just future data. However, always having to apply the same segment to get the required data can get tiresome, and it can interfere with the creation of other sub-segments. If you constantly need to consume data filtered by a particular segment, it might make more sense to create a dedicated

reporting container. Segmentation shouldn't be used as a long-term solution for a poorly architected reporting structure.

When you're working with aggregate reporting containers, they require special handling. When you combine page-level data from various websites into the same report, you need to specify their domain in order to differentiate between pages with similar page URL stems or page titles. You need to be able to discern which pages belong to which domains when the page-related data is aggregated. Consistency between profiles or report suites also becomes an issue if they are not aligned in how they use custom variables or track conversions. Custom data is mapped to specific custom variables by numbered eVar variables in Adobe Analytics (eVar1) or index numbers in Google Analytics (index = 1). For example, if one domain uses a custom variable (eVar5 or index = 5) for tracking internal search terms while another site uses the same variable to track affiliate partner codes, the combined report will be worthless.

When companies change web analytics vendors they are tempted to backfill data from their previous vendors into their new tools if they have the option to export and import data. The goal is to preserve year-over-year historical trends for the company's key metrics in the new tool. Despite this outcome being admirable, the exercise is rarely worth the effort. The new system will most likely support summary-level data only (not raw clickstream data), and it will vary from the new data because of differences in how the two systems inherently process data.

Variables and Reports

So, how is the data structured within a specific report container? All of the data going into each container is organized into a series of data tables (like a massive database). Different variables or fields in the page tag capture and transmit data to the web analytics tool so it can store, process, and visualize the values in various reports (Figure 28). In many cases, there's a one-to-one relationship between a tracking variable and a particular dimension or report in the web analytics tool. For example, a variable could be used to capture the site section of each page (sports, entertainment, business), which could be both a dimension and report in your web analytics tool.

When you look at the various reports in your web analytics solution, you may not realize there are any significant differences between the reports other than each report appears to cover a unique aspect or dimension of the website (pages versus campaigns). You'd be mistaken, however, because there are a number of subtle but important characteristics that differentiate the underlying variables of
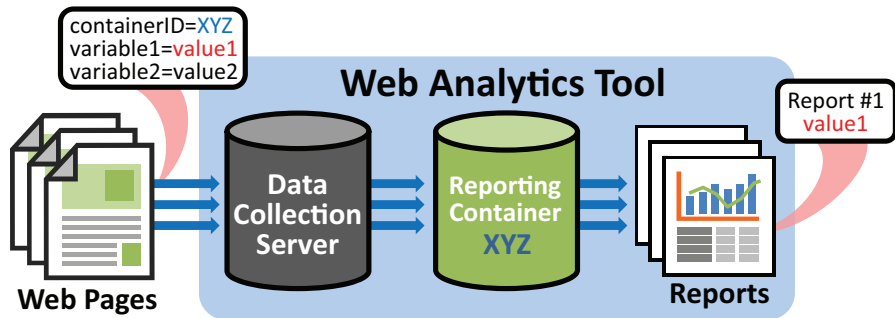
Figure 28: The page tag will specify the reporting container(s) where the data should go. Each tracking variable will typically correspond with a particular report within the web analytics tool.

each report. Some of these attributes can even influence how you should interpret the data within these reports differently.

When you evaluate the various reports in your web analytics tool, you'll want to remember the acronym CAPE, which highlights four key characteristics of tracking variables:

- Customization
- Attribution
- Persistence
- Expiration

Customization

By default, your web analytics tool will provide a set of standard reports out-of-the-box with little-to-no customization. For example, if you were to insert the basic page tag without any customization into your web pages, you'd receive reports on traffic sources (referring domains), content consumption (pages), and visitor information (geography, browser types, and devices). These standard reports streamline the implementation process because you don't need to think about every aspect that needs to be measured. You essentially get a baseline or foundation on which you can build upon. Unfortunately, many organizations don't progress beyond the basic reporting; not realizing that web analytics can provide more targeted, valuable insights that are tailored to their specific digital businesses.

Leading web analytics tools offer custom variables that empower you to track all kinds of onsite functionality and visitor interactions (product reviews and ratings, online forms). The custom variables can be used to expand upon the

data already provided by the standard reports or fill crucial gaps in the baseline reporting. If you're taking web analytics seriously, custom variables are invaluable tools for answering specific business questions about your online visitors and digital marketing investments. Although more implementation work is required, the payoff can be significant because the subsequent insights may be essential to steering your business strategy forward.

Attribution

In web analytics, attribution defines how credit will be assigned or allocated to different interactions or touch points that precede a conversion. Frequently, attribution is used to evaluate how various marketing channels, such as display ads, paid search, and e-mail, contributed to a key outcome or conversion. In many cases, an individual will touch multiple channels before converting and then companies subjectively decide how much influence each advertising touch point had on the visitor's conversion. To use a relay race analogy, if a race team won a 4-x-100-meter relay how would you allocate the prize money to the individual runners? If you were to use a last-click approach, the last runner would get the entire purse for winning the race. Under a first-click approach, the lead-off runner would receive all the credit. Although these two methods have been popular over the years, marketers have sought other approaches to spread the credit across more interactions.

In Figure 29, an individual touches four different marketing channels before making a purchase. The table shows how credit for the $100 purchase would be allocated across these channels based on various common attribution models.

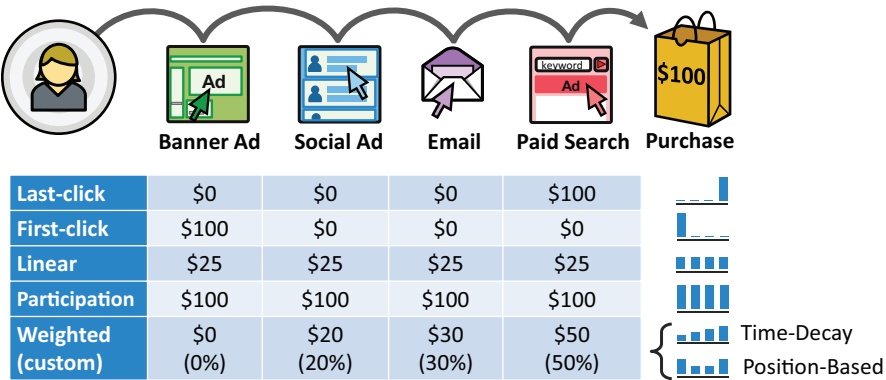|	Banner Ad	Social Ad	Email	Paid Search	
Last-click	$0	$0	$0	$100	
First-click	$100	$0	$0	$0	
Linear	$25	$25	$25	$25	
Participation	$100	$100	$100	$100	
Weighted (custom)	$0 (0%)	$20 (20%)	$30 (30%)	$50 (50%)	Time-Decay / Position-Based

Figure 29: Different types of attribution models change how marketing touches are allocated credit for a $100 order. In terms of weighted attribution, the time-decay and position-based approaches are the most common.

Each attribution approach offers slightly different perspectives on what's influencing conversion success:

- **Last-click**. This approach has been the most common attribution model for online marketing. As the name implies, this model gives credit entirely to the last interaction. This is the "what-have-you-done-for-me-lately" model where advertising touches are measured on their ability to drive immediate conversions—not eventual ones.

- **First-click**. This model focuses on the original source of the visitor who converted. This attribution model helps organizations to pinpoint what channels or campaigns were able to generate awareness in the early research and consideration phases of the buying cycle. First-click attribution is sometimes evaluated in conjunction with the last-click approach to balance out its heavy emphasis on what directly contributed to a key outcome.

- **Linear**. This attribution model divides up the credit equally between all channels that were touched prior to a conversion. While on the surface this model might seem to be the most equitable solution, the variation in the number of interactions adversely skews how much credit each channel receives. For example, if a visitor touched only two channels, each would split the credit. However, if another individual interacted with five different channels prior to converting, each would be given a fifth of the credit. The interaction set's size unfortunately adds unwanted variance to how much credit a particular channel receives.

- **Participation**. Unlike the other attribution models where the percent contributions of individual channels add up to one hundred percent, this approach allocates full credit to every interaction that played a role in a conversion. By assigning full credit, instead of partial credit, this model overcomes the variance issue that weakens the linear attribution model. When using this attribution model, you need to be aware that the report totals will overstate the actual conversions (all four channels add up to $400) so you can only use this attribution approach for measuring the individual performance of each channel and not the aggregate performance. This attribution method is particularly effective with understanding the influence of different content on your success metrics.

- **Weighted**. To find a better attribution approach, some organizations have experimented with other custom weighted models such as time decay (more recent interactions receive a higher proportion of credit) and position based (first and last interactions receive a higher percentage and the rest of the credit is distributed evenly among the middle interactions). With

the weighted approach, companies can tailor the attribution model to their specific marketing needs, which may mean giving credit to early influencers, not just the most recent ones.

When evaluating any report, make sure to understand which attribution approach is used. As you can see from the variances in how credit is allocated, it will affect how you interpret the resulting data. Although attribution is most commonly used to evaluate marketing campaigns and channels, it can apply to other scenarios where various interactions span a single session or multiple visits before some type of conversion. Nothing stops you from using multiple models to glean different insights, but for reporting purposes you must agree upon a particular attribution model for measuring your marketing efforts. If the attribution model is constantly changing or different lookback windows are being used (30-day versus 90-day), it will be difficult to benchmark what's really happening with the different items in the report. You won't know if the difference between reporting periods is due to the different model being used or the actual data points themselves.

Persistence

Each tracking variable will be set to persist, or retain, a value in memory for a specific duration of time. There are three basic levels of persistence: page, session, and visitor (Figure 30). You can think of page-level persistence as a snapshot from a digital camera. On each page load, this type of variable captures an attribute that pertains to a particular page. It doesn't need to retain or remember the value beyond a particular page. Page-level persistence is best for capturing insights on page-specific details or discreet interactions where you're not concerned about their effect on the rest of the visit. For example, if you wanted to capture the author name of various articles, you would pass this value into a page-level tracking variable on each page load. Custom page-level variables provide a richer set of page reporting than what is available out of the box from web analytics tools.

The session-level persistence makes a variable act like a digital video camera. A session-level variable will record the various interactions that occur as an individual visits a website. This type of variable is dependent upon a session cookie to persist values across multiple pages. Session-level persistence makes the most sense if you want to understand how a particular interaction affects subsequent micro or macro conversions that happen later on in a visit. For example, you might use a session-level variable for tracking internal search terms. Although you could track internal search terms at the page level, you wouldn't be able to see how the keywords influence downstream conversions like you would with a session-level view.

Type	Scenario	Examples
Page-level	GO → 🗎 → STOP	Article name Author Page type Site section
Session-level	GO → 🗎🗎🗎 → STOP	Internal promotions Internal search terms Login status
Visitor-level	Visit #1 Visit #2 Visit #3 GO → 🗎🗎 🗎🗎 🗎🗎 → STOP	Customer ID Membership type Campaign

Figure 30: Three levels of persistence are used for tracking different types of dimensions. It's important to use the appropriate level of persistence—not too much and not too little—or else you could end up with irrelevant data or not enough data.

The visitor-level persistence is similar to having a CCTV surveillance camera on your website. Visitor-level variables will remember a particular visitor and retain different interactions across multiple visits. This type of persistence is dependent upon persistent cookies instead of session cookies. These variables are useful for following the behaviors of specific visitor profiles beyond just a single visit or for measuring specific types of interactions that may span multiple visits before resulting in a conversion. A good example of visitor-level persistence is external campaign tracking. For internal promotions on your website, you'll typically use session-level persistence to see if certain offers directly influence a conversion, but

Internal search term
var1=runners

Internal search term
var1=mens runners

$100

Session

Site section
var2=shoes

Page type
var3=product page
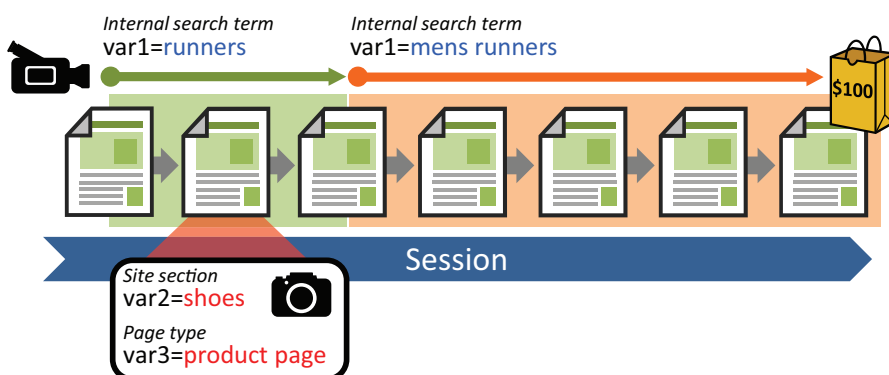
Figure 31: In this example, at the bottom you can see a couple of page-level persistent variables (site section, page type). They identify the site section and page type of a particular web page (like a snapshot from a digital camera). On the other hand, the internal search term variable has a session-level persistence (like a video camera). You can see that the keywords "runners" and "mens runners" were used at different stages in the visit before the conversion occurred.

for external campaigns you want to measure their effect across multiple sessions. Without this form of persistence, marketers wouldn't be able to understand how visitors interact with different campaigns before converting. In the case of the running shoes example (Figure 31), the user initially found the site from a social campaign on an earlier visit. The visitor-level persistence would allow marketers to tie the purchase on this visit back to the original social campaign that helped to acquire the customer.

Expiration

Expiration determines the scope of a variable or how long a variable will retain a value before resetting and waiting for new value to be received. Page-level and session-level variables have clear, pre-defined expirations. Visitor-level variables can persist for differing lengths of time, however, so keep track of when they're set to expire. As you can see in Figure 32, the expiration timeframe will determine how many conversions will be attributed back to a particular item (in this case an e-mail campaign). In the case of a company that has a longer sales cycle between a first visit and eventual conversion, a longer expiration window may make sense for campaigns. Beware: If the expiration window is too long, interactions that were inconsequential and forgotten by the visitor may erroneously receive credit for influencing conversions that happen months later.

Various web analytics vendors and other marketing-related tools such as e-mail service providers use different expiration periods for visitor-level variables, such as campaign tracking. Companies sometimes wonder why their various
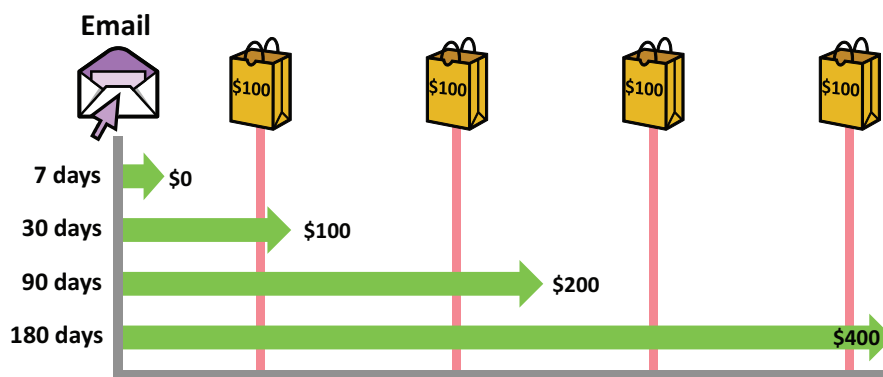

Figure 32: The expiration setting for a visitor-level variable, such as a campaign variable, will determine how much success is allocated to a particular value (campaign). A longer expiration period will naturally associate more success to each value than a shorter window. Choose an expiration setting that is appropriate for your business model.

marketing tools report inconsistent results and don't realize the tools might be using dramatically different expiration periods (30 days versus two years). A longer expiration window will show vastly different results than a much shorter expiration period. By default, Google Analytics' campaign expiration is set to six months, and its visitor-level custom variables expire after two years. These campaign and visitor cookie expirations can be modified to better match specific business requirements. The campaign and visitor-level custom variables of Adobe Analytics (eVars) can be individually customized to expire at different time intervals but also on specified events or conversions such as a purchase or lead submission.

In Disney's *The Incredibles* one of the memorable lines was "No capes!" Capes represented an occupational hazard for the movie's animated superheroes. In contrast, the CAPE acronym will benefit marketers and business users who want to interpret their web analytics reports correctly. Separating the standard reports from the custom ones will help you to understand which variables you can and can't adjust. You must know the attribution settings to really grasp how success is being assigned. The level of persistence (page, session, and visitor) will define the basic scope of the data, and for visitor-level variables the expiration settings will ensure you understand how long data is being collected. Understanding these four characteristics is essential to making informed business decisions based on your online data.

"Details create the big picture."

– Sanford I. Weill

Key Focus Areas of Digital Measurement

Now that you have a basic understanding of how data collection works, we can dig into some key measurement areas that apply to many digital businesses today:

- Interaction or event tracking
- Campaign tracking
- Mobile tracking
- Cross-device measurement
- Data enrichment and integration
- Tag management

As mentioned at the beginning of this chapter, you can decide which topics are relevant to your business and read only those.

Interaction or Event Tracking

Many dimensions and metrics are captured on a page-load basis, in other words when a page is viewed. For instance, each time a web page is loaded its page title or name (dimension) will be captured and a page view will be recorded. In some cases, a micro or macro conversion is associated directly with reaching a specific page in a process. For example, when someone registers on your site, she
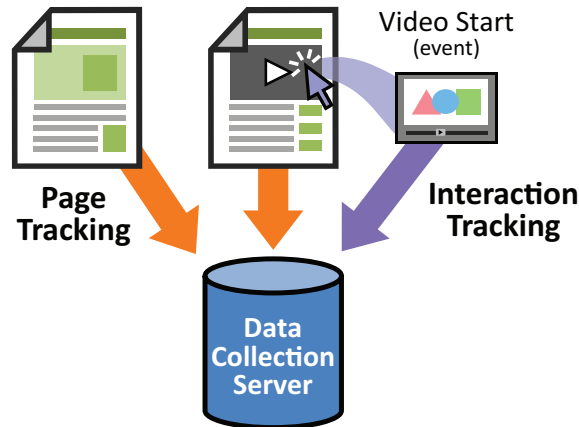

Figure 33: Not all dimensions and metrics are related to a page load. Many interactions occur after a web page has loaded. Event tracking allows you to measure these on-page interactions, such as video starts or other button clicks.

will typically land on a confirmation or thank you page. If you want to track site registrations, you would increment this metric whenever someone lands on this specific page (once per session). While data collection on a page-load basis (data is sent on every page load) has been the primary focus of web analytics, page tagging can also measure the interactions with different elements on a web page between page loads.

With websites becoming more dynamic and interactive, everything that needs to be measured can't be directly associated with a page view. Visitors interact with buttons, links, tabs, gadgets, or other page elements after a page has loaded (Figure 33). Many of these in-page interactions might be important to understanding visitor engagement and how visitors are progressing towards a macro conversion. Depending on your business objectives, the following types of in-page interactions may be important to your business:

- Playing a video
- Adding a product to a shopping cart
- Adding a comment to an article
- Sharing an article on Facebook or Twitter
- Viewing a tab for product rating and review information
- Using an on-site tool (calculators, configurators, polls)

- Clicking on a partner link
- Initiating a chat session with a support representative
- Downloading a brochure or white paper

Web developers add interactivity to the web pages through a combination of HTML events and JavaScript. There are many different types of events such as onClick (when someone clicks on an object such as a button), onMouseOver (when someone moves the mouse pointer over an element), onFocus (when someone focuses on a different object such as a new form field), and so on. These events are used to trigger JavaScript functions or scripts known as event handlers and event listeners to produce different effects. Without the HTML events indicating when a user action occurs, the JavaScript functions wouldn't know when and how to react. In the case of web analytics, these event handlers and listeners can be configured to send a call (image request) to the data collection server each time a specific event is triggered (usually onClick events).

With so many different HTML events happening on web pages, it becomes important to plan what needs to be measured and how it should be reported. As a first step, determine which events are important from a tactical or strategic perspective to your business. You might decide to measure a set of interactions for tactical reasons because you want to understand visitor behaviors and how various page elements are performing. For example, you could track when people comment on articles and tie those comments with the article name, author, and site section (business, sports, entertainment). At a basic level, it's primarily about determining what contextual details (dimensions) are needed to better understand the interaction.

Next, decide if certain events represent key milestones or success factors for your business—micro and macro conversions. You can measure all kinds of details about events without treating them as conversions. If an event is a micro or macro conversion, you'll need to go beyond basic event tracking, which may entail an extra step to configure or a slightly different implementation approach. For example, in Adobe Analytics, you would capture the event in a success event variable so that it can be seen in reports as a conversion metric. In Google Analytics, you would need to specify in the tool's admin section if an event should be handled as a goal (conversion).

The last step is to determine whether you care about totals or unique values for your events. A unique value counts only the first time an action occurs during a session and subsequent occurrences are ignored. Do you focus on how many times the user action occurred (total events) or whether it happened at least once

in a session or visit (unique events)? For example, four individual visitors come to your site and download at least one file during their separate visits (four *unique* downloads), but in total they download ten documents (ten total downloads). In some cases, you might want to track every time an event occurs such as video starts (more video starts means more ad revenue for a media site). However, in other situations you may only care if the action occurs once during a visit, not how many times it actually happens. Nothing stops you from measuring both unique and non-unique counts, but you need to be careful to interpret them correctly.

With abundant events to measure, you must carefully consider what you really need. Although page-level tracking is fairly straightforward, event tracking requires much more planning and implementation effort. You'll need to separate the *nice-to-know* information from your *need-to-know* metrics. Event tracking can waste valuable time and resources if it's used to create reports that no one will use or act upon.

Campaign Tracking

Web analytics plays a critical role in understanding how digital marketing campaigns perform. When individuals click through to your site from external ads, web analytics follows their paths on your site through to conversion. Without the help of web analytics, you won't understand the effectiveness of your campaigns and whether you're getting a good return on your ad spend. Campaign measurement applies to various forms of digital marketing:

- Banner ads
- E-mail
- Paid search ads
- Affiliates
- Social media marketing
- Shopping feeds
- Mobile QR codes
- Offline campaigns via vanity URLs

If a significant portion of your marketing budget is spent on these digital marketing channels, it's essential that you have a good grasp of how campaign tracking works. To link external ads to site behaviors, each individual ad needs to be assigned an identifier called a **tracking code**. Without tracking codes, web

NOTE: In Google Analytics, the _trackevent() function asks for information on the category, action, and label (optional) for each event. For example, in the case of an onClick event for a video play, the category would be videos, the action would be play, and the label would be product demo. In Adobe Analytics, the s.tl() function would be used to populate the label into an eVar variable and the action would be counted with a success event variable (category isn't needed because video is implied).

NOTE: In Adobe Analytics, you need to "serialize" the event to the session (an admin setting) to get unique counts for success events. In Google Analytics, if the event is also set up as a defined goal conversion in the admin, the reported number of conversions will show only the unique events metric, not the total events. In addition, you can convert only once per session for any goal.

analytics tools wouldn't be able to detect which particular marketing channel or ad brought a visitor to your site. Traffic from some marketing channels, such as e-mail and other non-browser-based channels, will be indistinguishable from direct traffic (people who enter the URL directly into the browser address bar) unless a tracking code is present. The tracking codes are placed in the query string of a destination page's URL so the campaign data can be extracted by the web analytics tool. Because you provide the link for your advertisements, you have the ability to append the tracking codes to the URLs so that your campaigns can be measured.

A **query string** is a method for appending data to a URL so that it can be passed from a web browser to web servers or applications (Figure 34). The query string is placed after the web address of the campaign's landing page. It always starts with
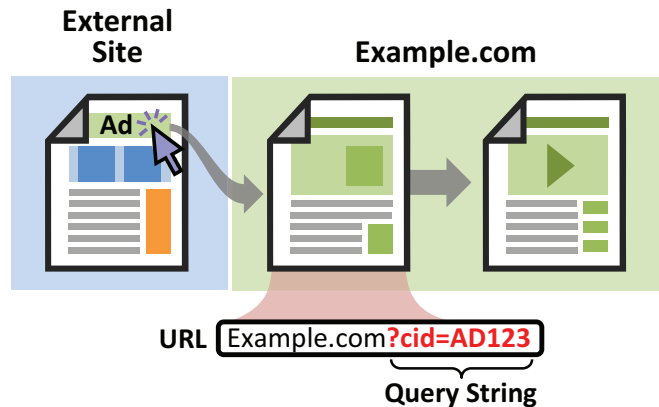

Figure 34: When someone clicks on an external ad, the landing page will typically include a query string appended to the URL. Within the query string, a key-value pair will specify which campaign (AD123) brought the visitor to the website.

a question mark character (?) to inform web applications which part of the URL is the query string. Within this text string, you'll see in at least one key-value pair and potentially additional pairs separated by ampersand characters (&). Each key-value pair consists of three elements: a parameter or field, an equal sign, and a value (Figure 35). After the domain and page portion of the URL, the query string will appear in the following format: ?key1=value1&key2=value2.

...?**cid=AD123**&**utm_campaign=spring_sale**&**utm_medium=banner**...

key1=value1   key2=value2   key3=value3

Figure 35: This query string shows three key-value pairs that are separated by ampersands. Multiple key-value pairs may be used to pass data into different variables within a web analytics tool.

A special campaign parameter (or set of parameters) is designated for campaign tracking purposes so it can be distinguished from other key-value pairs in the query string, and each campaign parameter is paired with a value or code that is tied to a specific campaign element or attribute.

Campaigns are multifaceted, and a single campaign might involve different creative (copy, images, multimedia), offers, channels, placements, and partners. To fine-tune your campaign performance, you want to understand which factors contribute the most to campaign success. Are certain marketing channels more effective than others? Do some promotional offers resonate more with your target audience? Which display ad formats work the best for your brand? Are there noticeable differences in what's working for each product line? You'll have lots of questions about your marketing campaigns so it's essential that you're able to drill into the details for each campaign and make comparisons across multiple campaigns. Web analytics vendors enable you to analyze the campaigns on many levels but handle the campaign attributes in different ways.

The two common approaches for campaign tracking codes are one-to-one (one parameter for each attribute type) or one-to-many (one parameter to multiple attributes). Google Analytics uses the first method and provides five parameters for pre-defined campaign attributes: campaign name (such as spring sale 2014 or ABC product launch), campaign medium (banner, e-mail), campaign source (Bing, April 2014 newsletter), campaign content (vert_120x600, footer link), and campaign term (targeted keyword for paid search).

Ad agencies and marketers can use Google's URL builder tool to add key-value pairs to a URL with its preset campaign parameters (utm_campaign, utm_source, utm_medium, and so on). The main advantage of this approach is that it is fairly straightforward and simple, but you're limited in terms of the attributes that can be evaluated.

Adobe Analytics primarily uses the one-to-many approach where one parameter is linked to multiple attributes. Unlike the one-to-one method, the campaign attributes are not passed through the query string on the frontend but uploaded directly into the system on the backend. Instead of using a set of predefined parameters, you choose the campaign parameter (cid, pid, xid, and so on) for measuring your campaigns. The key advantage of this alternative approach is you have the flexibility to have more campaign attributes and adjust or overwrite values if needed. Ultimately, the richness of the campaign data will depend on what attributes or metadata is subsequently uploaded into the system.

Regardless of which approach is used, there are two keys to successful campaign measurement: *granularity* and *consistency*. First, you need to decide what level of granularity is required (Figure 36). For example, if you were measuring e-mail newsletters, you could re-use a single tracking code for all newsletters or have unique tracking codes for individual e-mail links. Choosing the right granularity will be

a balance between insight and manageability. Using more granular tracking codes will provide more insights but will also require more time and effort to manage.

Remember you can always combine or roll together lower-level tracking codes, but you can't break them apart to get more detail once they're collected at an aggregate level. For instance, you'll never know which link was used in an e-mail if you didn't track individual links with unique tracking codes. If you're unable to make changes to your campaigns at a very granular level, then high granularity would be a wasted effort. The key is to calibrate the level of granularity to your business needs—not too high, not too low.

Second, campaign reporting is going to be useful to your marketing team only if your tracking is done consistently. It starts with ensuring that all digital campaigns are always assigned tracking codes. If only a portion of your campaigns are being measured then you will have blind spots across your marketing efforts. Incomplete campaign data makes it difficult to make meaningful comparisons and shift your marketing dollars around with confidence.

Consistency is also important when it comes to campaign attribute values. If different values are used for the same attribute, then analysis becomes more difficult and time-consuming. For example, if individual marketers within your company inadvertently use "banner ad," "display ad," and "online ads," you now have to aggregate the results for these three different variations to understand the overall performance of your banner ads. Ideally, all of the values for a campaign
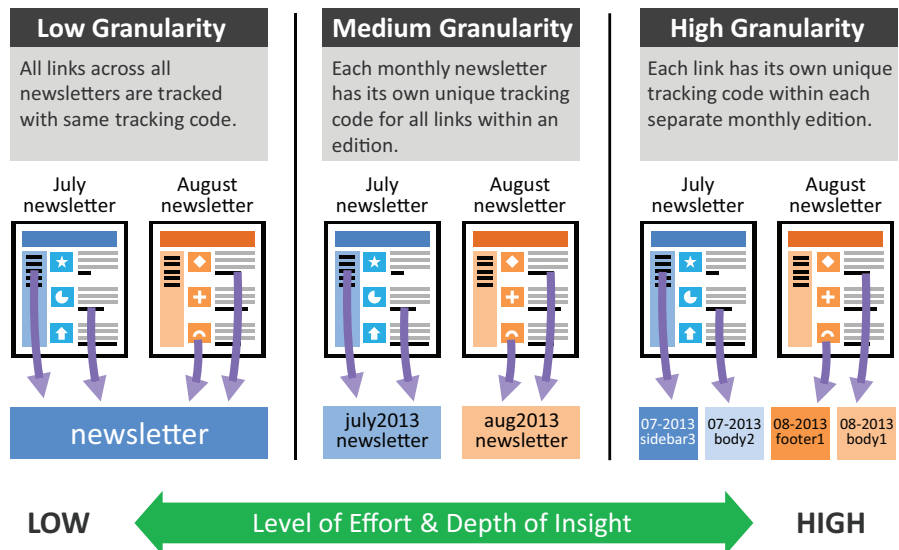

Figure 36: Which levels of granularity you use to measure links from an e-mail newsletter, depends on your business needs. As the granularity level increases (left to right) so does the level of effort in terms of tagging and analyzing the results.

attribute should also share a similar level of granularity. Mixing values with varying levels of granularity for the same attribute can make campaign reports less useful and harder to consume.

Before moving on to the next technical area, I want to mention URL redirection or forwarding, which has some interesting consequences for campaign tracking. A URL redirect is where a visitor is taken to a different page URL than the intended page URL. When a web page is moved to a different location in a website (new path) or its file name changes, the links from external referring sites and online ads will still be mapped to the old URL so the IT team has to set up an automatic redirect to take incoming traffic to the correct page. However, redirects can cause problems for campaign tracking if the query string information is not transferred to the new URL. Essentially you lose the ability to track incoming campaigns when the query string is inadvertently stripped.

Redirects don't always have negative repercussions for campaign tracking. If you're familiar with URL shortening services such as Bitly.com or TinyURL.com, a shortened URL will redirect to a specific page with a normal URL with its long query string. The more compact size of these shortened URLs makes them more conducive to sharing in social media applications such as Twitter or Facebook. The shortened URL also hides all the campaign parameters that might prevent people from clicking on certain URLs. Vanity URLs are another marketing vehicle that can combine friendly URL shortcuts with redirects. Your company might have TV, radio, or print ads that direct people to an easy to remember URL (mysite.com/tv). A redirect can send these visitors to a page URL that has all the campaign parameters for tracking purposes. In summary, redirects can cause headaches if campaign parameters are removed, but they can be valuable when combined with more user-friendly links.

Mobile Tracking

People are increasingly using mobile devices to interact with organizations through mobile browsers and apps. A recent study indicated that mobile devices now represent 15% of Internet traffic.[10] In December 2012, tablet devices for the first time surpassed desktop PC and notebook sales. App downloads climbed to an estimated two billion per week by the end of 2013.[11] If you are not paying attention to your mobile traffic today, you will be in the not too distant future.

Mobile analytics is generally split between **mobile web** and **mobile apps**. Mobile web refers to when individuals use their smartphones or tablets to view online content via a mobile browser. Many companies redirect these users to a

mobile-specific site (typically a different subdomain such as m.example.com) or use responsive design to adapt content to the screen size of the user's device or computer (Figure 37). Some organizations are starting to build tablet-specific sites as they are discovering that neither their mobile-specific sites nor their main websites ideally serve the tablet segment.
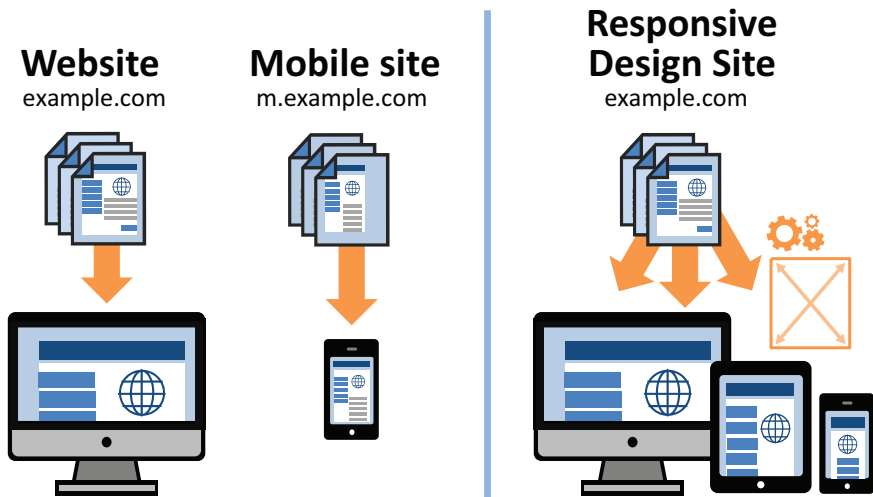

Figure 37: On the left, the company may have two separate experiences for desktop (example.com) and mobile device users (m.example.com). Alternatively, on the right, the company could have a single responsive design site that automatically resizes the content to fit the form factor of the device being used (computer, tablet, or smartphone).

In the beginning, many smartphones didn't support JavaScript or cookies; however, today most popular mobile devices support both of these technologies. At its core, the page tagging method for measuring web properties is similar to measuring the mobile web—with just a few caveats:

- Data connection speeds of mobile networks can vary dramatically by location and carrier technology (3G, 4G/LTE). Mobile sites need to be *light* and *fast* so that they load quickly for impatient mobile visitors. Because JavaScript can slow mobile site performance, the JavaScript analytics tags should be optimized for mobile devices.

- There are several mobile-specific dimensions/reports such as device name, device type, mobile browser, and carrier network that apply only to the mobile web. Many of these reports key off of the device's user-agent string, which is much more diverse for mobile devices than desktop computers because the device's make and model are also included. In contrast, with

desktop computers you only have to worry about two operating systems and a handful of web browsers that are regularly updated. In the mobile ecosystem, a wide range of operating systems (iOS, Android, Windows, Blackberry, and so on) exists, as well as mobile browsers for each device type. Web analytics vendors often partner with device library services to help map the user-agent strings to up-to-date mobile device lists. Unfortunately, this approach is not foolproof if manufacturers decide to re-use the same user-agent string for different devices, which Apple did with its iPad 2 and iPad Mini tablets.

- Mobile sites that leverage HTML5 can tap into the GPS location of visitors if individuals grant permission to access this data. The ability to pinpoint where visitors are by specific GPS locations far exceeds the geographic precision that can be provided for desktop visitors based on IP address.

- Screen size or resolution isn't foreign to website analytics, but its importance increases for devices with smaller, more varied form factors. The orientation of the screen (portrait or landscape view) adds a new twist that isn't a concern in the desktop world, as well as the fact that users are not interacting with the mobile site by clicking but by touching and swiping.

Although the mobile web is primarily reliant on the JavaScript-based page tagging approach for data collection, mobile app tracking uses an entirely different client-side approach that is more conducive to capturing native app activity. Web analytics vendors have created software
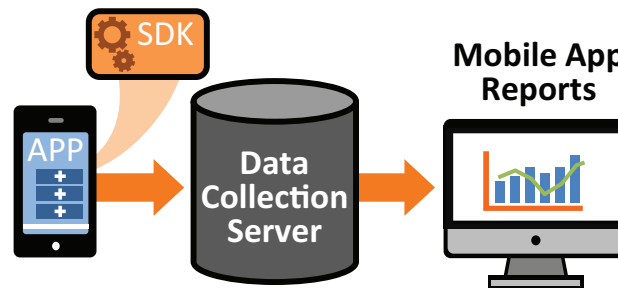

Figure 38: The software development kit (SDK) provides analytics code that streamlines the process of measuring mobile apps. The SDKs are written in the native programming languages of each mobile platform rather than JavaScript.

development kits (SDKs) for various mobile platforms such as iOS, Android, Windows, and Blackberry. Analytics SDKs provide a package of code that developers can insert into applications, which can be tailored to measure different app-related dimensions and metrics (Figure 38).

The SDKs help to streamline the measurement process because developers don't need to write their own unique tracking code. For example, an iOS SDK will provide measurement code in the Objective C programming language that is

used to build iPhone and iPad applications. Once a mobile application has been implemented with tracking code, it will send data directly to the data collection server whenever the mobile device is connected to a mobile network.

	MOBILE WEB	MOBILE APPS
DIFFERENT ⬛ ≠ ▯	→ Unique mobile dimensions / reports → GPS location (HTML5 sites) → Smaller, diverse form factors → Touch & gesture interactions	→ SDKs for tracking code → Screen views and other unique metrics → User IDs instead of cookies → Access to device features → Shorter session timeout → Offline usage → Version fragmentation → Cohort analysis emphasis
SIMILAR ⬛ = ▯	→ JavaScript tags → Traffic, engagement and conversion metrics	→ Event Tracking → Engagement and conversion metrics → Campaign tracking

Figure 39: This table summarizes the differences and similarities between web analytics and each of the two mobile analytics areas.

Besides using SDKs to deploy analytics code, mobile app measurement is different from both mobile web and website tracking in several ways (Figure 39):

- Say goodbye to page views and hello to **screen views**. Applications don't have pages like websites, but users do interact with various screens. You also have **sessions** instead of visits. Despite these subtle differences, you're essentially trying to understand the same thing—usage. Understanding the usage of specific screens is just as important as knowing which content is or isn't being consumed on a website.

- For mobile devices you can measure more than just what appears on the screen as mobile app analytics can access other built-in features, such as the device's accelerometer, gyroscope, GPS, and storage capabilities. Web measurement is limited to just the content that is seen in the web browser and some basic information about the computer, IP address, and referral source. Mobile app measurement offers the ability to track new types of user interactions that aren't seen on the Web.

- Unique users (not visitors) are identified via **user IDs** instead of cookies. A small database on the mobile device functions like a cookie by storing a unique identifier for the user. User IDs are more resilient than cookies, which are susceptible to being deleted. Due to mobile carrier contracts, people are often locked into using the same device for at least two years. In addition, due

to the personal nature of mobile devices—especially smartphones—you're more likely to understand behavior for a specific individual as opposed to a shared family computer that could have several users. User IDs can persist across version updates so that users are not lost when they upgrade. With user authentication the same unique user can be recognized across multiple apps and devices.

- Mobile apps have a shorter session timeout than that of websites. In general, a session will end after 30 minutes of inactivity for websites. For mobile apps, however, the session timeout may be as short as 30 seconds of inactivity due to a shorter perceived attention span. In addition, when users are multitasking and the app remains idle in the background for longer than the timeout duration, a new session will be triggered when the user returns to the app.

- Depending on how the application was developed, a user may not need to be connected to a mobile network to use the mobile application. Analytics tools can store what offline interactions occurred, record when they happened with time stamps, and then upload the data to the collection server when the user re-connects to their mobile network.

- App development teams are frequently rolling out updates and new versions. Unlike websites where all visitors receive essentially the same experience, an app user's experience will depend on what version she's using. When analyzing mobile app data, you can have users who are spread across different versions with potentially dissimilar app experiences.

- There's a greater emphasis on **cohort analysis** where distinct groups of users are measured over time to evaluate app retention or churn rates. By analyzing weekly cohort groups based on when they installed the application, you can evaluate the effect different app updates are having on retention as well as the app's overall performance in terms of engagement and conversion.

Aside from these key differences, mobile app analytics still inherits familiar measurement practices from web analytics. Web analytics and mobile analytics may not be siblings, but they're still closely related—first cousins, perhaps?

For example, measuring **engagement** is a key emphasis for mobile app analytics—something that has been frequently measured in web analytics. When measuring the effectiveness of mobile apps, downloading the app is only the first step for users. Organizations want to know how engaging their mobile apps are and whether users are using them on a regular basis. **Event tracking** is employed in apps to provide insights into how users are interacting with features within each

NOTE: Campaign tracking is another mainstay of web analytics (page 93), and it has surfaced on the mobile apps side. For example, campaigns can be tied to the Google Play Store (Android apps) or the iTunes Store so that you can understand which campaign and traffic source led to an app download. In addition, some organizations are deep linking from their mobile sites into their mobile apps and tracking these links like campaigns.

application. Similarly, measuring in-app **conversions** shows how successful each app is at driving specific key outcomes.

As long as you're aware of the subtle differences from web analytics, mobile analytics represents an exciting, new frontier for digital analytics.

Cross-Device Measurement

A 2012 research study by Wireless Intelligence found that U.S. mobile subscribers owned on average 1.57 devices.[12] With the growing popularity of web-enabled mobile devices, a single individual may interact online with one organization through various means besides just a computer. Typically, this individual will be tracked as separate unique visitors from each device. Cross-device measurement is a holy grail for digital analytics, and it involves stitching together the different cross-device interactions for a single user.

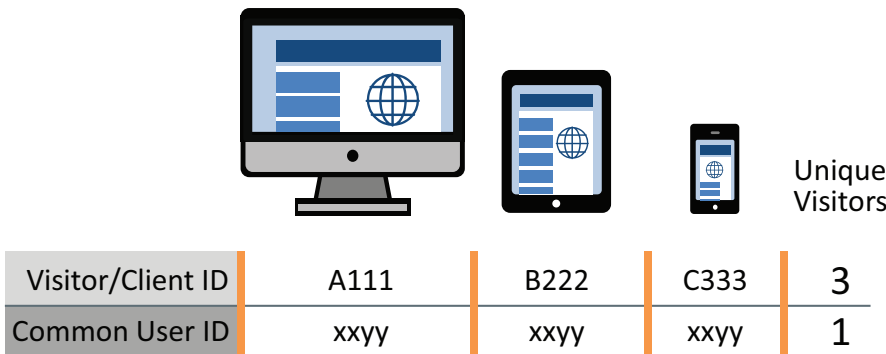|				Unique Visitors
Visitor/Client ID	A111	B222	C333	3
Common User ID	xxyy	xxyy	xxyy	1

Figure 40: On each device, an individual will be identified by a different visitor or client ID, resulting in three separate unique visitors for the same person. A shared or common user ID can be used to identify the same visitor across all the devices.

Rather than evaluating performance separately by various device types, cross-device measurement gives marketers a complete picture of visitor interactions across devices (Figure 40). Without a holistic view of how visitors touch different devices, it becomes more difficult for marketers to attribute conversions appropriately. For example, even though smartphones might not drive a lot of immediate orders, they might influence subsequent transactions through a tablet or desktop device.

Identifying visitors across multiple computers has been a longstanding challenge for web analytics tools. Over the years companies knew some visitors might visit their websites from a work computer or secondary laptop in addition to their home desktop computer. Now with the explosive growth in web-enabled devices,

there is even more interest in solving the cross-device identification problem. Web analytics vendors have sought to solve this issue in different ways, but one of the most common approaches is to assign a single user ID to an individual across devices and sessions, which is different from a client or visitor ID that is unique to each browser or device that the individual is using.

In most cases, the responsibility for managing the unique cross-device IDs is left to each organization, which can be the most challenging aspect. These current approaches fall short due to a few key hurdles, which will continue to limit the usage of cross-device identification until its benefits can be extended to a broader base of companies:

- **Signed-in experience only**. In order for a common user ID to work, the user must somehow identify himself to your organization on each device so that the same user ID can be assigned across devices. User identification typically involves some kind of authentication process where the individual logs in from each device. If the visitor fails to login from one or more devices, he will remain anonymous on those devices. The cross-device measurement will be incomplete and only provide a partial picture of device interactions.

- **Pre-login activity**. The vast majority of websites and apps don't currently require an upfront sign-in before allowing users to access online content. Without establishing the user ID at the beginning of the first session, the user would be anonymous until she eventually signs in. In an online store example, the user wouldn't be recognized until she reaches the checkout process where the user is required to sign-in. As a result, her pre-login interactions and traffic source information would not be linked with her post-login interactions (Figure 41). Similarly, previous visits by the same visitor would also not be associated with the user ID. To connect the user with pre-login interactions and visits, a web analytics tool would have to re-process the anonymous clickstream data so that it can be tied to a specific user. Google Analytics has partially solved the pre-login activity within the same session with its session unification feature, but as far as I know only Adobe's Data Workbench tool supports cross-session re-processing.

- **Privacy concerns**. Even though cross-device measurement identifies the same individual across multiple devices, the user should still be treated as anonymous. For example, you can't use any personally identifiable information (PII) for the user ID such as an e-mail address. Your privacy policy needs to be in synch with any cross-device identification you're performing. It may determine how you will handle users that have been identified in the past on different devices but don't sign-in from those
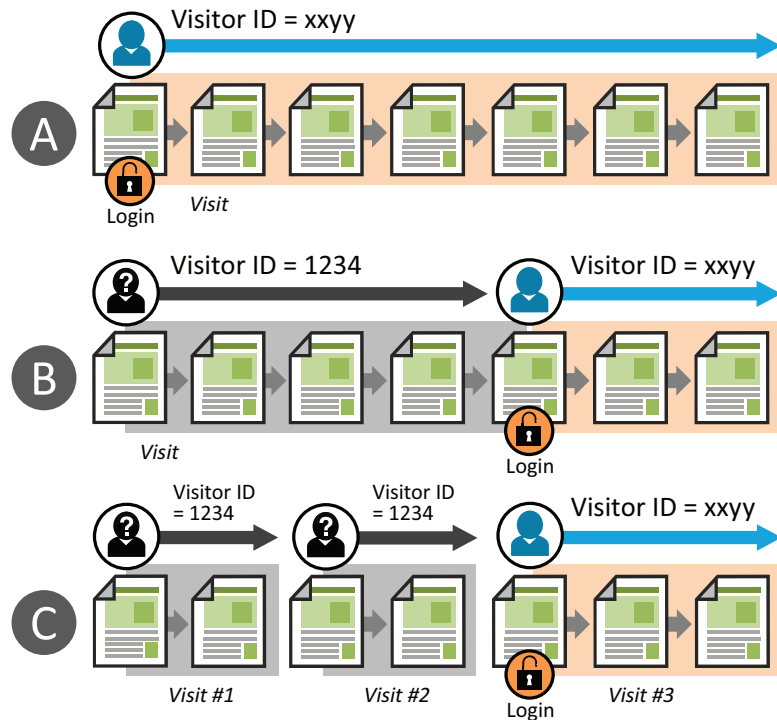
Figure 41: In scenario A, if users are asked to log in at the beginning of their visit, then you'll be able to capture all of their interactions during the entire visit. However, signing in at the beginning of a session isn't that common, which means the behaviors prior to logging in are associated with a different anonymous visitor or client ID (scenarios B & C).

devices during subsequent sessions. Technically, once a user has been identified, he doesn't need to be signed in again to maintain his identity but this may conflict with your privacy policy.

Despite the hype around cross-device measurement, the current authentication limitations still impede its widespread adoption. Some organizations have turned to more advanced data mining tools to stitch together visitor or user interactions across devices or channels (in-store, call center, and so on). For example, Adobe Analytics Premium is focused on customer analytics, measuring customers' online and offline interactions. In addition, the technology landscape is shifting rapidly to adapt to the multi-device world. For example, Google introduced a Google+ sign-in service similar to Facebook Connect where Google+ users can log into both websites and mobile apps. Future innovations that bridge the mobile and web environments may open the path for more streamlined cross-device measurement.

Data Enrichment and Integration

Web analytics tools can capture vast amounts of data on your digital marketing initiatives and properties. However, web analytics doesn't have a monopoly on useful marketing data, which can often live within other business systems or marketing tools. Even though the boundaries that once defined web analytics have changed dramatically, it won't necessarily collect all of the data that's needed to assemble a comprehensive picture of digital performance.

Fortunately, most advanced web analytics tools can combine clickstream data with data from other existing systems. By integrating the data from other *relevant* sources, marketers and business users can gain richer insights into online visitors and really understand how their digital properties are performing. This is not like a Big Data project where you're amassing data from diverse sources and then hoping that a data scientist will be able to piece together some useful insights. In this case, you're pinpointing specific data from other systems that, when combined with your clickstream data, will enable you to answer key business questions. It will often fall into the category of *if we could merge x with y, we'd be able to answer a, b, and c*. The right data integrations can often generate competitive advantages for organizations that are able to use their data more strategically.

When you integrate data from other systems, there are two main types of integrations: **user related** and **data element related**. For either of these approaches to work there needs to be a shared key that can connect data from other sources to the web analytics data (Figure 42). A unique identifier acts as the key or bridge between the two separate datasets and enables them to be tied together. In the user-related integrations, an anonymous visitor or user ID is the connection point between the two systems. Having a common visitor or user ID enables the data from the other system to be tied to the visitor's online behavior. In the case of data-element-related integrations, a unique identifier such as a product SKU, campaign tracking code, or article ID can be used to upload additional attributes (metadata) to further enrich the online reporting.
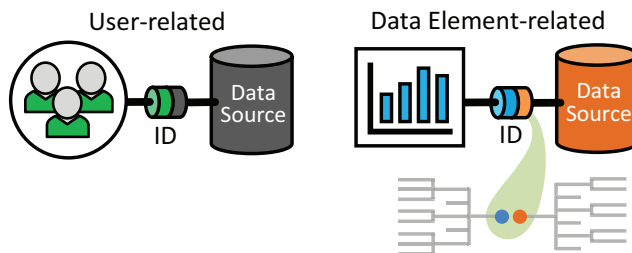

Figure 42: There are two types of data integrations: user related and data element related. Both types require an identifier to link data from other sources to the clickstream data.

Each web analytics tool will have a slightly different approach for uploading data from other *data sources*. Adobe Analytics uses a process called data sources to upload dimensions and metrics into its custom variables (eVars and custom events). For tying systems together, *transaction IDs* are used to link online and offline behaviors. A transaction ID is set at a key outcome, such as a lead submission or e-commerce transaction. Then the organization can upload offline data to understand the visitor's entire journey: online *and* offline combined. For user-related integrations, Google's Universal Analytics provides separate *custom dimensions* and *metrics* for importing data. These custom variables can only be passed into its Universal Analytics system with another data element (page view, event, and so on). For both tools, careful planning is required because the data cannot be deleted or removed once it is imported into the web analytics systems.

In the case of data-element-related integrations, Adobe Analytics uses *classifications* to add metadata to existing data elements in the web reports. Using a spreadsheet, you can map data element IDs in a variable to values for additional dimensions or classifications. For example, for a product SKU for a pair of shoes you could assign data for the category (men's shoes), type (soccer), brand (Adidas), color (red), and material (leather). The classification data is uploaded into Adobe Analytics via an FTP (File Transfer Protocol) server or API (Application Programming Interface), and it retroactively applies to all corresponding data element IDs within the variable. Google Analytics' *dimension widening* feature can only be used as hits occur and cannot be applied to historical data.

As I mentioned before, lots of useful and compelling data lives in other systems outside of your digital analytics tool. When this data is combined with your clickstream data, you'll unlock new insights that aren't available in either system independently. It really becomes a scenario of "one plus one equals three." For example, if a retailer tied its COGS (cost of goods sold) data with its online sales, it could optimize its online marketing efforts based on gross margin instead of just revenue. Rather than featuring low-margin, high-revenue items in its promotions, it could instead focus on selling more high-margin products.

The **Digital Data Ecosystem** covers five key types of data that can be connected with your clickstream data, which can complement and expand upon the insights you currently receive from web analytics (Figure 43). With diverse business models and unique business systems there are limitless possibilities for data integrations, however, the following core areas represent some potential starting points:

- **Campaign data**. Although web analytics captures campaign data once a visitor has been acquired, all of the preceding interactions before the visitor lands on a web property are invisible. For example, web analytics cannot
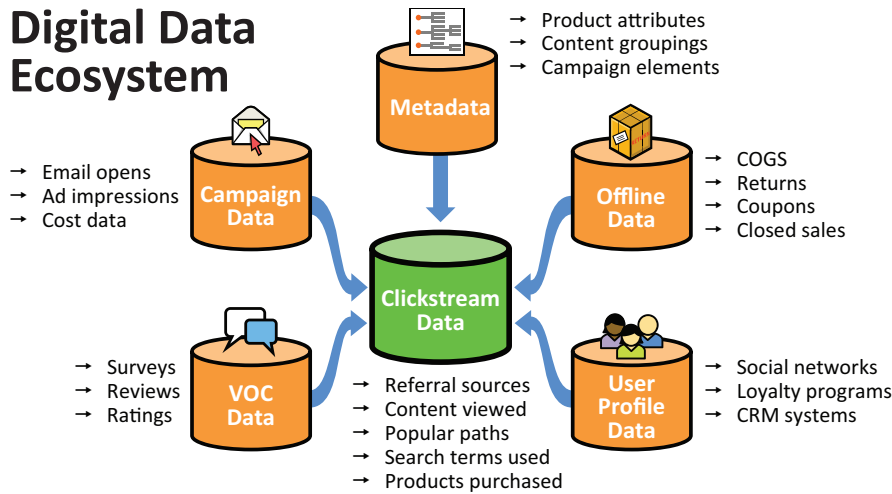
Digital Data Ecosystem

Figure 43: Various forms of data can be linked with clickstream data to provide new and deeper insights into online performance and visitor behavior. Data integrations can be game changers.

measure how many ad impressions there were for an external ad or how many e-mail messages were sent and opened. In addition, campaign cost data is not inherently available within web analytics tools. By integrating additional campaign data, marketers will have a holistic understanding of campaign performance. They will be able to simultaneously evaluate exposure and awareness with engagement and conversion. In addition, having the cost data will help marketers to spend their marketing budgets more wisely and maximize the return on ad spend.

- **Metadata**. With web analytics you can collect all kinds of data as visitors interact with websites or applications. However, metadata (data that describes other data) isn't always available when multiple data elements are being captured. Having the ability to upload metadata into your web analytics tool provides two key benefits. First, metadata enables you to aggregate discreet data elements into more manageable groupings. For example, instead of looking at individual article IDs you could roll up consumption metrics by author or category. Second, metadata helps to surface different insights that wouldn't be visible without an attribute breakdown. Although you might know which product sales were driven by a particular campaign, it might not be as obvious that a particular color or style outsold others ten to one without product metadata.

- **Offline data**. A customer's journey may begin online, but in many situations it will continue into other offline channels such as a call center, store, or

salesperson. The online channel may only capture micro conversions within the larger scheme of key outcomes. Whenever applicable it is important to tie your clickstream data to offline macro conversions. For example, a financial services firm may capture mortgage applications online (leads). It would be beneficial to its marketers to know which marketing campaigns are driving the most approved, high-value loans. If the marketing team only evaluated its campaign efforts based on leads generated, it might not realize it was relying on marketing channels that were generating a lot of declined or low-value applications. Retailers can also gain a clearer, more accurate picture of online performance by integrating cost-of-goods-sold, fraudulent orders, and returns data. Integrating relevant offline metrics can significantly increase the precision of your digital marketing efforts.

- **Voice-of-Customer (VOC) data**. Web analytics can shed light on visitor behaviors (who, what, when, how), but it typically captures no insights on visitors' attitudes, beliefs, or opinions (why). Often marketers wonder why visitors abandon on a particular page. When there's an obvious problem with the page it is easy to deduce what's contributing to the abandonment (a button is missing which enables the visitor to move to the next page in the process). The user experience issues might not be as obvious, however, and then analysts are left to guess what may be causing people to behave a certain way. Your website may gather valuable attitudinal data through online surveys and ratings that can be leveraged to enhance your visitor insights. For example, if your company performed Net Promoter Score (NPS) surveys online and integrated those scores into your web analytics tool, you'd be able to segment the unique behaviors of your detractors and promoters. You might discover that these two groups interact with different tools or content on your site, which could lead to meaningful optimization opportunities.

- **User profile data.** The more you know about your visitors, the better you can target relevant content and offers to them. Web analytics collects insights on their online behaviors across your web properties. However, unless they are asked to volunteer information about their preferences, interests, and demographics through some kind of online registration process, your user data will be limited to just their digital interactions (referrer, campaigns, content, browser type, geolocation, and the like). In order to augment the understanding of your visitors, user profile data from systems such as Facebook Connect, an ad serving network, a CRM (customer relationship management) system, or a loyalty program can be linked with your clickstream data. To connect a user across two or more systems, an online user authentication process (log in or sign in) or shared identifier is typically required. With additional

information on non-identifiable user attributes such as gender, you'd be able to segment women's online behaviors from those of men to better understand what products, content, and site features appeal to each gender.

With a wide variety of different integration options, you need to prioritize which additional insights would be most beneficial to your business based on your digital strategy. Data integrations aren't necessarily simple and will require technical resources and know-how to set up. Depending on the specific business system and your IT team's technical expertise, it may be relatively straightforward or very difficult to integrate a particular data source with your web analytics data. Most of the efforts will center on getting the data into an acceptable structure and format that can be readily consumed by the web analytics system on a recurring basis. A good understanding of both systems' capabilities will be critical to building a successful integration.

Fortunately, web analytics vendors have pre-built integrations to facilitate the sharing of dimensions and metrics between marketing systems. For example, Adobe has established an ecosystem of pre-built data connectors with various marketing technology partners, such as e-mail service providers and ad networks. It also offers native integrations for other related solutions (social media, A/B testing, rules-based targeting, content management, ad management, campaign management) within its Adobe Marketing Cloud. Google has created integrations for Google Analytics with its advertising offerings (AdWords, AdSense, and DoubleClick) so marketers can access ad cost, revenue, and impression data. In addition to importing data from other systems into your web analytics tool, enterprise-class digital analytics solutions also give you the ability to export raw clickstream data (very large files on a daily basis) out into an enterprise data warehouse (EDW) where it can be merged with other company data. Due to the increasing importance and scope of digital data, it is common to see data being both imported into and exported from web analytics systems at most large corporations.

Tag Management

The introduction of tag management systems (TMS) represents a major evolution in how web analytics tags are deployed and managed over time. As the JavaScript tag approach became the primary means for measuring online activity and adding new functionality, all kinds of marketing technology vendors ended up adopting it. E-mail, search marketing, affiliate marketing, behavioral targeting, testing, voice-of-customer, ad networks, social media, and other marketing services introduced their own unique tags. As a result, digital marketers found they

were deploying and maintaining tags from multiple vendors—along with those from their web analytics tool(s). In some cases, large companies were dealing with more than 20 tags on their web pages. The increased proliferation of tags presented several challenges:

- Manually adding, updating, and removing multiple tags burdened overloaded IT teams and agency partners with yet another time-consuming responsibility.

- Tags could be deployed or updated during web development and code release cycles only, which did not always coincide with marketing timelines and led to unwanted delays.

- Each tag added several lines of JavaScript code and a call to another data collection server that could slow down page load times and ultimately degrade the user experience.

- Added complexity introduced more opportunities for human error and tag conflicts, which could translate into data loss, interfere with web pages loading properly, or inadvertently trigger security warnings for users.

- The ad-hoc insertion of third-party tags meant that companies had little insight into what tags were on their web properties or control over what was being collected, which could lead to data privacy issues.

To address these issues, organizations have turned to various tag management systems, which now play a critical role in deploying and maintaining web analytics and other marketing tags (Figure 44). Instead of adding multiple lines of code to each web page for different vendor tags, a company places a single line of code for a **container tag**. This container, or master, tag determines which vendor tags to set on the page and how to populate variables based on settings that are configured in the TMS. Through an intuitive web console, digital marketers can deploy, edit, and remove vendor tags at the click of a button. Using various vendor-specific templates you can specify different rules or conditions for all your marketing tags.

To quickly serve up the container tag, most TMS vendors rely on content delivery networks (CDN) to optimize its transfer to web pages. A CDN has a collection of geographically dispersed servers in key data centers around the world that deliver cached content (in this case the container tag) to users based on their proximity. Some tag management systems offer companies the option to host the container tag on their own servers instead of a CDN.

Initially, the container tag would pull values from specific page elements within the HTML using the **DOM (document object model)**. The DOM is web development API, which specifies which HTML elements are found within a page (you can think of it as an org chart for web page elements). JavaScript uses the DOM to
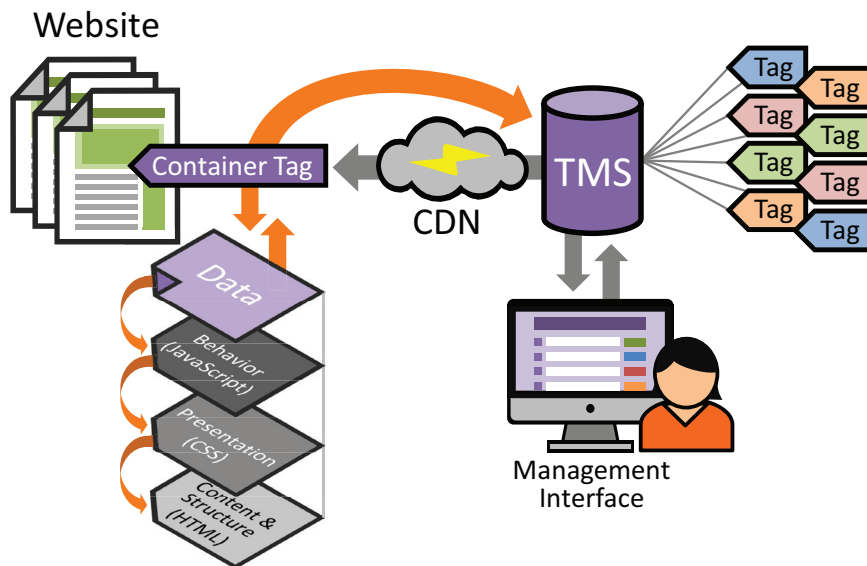
Figure 44: Tag management systems (TMS) use a container tag to serve up the different marketing tags. Marketers can configure and manage the various marketing tags through an intuitive web interface. When available, a data layer within the HTML page can expose the different data elements for the TMS to access and use.

access and manipulate the content, structure, and style of the web pages. The container tag could look in the HTML for a value and map it into a designated variable. This DOM-based approach can be problematic because it depends upon consistent naming conventions and structure for data continuity. If a web developer changes the name or location of an HTML element (the submit button for a registration form, for example), it could break a rule in the web console and prevent data from being collected.

Most tag management solutions are now relying on a **data layer** to obtain information from each web page. Previously, there were three layers that defined different aspects of a web page: content and structure (HTML), presentation (cascading style sheets), and behavior (JavaScript). The data layer is a fourth layer that holds all of the data elements in an easily accessible JavaScript object or section within the HTML page. Rather than having to comb through the HTML document for specific values using the DOM, the container tag just has to focus on the data layer, which remains consistent regardless of whether the page's structure or design changes. The data layer doesn't just apply to what appears on page load as data on user interactions can be saved to the data layer as well.

To use an analogy, the data layer is like a fish market. As a sushi chef, you could go out and fish yourself (DOM approach), making sure to use the right bait and

fishing technique in the correct location and depth. Preferably, you could just go to the fish market where all of the fish are laid out before you to pick and choose. Because you're not the fisherman, you don't have to worry about fluctuating factors such as weather conditions and water currents. The data layer simplifies the process of accessing the right data elements hidden within web pages. The growing importance of this new layer has resulted in various TMS vendors coming together to define a W3C industry standard for the data layer's format and syntax.

Although it is a relatively new technology, tag management has had a profound impact on the web analytics industry. While the primary audience of the web analytics reports shifted from IT to marketing, the implementation process remained highly dependent upon IT involvement. A TMS doesn't necessarily eliminate IT's role in deploying and updating analytics tags (don't believe the vendor hype). For example, the container tag still needs to be implemented, and a data layer may need to be created. Your marketing team may need to earn your IT team's trust before it permits ad-hoc tag updates. However, a TMS does significantly reduce marketing's reliance on technical resources over time, which is good for both teams. Marketing is able to be more agile in a fast-moving digital environment, and IT frees up valuable resources to focus on more strategic tasks and projects.

In relation to web analytics, tag management solutions offer marketing organizations many benefits:

- **Faster time to market.** For large organizations, a new web analytics solution can take several weeks or months to manually deploy. A TMS can significantly decrease the time it takes to deploy new web analytics tags, however, shortening the duration of an implementation project from months to weeks or from weeks to days.

- **More control.** Rather than being dependent on technical resources and IT release cycles to deploy or update code, marketers can play a more active role in managing their own data collections. A TMS offers a simple, drag-and-drop web interface, which enables non-technical staff to make timely updates without always relying on IT resources to add or customize JavaScript code.

- **Enhanced flexibility.** Organizations need to be able to adapt their tracking to changing business needs. With a TMS in place, marketing teams can quickly add new tags, update outdated tags, and remove unwanted tags. Being more adaptive and responsive to change helps digital reports to stay relevant and useful.

- **Better data.** Tag management solutions introduce a more systematic, process-driven approach to deploying analytics code, which reduces the likelihood of errors in the data collection process. Putting the tagging responsibility in the hands of marketers and analysts ensures business requirements are properly translated into meaningful reports.

- **Improved page load performance.** Having a TMS in place avoids any concerns that the web analytics tag is causing pages to load slowly and interfering with the user experience.

- **Greater operational efficiency.** By releasing IT from most of the burden of deploying and maintaining tags, technical resources are freed up to work on other strategic tasks or projects.

- **Lower switching costs.** A data layer and TMS reduce the level of effort it takes for a company to remove an existing digital analytics solution and replace it with another one. Being locked into specific vendor tags becomes less of an issue.

Digital marketers can choose from a host of paid tag management solutions (Ensighten, BrightTag, and Tealium, among others). Most of these systems not only support tag deployment for websites but also mobile applications. Adobe and Google also offer their own tag management solutions (Adobe Dynamic Tag Management and Google Tag Manager), which are free for their customers. As the tag management industry continues to evolve and mature, it will play an integral role in how digital analytics solutions are deployed and maintained.

Not Technical, Just Tech-Savvy

A few talented individuals are ambidextrous when it comes to both business and technology. They can just as easily code a new JavaScript plug-in as lead a strategic discussion around your cross-channel marketing efforts. You love to work with these individuals (if their egos are in check), but they're not that common in the wild (less than 1% or even 0.1%). For the vast majority of us who sit on the business side, technical considerations can be intimidating and confusing. The goal of this section wasn't to turn you into a technical expert but to make you more comfortable with the technical aspects of web analytics and appreciate what's happening under the hood.

By being a little more tech-savvy, you'll be able to form a better working relationship with your technical team and be in a better position to unlock the

> "Once a new technology rolls over you, if you're not part of the steamroller, you're part of the road."
>
> – Stewart Brand

full potential of your web analytics solution. Similar to the business essentials section, I'll leave you with six key technical principles that could help shape your digital measurement efforts.

1. Garbage In, Garbage Out

All forms of analytics are only as good as the raw data they collect. Advanced analytics tools can't compensate for poor quality data. With Big Data, you often have little to no control over the data that is received, because it is coming from various systems inside and outside your business. In many situations, the raw data is what it is—take it or leave
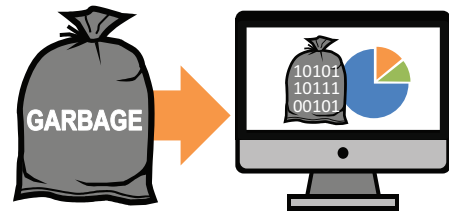
Figure 45: Web analytics is only as good as the data that you feed into it. A bad implementation will handicap any web analytics system.

it. However, in the case of web analytics, you have influence or control over the implementation that feeds your digital reports.

If these reports are useless or can't be trusted, you most likely have a broken implementation process. Rather than simply blaming your web analytics tool, identify the root cause of the problem. It could be anything from poor requirements gathering to inadequate data validation. The issue could also stem from the technical resources not being sufficiently trained on how to properly deploy the solution or from outdated IT policies that limit how web analytics can be deployed or maintained. You have a vested interest in finding a solution to whatever process issues may exist in order to get the right data you need (Figure 45). If you can fix the input, the output will improve.

2. The More You Put In, the More You Get Out

Many organizations have deployed web analytics tools but failed to tailor them to their unique business needs. Without any customization, a web analytics solution will provide only basic information on the usage of different web properties (Figure 46). If the executives at these companies are only mildly curious about their digital channel then that might be sufficient. Some data is definitely better than no data, and it's unlikely they'll act upon the data anyway. However, for the rest of the firms that are taking digital marketing seriously, these generic, out-of-the-box reports are only a starting point. They will answer only the most basic business questions and leave many important ones unanswered.

To fully understand the inner workings of your digital business, you will need to invest in tailoring what's measured to your specific business needs. The more deeply you wish to understand your visitors and how your digital marketing initiatives are performing, the more time you'll want to spend on crafting and refining your implementation. As you seek further enlightenment, you'll end up using more custom variables, event tracking, and even data integrations. It is often an iterative process where you roll out additional tracking over time to further augment existing data and reports. Even though it requires more work, if done right customization can yield a huge payout.
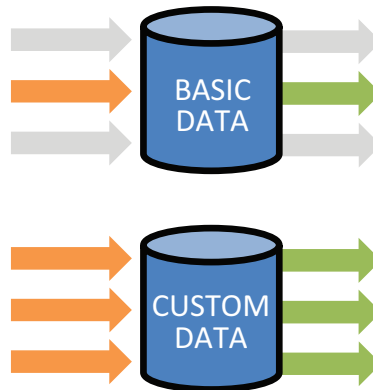

Figure 46: Without customization to your specific business needs, web analytics can at best provide only basic insights.

3. Separate Need-to-Know from Nice-to-Know

With a plethora of options for what can be measured in the digital space, it's important to separate what's *need-to-know* from what's *nice-to-know* (Figure 47). In both cases, you're attempting to answer business questions, but there are differences between these two types of data. Need-to-know information is critical to your business or your specific role; it can't be ignored and will be important to you over time. Need-to-know data is directly connected with your business goals. If you discover significant shifts in this type of data, it will influence or change how you market or operate.
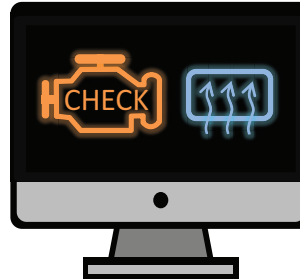

Figure 47: Recognize which data is need-to-know (high priority) and which is only nice-to-know (lower priority).

On the other hand, nice-to-know information stems from business users trying to verify a particular hypothesis or broaden their understanding on a subject. Nice-to-know information is generally more disposable. Once you gain a specific insight or confirm a hunch, you don't care about the reports anymore. Nice-to-know data rarely leads to any tangible actions because no one is held accountable to the numbers.

The danger of nice-to-know information is that it can burn through valuable time that could have been spent on capturing and analyzing need-to-know

data. Nice-to-know information is not free, and it can end up being quite expensive if it's complicated to set up and unlikely to be acted upon. Technical and analytics resources can't always discern between what's essential and what's ancillary so it's up to business users to carefully filter and prioritize their business requirements appropriately.

4. Partner with Business-Savvy Technical Resources

If you've ever attempted to speak in a foreign language with someone, it's always easier when the other individual is somewhat familiar with your native tongue. The conversation might end up being a mixture of both languages, but you're more likely to come away with a mutual understanding. The same applies to business users who are working with technical resources to translate their business requirements into meaningful web reports. When both sides know where the other side is coming from,

Figure 48: When technical experts can speak the same language as business users (and vice-versa), you'll see more traction with your web analytics program.

they'll be able to collaborate on creating a better measurement solution.

Whenever possible seek out technical resources who don't just know the technology but can also appreciate the business rationale behind your web analytics requirements (Figure 48). They'll be able to meet you in the middle to help you navigate through your company's technical infrastructure to achieve your measurement needs. This partnership will help to avoid costly missteps and result in an implementation that is more finely tuned to your business needs. Some marketing teams have found success in hiring business-savvy technical staff to work closely with marketers and champion their needs to the broader IT organization as needed.

5. Maintain to Gain

For large companies, a significant amount of time and effort can go into determining the business requirements, architecting the right implementation approach, and then deploying the tracking code across multiple web properties. However, some organizations make the mistake of ignoring what happens after the initial deployment. Web analytics can't be treated as a *once-and-done project*; it has to be

managed as an *ongoing program* to ensure the reports remain relevant and useful over time (Figure 49). As new campaigns or site content is rolled out, standards need to be maintained so that the data remains clean and consistent. Too often the report quality erodes over time when there is no oversight in place.

Besides the normal ebb and flow of digital marketing activity, eventually a company will outgrow its current implementation or need to re-align its measurement efforts to

Figure 49: Web analytics can't be a once-and-done project. The implementation needs to be maintained over time to continually benefit your company.

new business priorities. Business strategies rarely remain static, especially in the digital arena. Web analytics implementations must be dynamic and adapt to the business's current reporting needs. When an implementation becomes outdated or misaligned, the web analytics tool is often blamed for providing inadequate or irrelevant data. You can't blame your suit or dress for not fitting perfectly if you've recently gained or lost a significant amount of weight. The clothing simply needs to be tailored or fitted to your current dimensions—not those from three years ago. As your business changes significantly, don't forget to update your digital measurement strategy.

6. Let Technology Do the Heavy Lifting

The pace of digital marketing is not going to slow down. When web marketing first started, marketers and web analysts only had to worry about a limited set of online dimensions and metrics. As digital marketing has extended beyond just websites into other digital channels and the level of analytics sophistication has increased, it can be a struggle to keep all of the plates spinning in the air.
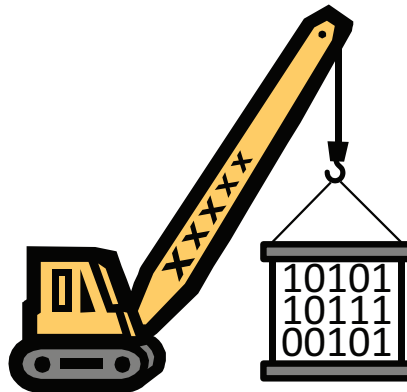
Whenever possible, companies must rely on technology to help automate as many manual tasks and responsibilities

Figure 50: Wherever possible allow technology to handle repetitive, labor-intensive tasks.

as possible. The web analytics industry has introduced more functionality that

enables users to streamline low-level tactical matters with business rules or algorithms to simplify both implementation and reporting. In many cases, repetitive but essential tasks no longer need to be performed manually. If you find your analytics resources are stretched too thin, explore what labor-intensive tasks or processes might be automated (Figure 50). Even if it requires a small investment in additional technology, freeing up valuable resources for more strategic, high-value work could easily pay for itself several times over.

In this chapter and the previous one you learned about both the business and technical essentials of web analytics. With a firmer understanding of both the *why* and the *how*, you're now prepared to examine the process of digital measurement. Depending on your current role and exposure to digital data, you may not fully comprehend how all the aspects come together in a successful web analytics program. The final chapter walks through the entire process of how data is transformed into valuable enhancements for your digital business.

CHAPTER 4

THE PROCESS OF DIGITAL MEASUREMENT

"Successful organizations make habits of things others don't like to do, or don't find time to do."

– Don House

After reviewing the business and technical essentials of web analytics, you should have a better understanding of how web analytics works and how to take advantage of it for your particular business needs. However, you still need to appreciate one final aspect of web analytics which will be critical to your long-term success, and that is **process**. To take full advantage of your web analytics at your organization, digital measurement must be handled as an *ongoing process or program*—not just an ad-hoc, occasional event.

The promise of Big Data has opened marketing executives' eyes to the many possibilities that data has to offer: untapped customer audiences, more precise targeting, more cost-effective campaigns, deeper customer insights, and so on. With innumerable benefits at hand, many organizations are aspiring to be more data-driven, but very few possess the requisite *discipline* to truly achieve it. Consequently, they make some of common mistakes with digital analytics:

- Lack of clarity around key business objectives
- Too much emphasis on reporting instead of analysis
- Lack of process in handling ad-hoc business questions and report requests
- Being reactive with analytics instead of proactive
- Becoming paralyzed by the need for perfect data

- Not slowing down to understand, fix, or enrich the data
- Expecting the data to do things it wasn't intended to do
- Chasing shiny objects instead of focusing on the fundamentals

Most marketers would agree that online data has the potential to be incredibly valuable to their organizations, but for whatever reason it can often fall short. When it does, the technology typically takes the blame, but the real reasons frequently lie outside of your web analytics tool. You may have seen one or more of these listed mistakes being made at your company. Most, if not all, come down to a lack of process or discipline related to digital measurement efforts. When these slip-ups occur they interfere with or limit the value you could receive from web analytics. Rather than receiving value on a repeated basis, it may end up being just a random occurrence. That's not acceptable, and something needs to be done about it.

In my book, *Web Analytics Action Hero*, I introduced the concept of the **Path to Value**, which uses the metaphor of a domino line to represent the crucial steps that are necessary for generating value from web analytics (Figure 51). If any of the dominoes in the line is missing or out of alignment then you cannot generate value from your web analytics tool. Each domino is dependent on the preceding one to fulfill its own role. If you take a closer look at each success factor, you'll understand how they each contribute to value generation from analytics.
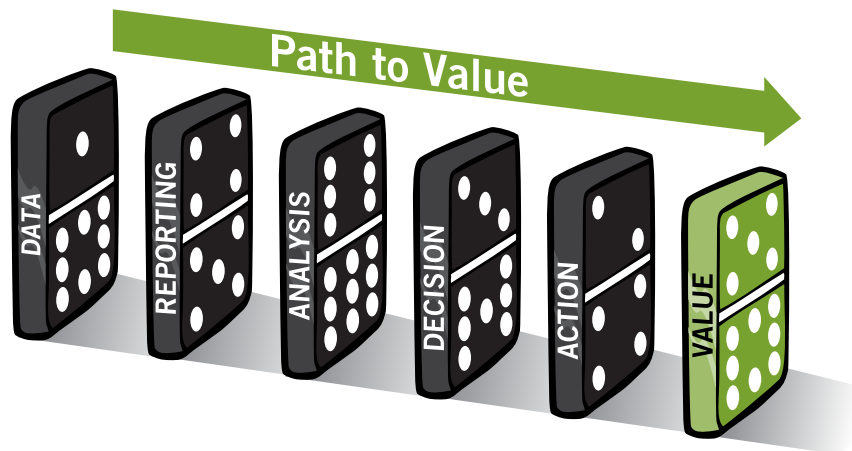

Figure 51: The Path to Value highlights the key steps to driving value from analytics. The process begins with data and is then dependent upon subsequent dominoes falling into place to achieve the expected value.

1. **Data**. The path starts with having good, reliable data. All of the subsequent dominoes are dependent upon it for success. If your organization doesn't find its data relevant, useful, or trustworthy then nothing productive will happen until those problems are resolved.

2. **Reporting**. Next the raw data is turned into meaningful information that sheds light on different areas of the digital business via custom reports and dashboards. Effective reporting gives a broad audience of business users an important lens into online performance, fostering understanding and providing context. Ineffective reporting can actually interfere with analyzing and extracting insights from the collected data.

3. **Analysis**. This step involves identifying actionable insights within the various reports that your business can use to enhance its marketing activities. Reporting will rarely initiate any action on its own as analysis is required to help bridge the gap between data and action. Analysis results in findings and recommendations that are used to influence business decisions. Unfortunately, most organizations spend more time on preparing the data and building reports than performing actual analysis.

4. **Decision**. When a recommendation is made to optimize the way something is being done, a manager or group of executives typically needs to decide what action to take. Even though an effective analysis can build a compelling business case for a particular enhancement, it doesn't guarantee that the right decision will be made. Politics, egos, and power issues can get in the way. Sometimes, the outcome is no decision, and regrettably the window of opportunity closes or the situation worsens as the insights are impeded by indecision.

5. **Action**. Before any value can come from analytics, insights need to be acted upon. Even when the right decision is made, the idea may still be executed poorly or resisted by other groups who are responsible for acting on the recommendations. At times, a lack of technical resources or an inflexible back-end infrastructure may impede enhancements from being implemented. Whatever stands in the way of your company putting insights into motion will stop it from realizing the potential benefits of web analytics.

You'll be constantly setting up and knocking down these dominoes on a regular basis to get maximum value from your web analytics investment. By investment, I don't just mean what you're spending on the actual web analytics tool, but your total cost of ownership (TCO) which includes analytics staff, IT support costs, consulting fees, training expenses, and any other supporting technologies (such as TMS, debugging, and testing). The return on your investment (ROI)

will be dependent on the presence and proper alignment of each domino and your organization's ability to move through each step in the Path to Value on a consistent basis.

Digital Measurement Cycle

When your business wants to measure the performance of any new digital marketing initiative—a new website, campaign, or mobile app—it will pass through the **Digital Measurement Cycle** (Figure 52). The process aligns closely with the Path to Value concept. At a high-level, this process can be divided into two main areas: *data collection* and *data usage*. The entire process should be focused on the continuous improvement of your ongoing digital marketing efforts. Although that is the goal or intent of the digital measurement cycle, many companies experience some key challenges with both data collection and data usage.
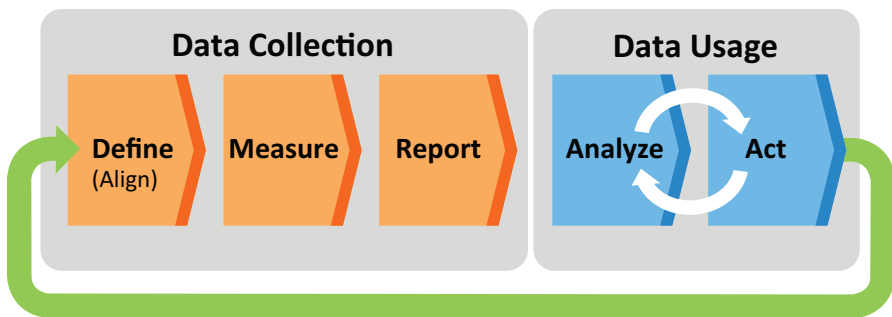

Figure 52: The Digital Measurement Cycle shows the key steps for tracking and optimizing digital marketing initiatives. The overall process can be divided into two main areas: data collection and data usage. If done correctly, the cycle will focus on continuous improvement.

Data Collection

Sherlock Holmes, the famous fictional detective, couldn't form any hypotheses or draw any conclusions until he had sufficient data to do so. If you work in the digital space or manage digital properties, you are equally dependent upon digital clay (data) to form your optimization bricks. You too should be frustrated if you don't have the numbers you need to understand and manage your online business.

In web analytics, a solid foundation of data is essential as it underpins everything. As represented in the Path to Value diagram (see Figure 51), your digital data is

the basic building block of reports, analyses, business decisions, and successful optimizations. This foundation doesn't happen on its own as it takes careful planning and execution. Even after the initial implementation work is done, it needs to be maintained and updated over time. As such, **data quality** is a central focus of the data collection phase. If something goes wrong, it will happen at one of the three steps that comprise the data collection stage (see Figure 52):

1. **Define (Align)**. Before any data can be collected, key stakeholders must clearly define the business goals and agree upon the business requirements. Only then can an appropriate measurement strategy be designed to deliver the necessary data. In the case of an existing initiative that is already being tracked, it might need to be re-aligned if business goals and needs have evolved or shifted.

2. **Measure**. Once the tagging approach has been defined, the technical team can deploy the appropriate tags and validate that the correct data is being collected. Typically, marketers were dependent on technical resources for tagging various web properties, but now they can leverage tag management solutions to deploy and update analytics code on their own.

3. **Report**. The final step is to prepare and organize the reports so your organization can be easily consume them. Raw data may be fine for some analytics power users, but most often the reports need to be configured and tailored within the web analytics tools to meet the needs of different end users. In addition, not everyone will log into the web analytics tools to access the information so a distribution strategy may be necessary (scheduled reports or dashboards).

When judging the quality of your digital data, it comes down to two main factors: **usefulness** and **trust**. You can ask yourself two simple questions:

- How useful is my data?
- Do I trust it?

Your answers to those questions will determine where more attention is required in the data collection phase. If your data isn't relevant or useful then you most likely have an alignment problem in the Define step. Otherwise, the issue could be in the Report step if the right information is being presented in the wrong manner. If you don't trust your data, then you may have issues in the Measure step. However, strive to be objective and not call into question the data's accuracy simply because it doesn't show the results you were expecting to see. The more you see your digital data as being useful and trustworthy, the more you'll use it in evaluating and improving your online marketing efforts (Figure 53).
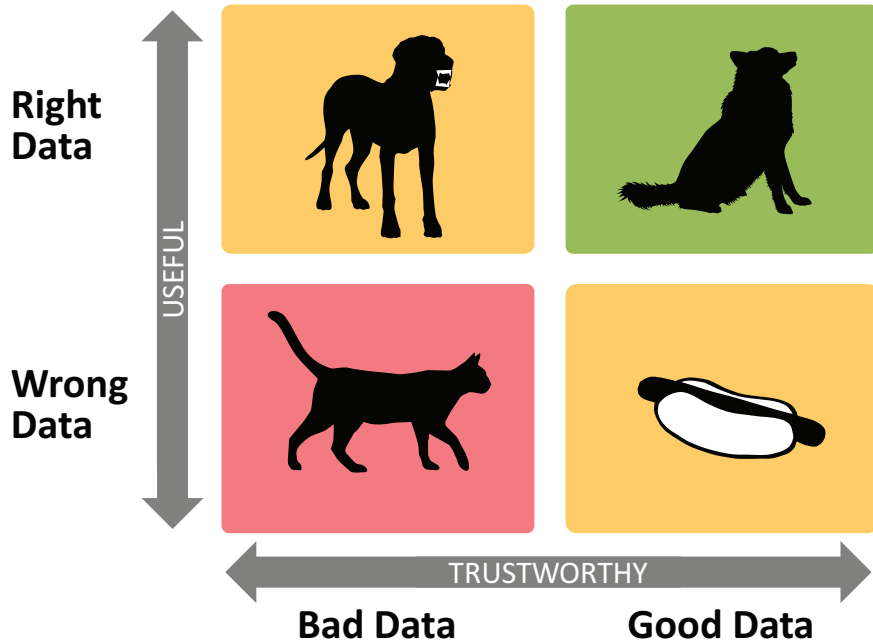
Figure 53: Your digital data must be both useful and trustworthy. Obviously, if your data is both wrong and bad, it won't help you at all (cat). You can have the right data, but not trust it (scary dog). Alternatively, you can have data you trust, but it isn't relevant (hot dog). Only when you have both aspects covered will you have what you need to manage your digital initiatives.

Usefulness: Right or Wrong Data?

When you attempt to answer important business questions but can't due to limitations with your digital data, you have the *wrong* data. The *right* data will satisfy the immediate and ongoing reporting needs of your organization. If your data is supposed to help measure and optimize your firm's digital performance, it's imperative that your implementation is aligned with your company's current business goals and digital strategy. When there's a serious misalignment, your data won't be able to answer routine business questions or provide the necessary insights into digital performance.

Remember: Your digital initiatives (websites, campaigns, apps, among others) are not static, and, therefore, your analytics implementation can't be static either. Your organization should be in the practice of constantly fine-tuning and calibrating its data to the evolving needs of your business. If digital analytics is treated as an afterthought and not integrated into the web development process, you're going to run into issues where your sites and content are changing but your digital

analytics tool will be stuck measuring and reporting on what was important in the past—not what's important today!

The usefulness factor is more than just relevance as you can have relevant data that isn't necessarily useful. To use a baseball analogy, relevant data is in the right ballpark while useful data falls in the strike zone (Figure 54). With useful data there's a higher degree of calibration to the needs or goals of the business. The out-of-the-box reporting in most web analytics tools will provide some relevant information. The most compelling and useful reports, however, are typically those that are customized or tailored to answer specific business questions. Useful
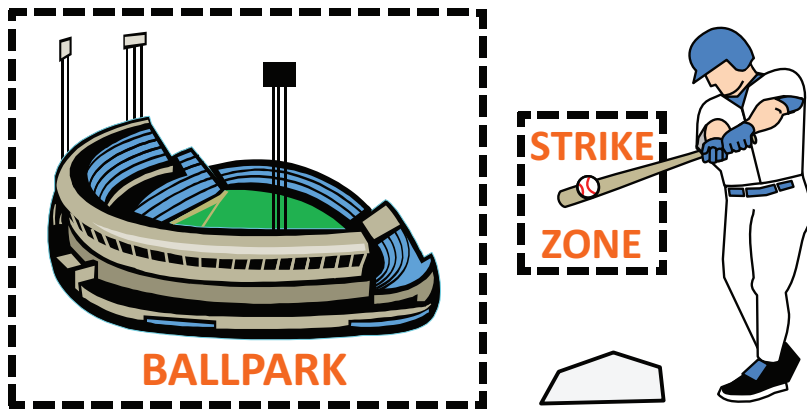

Figure 54: Relevant data that is in the right ballpark isn't enough. You need useful data in the strike zone that you can act on to enhance your digital business.

data is exponentially more actionable because it sheds light on critical business initiatives that demand attention and action.

Timeliness is another key attribute of useful data. Data can have a shelf life and become less and less useful over time. In most cases with digital analytics, you're dealing with real-time or near real-time data so timeliness isn't typically an issue. However, that assumes you have what you need directly out of your analytics reports and it doesn't need to be massaged in any way, which can lead to delays. Finally, if your data is incomplete then it's going to be less useful than if it covered the entirety of what needed to be measured and understood.

Trust: Good or Bad Data?

Usefulness always comes before the trust factor because it doesn't matter how much you trust your data if it's not useful to begin with. Nevertheless, trust is

also essential because you typically won't act on data that is suspect. In my view, trust is a factor of both *accuracy* and *consistency*. Data accuracy is when your data matches its actual true value. But, what is the "actual true value," and where can it be found? To validate your digital data's accuracy it helps if you have a system that contains the correct numbers, which can serve as a benchmark for your web analytics data. For example, you might compare your data against the numbers in another digital marketing tool or data from a backend transactional system.

Just because two sets of data don't match doesn't mean one is correct and the other is wrong (or vice versa). *Each system will collect and process data differently.* Be careful that you don't jump to the conclusion that there are data issues, because discrepancies might simply reflect nuances of each unique system. For example, a retailer's transactional system may remove returns and fraudulent orders from revenue totals that your web analytics system won't. Even between web analytics tools, your digital data can be different due to variances in how data is collected and processed. Typically, you want to see the numbers moving in the same direction and staying within an accepted threshold of variance, even though the results may not match up directly.

It's recommended to establish one source of truth for your digital data even though you may have data in a variety of other tools. Periodically checking the data accuracy is one thing, but constantly questioning the numbers and comparing the same results across multiple tools can waste time that could be better spent on optimizing your digital business (Figure 55). Business users can fall into the trap of needing to have their digital data match exactly. While you might not want your digital data to vary more than a certain percentage from another system's data, you'll expend a lot of effort and realize diminishing returns as you strive to remove all margin of error. You can't afford to become immobilized or entangled by minor imperfections
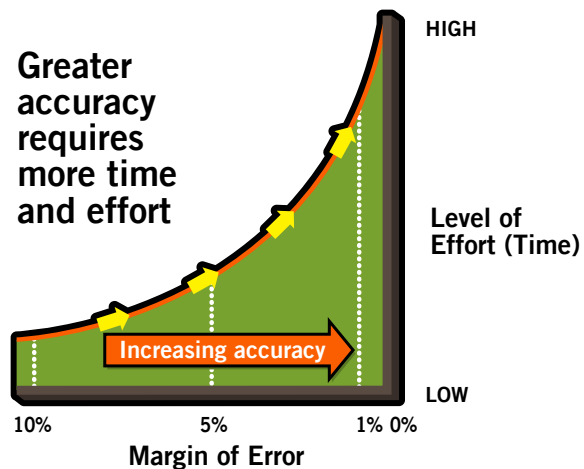

Figure 55: As you strive to reduce the margin of error within your digital data, you will increasingly invest more time and effort to do so. At some point, the costs will begin to outweigh the benefits, and you should accept some margin of error in order to invest more time in using the data rather than constantly seeking perfection.

in your data. If your data is off 10–20%, you should consider your data to be "good" and start using it to analyze and optimize your digital initiatives.

In many situations, there isn't another system that you can use to benchmark your digital data's accuracy. In these cases, it becomes essential to validate that your analytics tagging is done correctly. Frequently when marketing teams are racing to launch a new website or campaign, companies rush through the measurement process, failing to properly define what needs to be measured and then neglecting to do any data validation. These same firms then discover that they are unable to measure the performance of their digital marketing initiatives due to incomplete or shoddy data.

Data validation should be performed from both a technical and business perspective. From a technical standpoint, you want to ensure the tags are firing properly and data is being collected. Then from a business perspective, you'll want to confirm the data collected works for the business in terms of its structure, format, scope, and so on. Even though a report is fully populated with data, someone from the business side needs to confirm it can actually provide the desired information and insights.

Although accuracy is important, consistency may be even more critical as digital analytics is susceptible to data irregularities, which can erode people's trust if the issues are not minimized or explained. Maintaining the integrity of your digital data is like managing a garden; it's something that requires constant attention. If your implementation becomes overrun by weeds, you may lose your entire crop of useful data. All the hard work that went into planning and planting the crop will be wasted, and in the end there won't be a bountiful harvest of meaningful insights and action.

Overall, your digital data may be very sound, but unusual glitches can throw all of your data into question, causing people to lose confidence in it. Having well-defined processes around deploying new page tags will help to decrease internally generated discrepancies and maintain consistency. Common internal sources of data issues include website redesigns, code changes, content updates, campaign launches, and URL redirects. For example, a marketing team might launch new web pages with inconsistent tagging or an SEO agency may introduce URL changes that mess up how individual pages are tracked over time. With better communication and coordination between teams, you should be able to prevent "self-inflicted" issues from spoiling your digital data.

Other external factors, such as browser limitations, search engine changes, mobile device inconsistencies, cookie deletion issues, and bot traffic, can impact your data as well. You can't necessarily escape these externally generated discrepancies,

but your company must be adept at spotting, investigating, and resolving them quickly. In some cases, a technical workaround or patch can be put in place to avoid or minimize such anomalies. In other situations, the external circumstances may be beyond anyone's control and the best you can hope for is that, internally, people are aware of what's causing the irregularities in the data. Ultimately, your organization will want to avoid poor practices that lead to bad data and instead make sound business decisions even when uncontrollable anomalies appear in your digital data.

Every garden is going to have a few weeds, and not every implementation will be perfect. Some of your reports may not be as clean or complete as you'd like, but that doesn't stop you from gleaning useful insights from them. You're not evaluating accounting records or financial statements; you're simply looking to make more informed marketing decisions. It doesn't mean you shouldn't try to avoid or mitigate wrong or bad data; however, your focus should be how you can use your current data to its fullest rather than waiting for perfection. It can be frustrating when a key report appears to be broken, but it's only in rare situations where all your data is completely unusable.

Ten Tips for Improving Data Quality

In a marketing environment that is becoming more agile and increasingly dependent upon data, everyone involved in digital marketing needs to be aware of how they can contribute to data quality. It's not the sole responsibility of the web analytics team or IT department. The data collection process requires active support and participation from all members of your organization who can benefit from useful and trustworthy data. Either directly or indirectly, you can play a role in ensuring your data is relevant and clean. The following process-related tips reveal some ways in which your marketing team can work towards improving its data quality:

1. **Clarify your digital strategy.** A fuzzy, unclear strategy will lead to fuzzy, unclear reports. If your digital strategy isn't well-defined or agreed upon, the best thing you can do is carve out some time with the key stakeholders to define what your business goals are and what your KPIs should be, which may be very different than the metrics you're currently using. You may require a neutral, third-party to facilitate the discussion, drive consensus, and obtain sign-off from management.

2. **Build tagging into your web development process.** When digital measurement is an afterthought or ad-hoc occurrence when new web pages or properties are launched, your reports will always be plagued with data issues. If you're

able to build web analytics into the web development process, however, you'll ensure that report requirements are gathering upfront and ample time is allocated for deploying and validating tags prior to each launch.

3. **Establish and maintain standards.** For large companies, it's essential to establish and maintain corporate standards for measuring websites, apps, and campaigns. After deploying your initial web analytics tags the data can be easily polluted over time if content updates or changes don't adhere to the same measurement approach. Corporate standards are also important when you want to combine or compare your digital data across products, brands, or regions. You need to determine beforehand how common dimensions and metrics will be used across your business. If the same approach isn't used for capturing data, you lose valuable opportunities for benchmarking online performance.

4. **Demand accountability for tagging.** In addition to holding business teams accountable for their online results, organizations should also hold them accountable for adhering to internal tagging processes and standards. Missing tags or poorly executed tracking hurts your company's ability to manage its performance and shouldn't be tolerated. Agency partners who are unable or unwilling to adhere to tagging standards should be switched out for ones who appreciate the importance of digital measurement.

5. **Create feedback loops.** One of the dangers in digital analytics is to set up the reporting and jump to the next challenge without soliciting feedback from internal stakeholders. Your web analytics team should be following up with different internal stakeholders on their reports to verify if they are useful and trusted. If you have serious concerns about your reports, let the analytics practitioners know so your issues can be examined and addressed. Dashboards and automated alerts can also be configured to catch and highlight potential data issues before they become potential disruptions to the business.

6. **Regularly audit the reports.** Your web analytics team should be setting aside time to audit the tags and reports on a recurring basis. It's important to review the digital measurement strategy on at least an annual basis and re-calibrate reports that are not implemented correctly or no longer relevant. For large, complex websites, a site scan or tag auditing tool such as ObservePoint can monitor and detect missing or incorrectly configured tags that can hurt your data quality.

7. **Leverage a tag management solution.** It is one thing to spot a data issue; another to correct it in a timely fashion. Having a tag management system in place enables your marketing team to be more responsive to changing

business needs and more agile in fixing tagging issues without always having to go through an overburdened IT department for minor code modifications.

8. **Iterate to refine data quality.** Creating useful data is an iterative process where you may not nail the desired insights perfectly the first time. You may need to start somewhere and then keep refining until your data shifts from being relevant to essential. Continually ask yourself, "What would make my key reports even more valuable?" Eventually, you'll arrive at a point where your reports will give you more information than you'll know what to do with.

9. **Isolate shortcomings through analysis.** Analyzing your data is a great way to identify data quality problems. When you actually dive in and take a close look at the data to answer real business questions, you can see issues that couldn't be spotted by just scanning reports or dashboards. Just like test driving a used car, you don't notice what's wrong or missing until you're actually in the driver's seat on the open road.

10. **Ensure adequate staffing levels.** If your web analytics team is spread too thin and unable to properly manage the data collection process, you will naturally encounter more data quality issues. It's unrealistic to expect your digital data to be pristine without some oversight. If your annual digital marketing spend isn't an insignificant or trivial investment, then it's in your best interest to ensure you have the right level of analytics expertise in house to reliably measure and optimize your digital performance.

As the detective Sherlock Holmes recognized, data is essential to solving problems and unlocking insights. In the digital realm, data is the foundation that either limits your ability to optimize your online business or empowers you to take it to the next level. The more useful and trustworthy your digital data is, the greater the impact it will have on your organization.

"The new source of power is not money in the hands of a few, but information in the hands of many."

– John Naisbitt

Data Usage

After going through the hard work of setting up the tagging and configuring the reports, your business is finally in a position to take advantage of its digital data. Although the data collection phase is a grind, the data usage stage is the most enlightening and rewarding part of the Digital Measurement Cycle. Surprisingly, it is also the area where many companies appear to fall down or struggle. On the surface, the following two steps in the Data Usage phase look to be fairly straightforward and innocuous. Before examining what can go wrong, let's review how it's supposed to work.

1. **Analyze**. Once you've collected information on your various web properties, you're ready to examine the data more closely and discover the important insights it has to reveal. Analysis may be initiated by an anomaly in the reports or by ad-hoc questions from various business teams. Typically, dedicated web analysts with knowledge of the digital data and expertise with the web analytics tool perform the deep-dive analysis. However, with a little training and a hint of curiosity, business users can also push beyond the summary-level data in their dashboards. The outcome of the analysis is a set of findings and recommendations, which can be used to guide key business decisions on how to make digital marketing efforts more effective or efficient.

2. **Act**. When your business decides to pursue a promising optimization opportunity, it then needs to make the recommendations a reality. Depending on the scope and nature of the proposed change, your organization may simply implement the change (bug fix) or decide to test the idea on a limited scale (new marketing offer) before rolling it out to the masses. Your company's ability to execute will be dependent on a number of factors including available resources, budget, release schedules, and even internal politics.

In the Digital Measurement Cycle diagram (see Figure 52), you'll notice the white cycling arrows between the Analyze and Act steps. As your company analyzes different aspects of its digital business, it will be revolving back-and-forth between the two steps in the Data Usage phase. In addition, after the findings are acted upon, your business will want to understand the impact of the optimization, leading to a follow-up analysis. The analysis cycle is a *continuous process of learning and improving*. The first round of business questions leads to more questions and so on. Eventually, you'll reach a limit with your existing data set where it won't be able to answer certain business questions without collecting more targeted data. When your current implementation doesn't deliver all the information you need, you must head back (green arrow in Figure 52) to the Data Collection phase to modify the tagging and introduce new metrics and dimensions.

Transitioning from Data Collection to Data Usage

Unfortunately, many organizations lose their way in the Digital Measurement Cycle and never make it through to the Data Usage phase. Even for those companies that do, many still spend too much time and effort on tagging and, in particular, reporting. These firms are then left with insufficient time and

"Don't confuse activity with achievement."

– John Wooden

resources to focus on using the data and reaping the rewards of their data collection efforts through analysis.

Reporting and analysis are related analytics terms, but it is important to clearly understand how they differ. **Reporting** is the process of organizing data into informational summaries in order to monitor how different areas of a business are performing over time. **Analysis** is the process of exploring data and reports in order to extract meaningful, actionable insights, which can be used to better understand and improve business performance. Essentially, reports are the instruments by which analysis is performed.

There's a widespread misconception that the main goal of web analytics is simply to provide information or reports. On their own, reports accomplish very little and often nothing if no one is exploring the data for meaningful insights. Going back to the garden analogy, if all of the focus is around preparing and planting your analytics garden but no time or energy is left for harvesting (analyzing) then your crop of digital data will go to waste. To use another metaphor, your analytics vehicle is well-maintained, well-equipped, and ready for daily use, but instead it sits parked in the driveway all day or is only used for short errand runs.

Reporting is a foundational function of web analytics, but it can't be viewed as the ending point. The chasm between reporting and analysis needs to be bridged to drive action and value (Figure 56). The standard for your company can't be *whether you have reports on all your digital marketing initiatives,* but instead *how much is the data helping your digital marketing team to learn and improve.*

If your organization is not careful, it can easily find itself stuck in an ongoing reporting rut—unable to cross the analysis chasm. Even though larger organizations
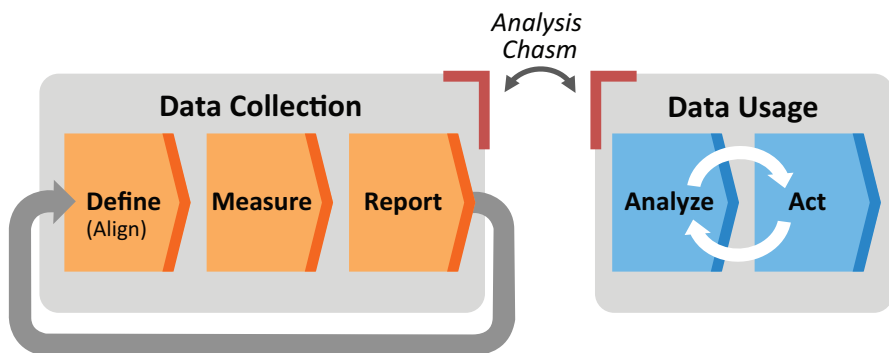

Figure 56: When companies have a limited understanding of the real purpose of web analytics, they often fail to recognize the importance of analyzing and acting upon the insights contained within the reports. When web analytics is only providing web reports, you can easily to see why these organizations may eventually question the return they receive. Companies need to cross the analysis chasm to derive value from their web analytics investment.

are more susceptible to this problem, smaller ones aren't necessarily immune either. Companies of all sizes can become complacent with having data and information but not insights. Several factors can contribute to an overemphasis of reporting and a lack of emphasis on analysis and action. For each of the following five common causes, I'll suggest ideas for how companies can overcome each particular reporting-related challenge:

- **Lack of resources.** When the web analytics team is understaffed, team members usually can't focus on much more than just tagging and reporting. Even though they'd love to perform more deep-dive analysis, your analytics team is simply spread too thin and unable to take on more responsibilities.

  Solution: Aside from the obvious answer of hiring more analytics staff, there are a couple of other options when headcount is difficult or impossible to obtain. You might be able to outsource routine reporting responsibilities to a third-party agency to free up seasoned analytics staff so they have more time to focus on strategic analysis. Alternatively, you could distribute the reporting responsibilities more by training and assigning other business team members to handle the reporting tasks for their respective groups.

- **Lack of process.** If your firm hasn't established any specific processes for web analytics, then your analysts won't be as efficient as they could be. With unclear or conflicting priorities and random fire drills pulling them in multiple directions, it can be challenging to carve out time for actual analysis.

  *Solution***:** Review how different business teams interact with the web analytics team to identify any broken or missing processes. Whenever business users are making requests for reporting or help with ad-hoc business questions, they should fill out a form that clarifies the purpose and importance of each request. With more information on each potential project, analysts can prioritize key requests and better manage their time.

- **Lack of expertise.** In some cases, the web analytics team has become accustomed to focusing on only implementation and reporting-related tasks. They are uncomfortable or unfamiliar with tasks extending beyond these current responsibilities. In a few cases, the analysts don't have the necessary aptitude to perform analysis or effectively communicate findings, but in most situations they may only need training and practice to get up to speed.

  *Solution***:** Test the web analytics team by asking for members' help with a series of small analysis assignments. Through the course of the projects, provide feedback to the analysts on what they missed or where their findings

and recommendations could be improved. In the end, you should have a better sense of whether you have the right talent in-house or if you need to look elsewhere for assistance (hiring new talent or a third-party agency). Training courses could also be used to augment existing skills and knowledge.

- **Lack of automation.** Reporting can be a highly labor-intensive process if analysts do not look for ways in which it can be streamlined and automated. It can take analysts hours to build and update reports, leaving little to no time for analysis. Sadly, analysts may be slaving away on producing daily, weekly, or monthly dashboards or reports that no one is using.

  Solution: First, perform an audit of all the recurring analytics reports and re-evaluate which ones are still essential to the business. Second, explore how they can be streamlined, such as removing unnecessary information that end users don't need or care about. Third, identify technologies or tool capabilities that can automate the reporting process. For example, you can use an Excel plug-in for your web analytics tool to create custom reports that simply need to be refreshed for a new time period rather than built entirely from scratch.

- **Lack of leadership.** The web analytics function can struggle when it doesn't have an executive sponsor or champion. Without strong leadership and clear direction it can be difficult for web analysts to overcome organizational inertia and not be buffeted by request after request for reports. Most of the aforementioned issues that create a reporting rut may just be symptoms of this leadership void.

  Solution: Make sure that your organization has a capable, experienced team leader and ensure the analytics team has an executive sponsor. The champion should be a senior executive with a vested interest in the success of web analytics. This data-driven leader must have ample authority and influence to help the web analytics team get the necessary resources, tools, and budget to move beyond just a reporting focus.

By addressing each of these potential problem areas, your organization can overcome the analysis chasm and move beyond just fixating on reporting. The goal should be to move efficiently through the data collection phase, and then dedicate as much time as is needed to extracting valuable insights from your digital data. Ultimately, your success with web analytics will not be determined by how much data is collected, how many reports are sent out each week, or how visually stunning your dashboards are. It will be decided by the business value that flows from insights guiding improvements to your digital performance.

The Art and Science of Digital Analysis

The process of analyzing your digital data is both art and science. It requires you to use both sides of your brain, blending the left side's numerical and rational skills with the right side's creativity, big-picture thinking, and storytelling abilities. Most often data exploration and discovery is triggered by questions. Your web reports should produce a steady flow of business questions that demand further explanation and answers. These questions may be based on simple observations about shifts in your KPIs or hypotheses about visitor behavior that need to be validated or disproven. If your reports aren't generating many enquiries, then you most likely have a problem with your reporting or business culture. If they're effective you should see more scrutiny of your marketing results, not silence or apathy.

Some of the questions or hypotheses that surface from your reports will matter and others won't. Of those that matter, some will be a higher priority than others. Having a clear understanding of the business objectives or goals is critical to collecting the right data. Now it's equally important for prioritizing and focusing your analysis on what's truly important to the success of your online business.

You need to have clear analysis objectives or else it will be difficult to separate what's vital in the data from background noise. When you need to analyze your digital data—either on your own or with the help of an analyst—you'll easily have more data than you know what to do with. Knowing beforehand which KPIs or dimensions are relevant to your analysis can reduce wasted time and effort. If you're new to web analytics, it's helpful to know the full spectrum of reports found in your web analytics tool, which typically fall into four main categories:

- **Visitor attributes.** These reports will provide audience profile information in terms of their locations (country, state/province, city), technology usage (web browser, operating system, mobile device, screen resolution), and behaviors (new/return visits, visit duration, visit frequency).

- **Traffic sources.** A number of reports focus on how people get to your website. They contain information on different referral sources, such as campaigns, search engines, social networks, and other websites.

- **Content.** These reports capture data on what content visitors consume on your site. They can include a variety of forms of content, such as pages, page types, site sections, downloads, videos, and internal search terms.

- **Conversions.** This last set of reports focuses on key actions or outcomes that occur on your website. These reports will depend on your business model and the custom reporting you've implemented. They will include any micro

> **"Art and science have their meeting point in method."**
>
> – Edward Bulwer-Lytton

Segment

Figure 57: Segmentation isolates key visitor groups so you can better understand their unique behaviors and characteristics.

Step 1

Step 2

Step 3

Step 4

Figure 58: Conversion funnels are useful for analyzing multi-page processes to find key attrition points.

Landing Page   Next Page   Next Page

Figure 59: Pathing or flow reports show the sequential interactions of visitors, such as where visitors go after entering on a particular landing page.

and macro conversions you're measuring. For example, an e-commerce site will have reports on product, shopping cart, and checkout interactions.

The first two categories contain mostly standard, out-of-the-box reports; whereas, the latter two categories are comprised of more customized reports. The vast majority of these reports are time series charts (trended) and data tables that are similar to those you would find in other analytics solutions or even spreadsheets. Web analytics also includes a number of unique reports and analysis features that will be essential to your analysis efforts. Most web analytics tools offer these capabilities but each vendor will offer slightly different features or functionality:
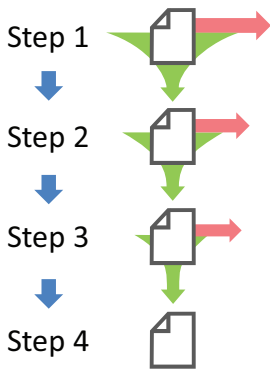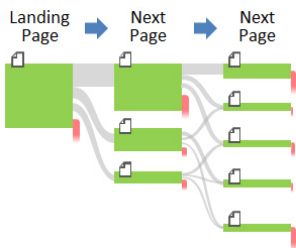
- **Segmentation**. Rather than focusing on all of your visitors, you can build targeted segments based on different profile attributes (web browser = Google Chrome or country = Germany) or behaviors (visited more than three pages or purchased a particular product). These segments can then be applied to your reports to learn more about the particular preferences and actions of various visitor groups (Figure 57). Previously, segmentation was limited to only visit-based applications but can now be applied to visitors across multiple sessions. Segmentation enables analysts to pinpoint unique and actionable insights that would have been hidden within the interactions of your entire visitor base.

- **Conversion funnels**. If you need to evaluate a multi-step process that involves multiple pages, such as a loan application process or checkout process, conversion funnels will be an essential instrument in your analysis (Fall-out reports in Adobe Analytics). When setting up a conversion funnel, you designate each step as a milestone or checkpoint in the funnel (Figure 58). To progress through the conversion funnel, a visitor needs to pass through each milestone in sequence. She can visit other pages between each checkpoint as long as she progresses between the steps. Conversion funnels are invaluable for streamlining online processes and diagnosing potential attrition points.

- **Pathing or flow reports**. Web analytics tools provide a set of reports that show the sequential interactions with different pages, events, and other forms of content. These pathing or flow reports reveal how visitors are moving from one page to the next through a series of interactions (usually three to four levels) as well as where they're exiting the website. Whereas

conversion funnels track different milestones, pathing or flow reports show the direct interactions between various pages both upstream and downstream (Figure 59). Ideally, you would leverage these reports for understanding a visitor's behaviors after he enters a key landing page or what's happening prior to his arrival at a key conversion or exit page.

- **Marketing channels reports**. If you have questions about which traffic sources your visitors are touching prior to converting, then you'll want to turn to your marketing channels or multi-channel funnel reports (Figure 60). Attribution plays a role in determining how different marketing channels (display ads, paid search, organic search, e-mail, and other sources) contribute to success. Although some channels can be detected automatically, typically these reports require some set-up or configuration so that the web analytics tool knows how to identify campaign-related traffic from other forms of unpaid traffic. The investment of time is worth the effort to gain better insights into channel interactions and contribution.

- **Page overlays**. In some situations, you may be interested in knowing exactly how visitors are interacting with the content and links on a web page. Web analytics vendors provide special in-page tools that visually overlay the click data on a web page to show where visitors are actually clicking (Figure 61). If the web page in question receives frequent updates then it won't be a good candidate for this type of analysis because the historical click data can't be applied to page elements that are no longer present on the page.

- **Real-time reports**. For many years web analytics vendors touted their real-time data, but "real-time" turned out to be more of a buzzword than reality. It really meant that processed data was available within a few hours or up to 24 to 48 hours later. The emergence of true real-time analytics tools, such as ChartBeat, pushed other vendors to add real-time reporting capabilities to their offerings. These reports provide a limited set of metrics and dimensions within seconds or minutes of being collected. Most analysis is still based on fully processed data, but the real-time data provides new analysis opportunities for scenarios that demand timely insights and rapid responses (Figure 62).

Marketing Channels

Figure 60: Marketing channels reports show how visitors interact with different traffic sources before converting on your site.
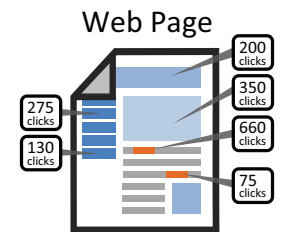

Web Page

Figure 61: Page overlay tools show how many clicks and the percent of total clicks each link or content element on the page received.
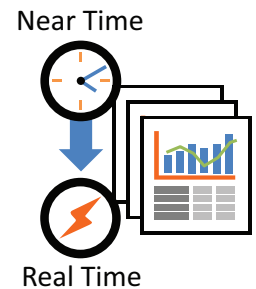

Near Time

Real Time

Figure 62: Real-time reports show you what content is being consumed on your site within seconds or minutes.

Although you have a significant arsenal of reports and ammunition of data in your web analytics tool, the time that can be devoted to analysis is finite, expendable, and precious. During the **Analyze** phase, organizations need to be efficient with their analysis efforts. Costly problems will continue to hemorrhage money and golden opportunities will never pay out if they go undiscovered; the time employed on analysis can't be wasted. Along with having clear analysis objectives, take a scientific and systematic approach with your analysis efforts. Essentially, when something stands out in your digital data, you need to answer three key questions:

- **What happened?** Do you have a clear understanding of what occurred? Could it be an error in the data collection or an actual event?

- **Why did it happen?** Can you isolate the root causes of the issue? What external factors may have contributed to what happened (context)?

- **So what if it happened?** Does the occurrence have a material effect on your business? Is it something that you can influence, control, or affect in the future?

When you're attempting to answer these questions, it helps to create a plan of attack or a hit list with boundaries around what will and won't be analyzed. Most analyses begin with an exploratory phase (breadth) at the surface level of reports to spot any unusual or interesting aberrations. Once you've found a meaningful irregularity, you shift to the deep-dive phase to help explain or understand its root cause. Through this two-step analysis process, you may need to turn over a lot of rocks before identifying a valuable insight. It's important to stay the course and not be distracted away from the original analysis goals.

Once you've discovered a potential recommendation, the science transitions to artistry as the problem or opportunity must be effectively communicated to key stakeholders so they are properly informed and compelled to act upon the insights. No matter how brilliant a particular analysis finding is, it won't be valuable to your organization if the analyst is the only one who understands or appreciates it. Raw numbers alone won't persuade teams to act. Analysts must be skilled at visualizing the data and presenting the insights with adequate business context so that key stakeholders can make informed decisions. Effective data storytelling adds color to faceless, sterile numbers and bridges the gap between insight and action. It's an essential step in the analysis process and just as crucial as the actual data mining.

Your success with analysis will depend upon a number of foundational elements such as having clean data, relevant reports, and well-defined business objectives. You'll also need a sufficient number of dedicated analysts within your organization who are both competent and well trained. This may mean at least one person at

smaller companies or teams of analysts at larger firms. Other less obvious but common factors can interfere with productive analysis if you're not vigilant:

- **Invalid Assumptions.** It's common for people to form rigid beliefs about certain things and avoid questioning them. For example, when managers or organizations have good success with a particular tactic, approach, channel, or program, they assume these practices will continue to deliver consistently in the future. These beliefs shape how they operate, and they become untouchable sacred cows, receiving little scrutiny from the business ("we never feature new products on the homepage," "our affiliate channel is the best way of finding new customers"). Rather than limiting your analysis in any way, any existing belief or practice that is relevant to an analysis should be open to examination, testing, and improvement—regardless of its past track record. The pace of change in the digital space means no assumption should be off limits as none will ever have an unlimited shelf life.

- **Insufficient context.** One of the biggest obstacles to effective analysis is an inadequate level of business context. Analysts can be easily tripped up by unexpected data fluctuations and then waste precious time trying to determine their cause. Sometimes these data anomalies don't require any deeper analysis at all, just clarification from someone who can provide more background information into what's happening. For example, an analyst could burn through several hours trying to determine why sales are down for a particular product category when the marketing team could have easily informed her that a different category was now being emphasized in the e-mail and onsite promotions.

  Even if you're not performing the actual analysis work, you may be able to provide invaluable business context that can streamline the process and make the analysis more precise. Key analysis projects should start with an analyst briefing and open lines of communication should be encouraged throughout the analysis cycle in case they stumble upon something that could benefit from a little more context. Having dedicated analysts embedded in the actual business teams can expose them to richer contextual information. Analysts need to be plugged into the tribal knowledge at your company, and anything you can do to accommodate this need will pay dividends.

- **Confirmation bias.** While performing analysis one of the dangers is the tendency to inadvertently seek out information that supports your preconceptions and discount data that doesn't. Consequently, you're more likely to get exactly the results you want to see rather than learning what's really happening. Being objective and open-minded to the facts is important because your digital data

can't teach you anything about your business if you're unable to see what it has to show you. To avoid self-deception from this form of cognitive bias, be aware of your own prejudices or beliefs and then make sure you or your analysts also seek out data that disagrees with your opinions.

- **Analysis paralysis.** Sometimes analysts and managers can get lost in the process of researching and examining various data points but never emerging with a clear outcome or business decision. An executive might be fearful of making a bad decision and wants to reduce his risk by gathering and analyzing more and more data. When you're operating in a fast-paced digital environment, many things won't always align, be clear-cut, or have predictable consequences. Too often in these situations the unfortunate outcome is wasted analysis time and inaction. It's important to have clear analysis objectives and monitor your progress towards achieving them. At some point, you need to become comfortable with directional data and be willing to test and fail. By testing ideas you can mitigate your exposure and learn what really works and doesn't. If you're afraid to fail, you won't have the opportunity to learn.

- **Decision justification.** Rather than seeking insights that will improve digital performance, managers may use data to defend or justify ineffective decisions. A vast amount of time can be wasted on manufacturing numbers to support their positions or massaging results to hide missteps that could threaten their reputation, power, or resources. This practice has the illusion of being data-driven, but it's really just a facade or cover. Organizations need to demand more accountability from their managers to avoid these unwanted behaviors. The KPIs and targets for digital marketing initiatives should be clearly defined upfront and not open to interpretation (and manipulation) after the results have been collected. Despite this self-interested behavior being difficult to root out entirely, you can't allow misleading results to permeate your organization and lead to a rude and costly awakening.

All of these factors can limit your company's productivity in the Analyze phase. After the time and effort to just reach this crucial phase your organization can't afford to be inefficient or ineffective with its analysis. Anything that prevents you from gaining critical insights into your digital performance on a regular basis must be addressed. The opportunity cost is potentially very high. Once you've been able to mine some potentially valuable insights from your digital data, there is still one more critical, make-or-break step left to accomplish: taking action.

Pairing Insights with Executional Agility

Organizations must couple being data-driven (relying on data to make informed decisions) with being action-agile (responding quickly to identified problems or opportunities). The full benefits of being data-driven won't be realized if your organization can't act or respond quickly to the insights found within its digital data. In the **Act** phase, it's all about *time to value*. If companies are unable to execute on ideas in a timely manner, they may miss time-sensitive opportunities or allow costly problems to linger longer than they should. Assuming that timely decision making isn't a problem, the next hurdle is putting the implementation plans in motion after a decision has been made. Whether you're just experimenting with an idea through A/B or multivariate testing or launching it on a full-scale basis, three key factors are needed to repeatedly translate insights into value:

- **People are aligned, committed, and accountable.** If the execution team isn't in favor of the change or enhancement, it can delay or prevent the idea from being introduced. In addition, the team might choose to implement the change a different way than it was intended or do a poor job on the actual execution, which may completely undermine any potential value it would have delivered. Alignment, commitment, and accountability are essential if you expect teams to act upon the insights.

- **Processes are streamlined, responsive, and flexible.** Over time companies have introduced various IT processes and policies to cope with complex, rapidly changing business environments. These rigid processes may be incompatible with your optimization efforts, however, and create unwanted bottlenecks or roadblocks. Today's business processes need to be streamlined, responsive, and flexible to handle the flow of insights coming from multiple analytics tools.

- **Technology supports, not impedes, agility**. Many organizations are still saddled with outdated IT infrastructure for managing the digital side of their businesses. These environments are often a mash-up of different frontend and backend systems that are held together by the technical equivalent of duct tape and baling wire (maybe a little chewing gum too). To avoid breaking anything, changes take weeks or months to implement instead of hours or days. Your technology stack shouldn't be a hindrance or deterrent to your optimization efforts and should support an action-agile organization.

How often and how quickly your business can respond to insights will determine how agile your organization is. Any delays in implementing or testing the changes disrupts the entire analysis cycle because once an enhancement has been introduced

the results need to be analyzed and understood to determine any new actions. The Digital Measurement Cycle is a process of continuous improvement, and analysis alone is insufficient unless it's paired with action. Organizations must be ready, willing, and capable of optimizing their digital marketing initiatives in order to fully benefit from their investment in web analytics. Business value will be created only by those companies that are both data-driven and action-agile (Figure 63).
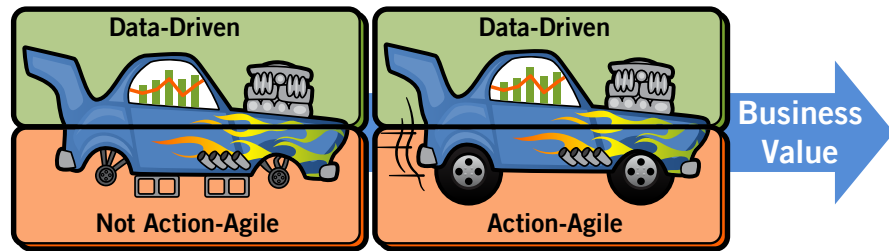

Figure 63: On the surface, both companies appear to be data-driven. However, Company A lacks the infrastructure to act upon any of the insights it's drawing from its digital data. Meanwhile, Company B can combine insights with action. As a result, Company B leaves Company A in the dust in terms of generating business value from its web analytics investment.

Digital Measurement Maturity Path

"What's dangerous is not to evolve."

– Jeff Bezos

Each organization—small or large—will be at a different stage in its digital analytics maturity. The Digital Measurement Cycle will in part reflect your company's maturity level in terms of what digital data it focuses on and how it leverages this data. Because the cycle is an iterative process (remember the green arrow in Figure 52) you'll constantly refine the data you collect to answer new business questions, and you should see an evolution in what's being measured and done with the data over time. When you're just beginning with web analytics, you'll be satisfied with basic reports on the use of your web properties. If your digital initiatives aren't that strategic to your organization then you might never progress beyond these standard reports. Business in general is becoming increasingly focused on digital channels, however; and your digital measurement efforts should evolve. I've identified five key stages along the maturity path to help you benchmark your own company's progression in terms of its digital measurement efforts (Figure 64).
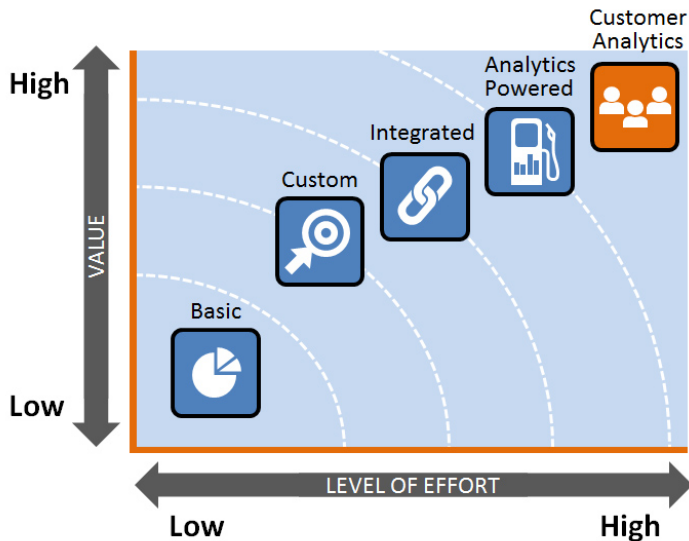
Figure 64: Every company may initially start with a simple, basic implementation of web analytics. Eventually most organizations realize they need to tailor the reports to their specific business needs, however. Gradually, companies can evolve their measurement practices over time until digital analytics merges or morphs into customer analytics.

Stage 1: Basic Measurement

When you're first starting with web analytics, you may be content to know how many visits and visitors you have to your site, where the visitors are coming from, and which pages are most popular. With very little implementation effort—just inserting the analytics tag on your web pages and a few simple report settings—you're able to receive a baseline of useful and interesting information on your web properties. Many individuals and small businesses start at this stage because it is easy to get up and running with a free or low-cost tool.

The standard, generic reports that you receive may be sufficient for your needs in the beginning, but you eventually will discover they can't answer fundamental questions about your specific web property because they aren't tied to your unique business goals or objectives. Although you'll have a better appreciation of traffic sources, general content consumption, and basic visitor attributes, you won't have a clear picture of how successful your website is, which makes improving your online performance more akin to guesswork than science.

Stage 2: Custom Measurement

After some initial forays with web analytics, most organizations recognize the need to have their analytics reports aligned with their business strategies. The successful organization goes beyond the standard reports and default metrics that are available out-of-the-box and measure aspects that are unique to its particular digital strategy, online business model, and industry vertical. Custom reports and metrics provide deeper, more targeted insights into key visitor activities such as engagement metrics and conversions. Tailoring reports to your specific business needs will require more planning, implementation work, and maintenance, but the payoff is significantly higher. The richer information will provide a clearer, more granular lens for understanding visitor behaviors and improving your overall digital performance.

When your digital measurement efforts are closely tied to your unique business goals, you'll find custom reporting becomes an iterative process where you repeatedly refine what's measured over time. First, your digital measurement will need to stay aligned and updated to match your company's shifting business priorities, objectives, and targets. Second, similar to a gold mine, once your custom reports have been sufficiently mined and stop yielding as many new insights, a new mine shaft or set of custom reports may need to be tapped to discover the next gold deposit. You may find that your existing reports can answer business questions only up to a certain point before additional implementation work is required to provide more granular reporting and answer deeper questions.

Stage 3: Integrated Measurement

After customizing your reports, you may discover the need to integrate data from other sources to obtain even richer insights. For many businesses, web analytics captures only part of the customer journey or story. What precedes or follows an online session may be just as important as or even more crucial than the observed online activity. All kinds of valuable data often resides in other marketing and backend systems that if connected with your web data could enrich your understanding of your visitors and what drives overall success—not just digital success.

In some cases, pre-built integrations make it fairly straightforward to merge data from other sources with your online data. For proprietary backend systems, the integration path may not be as easy or seamless; however, the rewards could be even greater in terms of what competitive advantages it affords your company. For example, knowing that an expensive, hotly contested marketing channel

generates a lot of online leads but very few closed sales (data from your CRM system) will enable you to target more effective but less competitive channels that your rivals have overlooked or ignored. When your web data is integrated with relevant offline data, it will be more potent and valuable to your organization.

Stage 4: Analytics-Powered Solutions

At this stage the focus shifts from enriching the data or reports within your web analytics tool to how your digital data can be used throughout your organization in more innovative and automated ways. Rather than bringing external data into your web analytics tool, you now focus on how your digital data can be fed into other applications and systems to make these solutions even more intelligent, targeted, and effective. While some companies are distracted by massive, all-encompassing Big Data initiatives, a subset of clever, more nimble organizations recognizes they already have a wealth of relevant, actionable data within their immediate grasp that can be used to optimize and power their marketing and business operations.

In this phase, most of the emphasis transitions from *descriptive* analytics where you're analyzing historical performance to *predictive* and *prescriptive* analytics in which you anticipate future outcomes and recommend or take an optimal course of action. Analytics-powered solutions are typically reliant on business rules, algorithms, and models to identify and take advantage of the insights hidden within the digital data. This approach opens up opportunities for marketers to target more relevant offers, personalize online experiences, drive re-marketing efforts, inform dynamic pricing, and so on. In some cases, you might be able to leverage existing integrations and in other situations you may need to build hybrid solutions using various technologies.

Stage 5: Customer Analytics

Many organizations reach a point where they need to expand their focus from digital analytics into the area of customer analytics. When companies want to understand how individuals interact with their businesses *across multiple channels or touch points*, web analytics is limited to just measuring their behaviors and activities within the digital channel as online visitors. With integrated measurement (Stage 3), companies can enrich and complement their online data with a targeted set of strategic external data to obtain deeper insights. However, the perspective remains firmly centered on the digital channel and how it potentially impacts other offline channels.

Customer analytics places the individual at the center of analysis irrespective of the channel. It combines the clickstream data with data from such other channels as point-of-sale (POS), call center, and CRM system to create a more complete, holistic view of customers and their cross-channel interactions. User identification within each channel is central to customer analytics so that it can bridge user interactions across channels. Through loyalty programs and other opt-in registration processes, some organizations already have all or most of the necessary pieces to construct a comprehensive view of their users or customers. As the digital channel continues to expand and grow, web analytics will increasingly converge with customer analytics. However, it should remain a unique and specialized tool that complements and supports customer analytics rather than competing with it.

Where Do You Stand?

By sharing these maturity levels, my goal is to clarify the key transition points or milestones that your organization will experience or may have already experienced in its digital analytics journey. It's helpful to know where you currently fall amongst these stages as well as where you might head next. If your organization is efficiently moving through all the steps within the Digital Measurement Cycle (Define, Measure, Report, Analyze, Act), it will get a taste for the value that can be generated by web analytics. As you experience some wins, your organization will build momentum with web analytics. A hunger for more and deeper insights will emerge and propel your company down the maturity path.

If you're worried about where your organization currently sits in this maturity continuum, don't forget you need to crawl and walk before you can run. Although you can certainly skip forward to the latter stages, each organization needs to gain experience, expertise, and confidence through the initial measurement stages. In addition, integrating other data sources or pushing data into other systems will make little business sense if your underlying digital data isn't properly aligned with your business needs.

The custom measurement stage is a crucial point where web analytics should begin to play a meaningful role in shaping the success of your online business. A great deal of time and effort will be spent just within this key stage, and you'll continue to focus on custom tagging even after you've shifted to more advanced levels. If your company is not receiving any value from its web analytics tool then you need to re-examine what you're doing at your current level or even take a step back if needed—jumping to the next level isn't going to solve your problems.

If your digital channel is strategically important to your business, web analytics can offer unparalleled insights into how your marketing efforts perform in this key channel. These insights can set up critical improvements that can drive cost savings and higher profits. When breakdowns and mistakes occur within the Digital Measurement Cycle, however, companies won't receive anywhere near the return they were expecting. The technology is extremely powerful, but it can't do everything on its own and may even create more problems than it solves. Discipline is essential, and an effective process is critical to your success with web analytics. Paying attention to process issues will pay significant dividends and will separate those organizations that are able to win on a repeated basis from those that never seem to get off the ground.

MATURITY LEVEL	EMPHASIS	DESCRIPTION
1. Basic Measurement	Simple traffic reports	Simple, generic implementation. Reliant on out-of-the-box reports and default metrics. Limited insights into online performance.
2. Custom Measurement	Customized reports for traffic and conversions	More robust implementation that is tailored to measure unique business needs. More granular, custom reports provide deeper and sharper insights into online performance.
3. Integrated Measurement	Offline data integrated with online reports	Offline or third-party data is combined with online reports to further enrich digital insights. Provides insights into how digital marketing efforts are impacting offline transactions or interactions.
4. Analytics-Powered Solutions	Feeding online data into other business systems to enrich customer interactions	Based on digital data, leverages business rules, algorithms, and models to better target and personalize the user experience. Ties insights with programmatic actions in other systems.
5. Customer Analytics	Customer insights across multiple channels (not just digital)	Digital data is fed into a broader data set that covers multiple customer touch points or channels. Doesn't replace digital analytics but puts it in context of the greater customer experience.

Final Words

When you're learning something new, it can be intimidating, frustrating, and time-consuming. Whether you're learning how to drive a car or preparing to become a parent for the first time, you're going to have a much better experience if you can turn to others for direction and advice. In the increasingly digitized world we live in today, more and more people are being exposed to digital data—either indirectly or directly. Unfortunately, a knowledge gap continues to persist

even though web analytics has been around for the last 15 to 20 years. Although a small niche of experts are exploring how digital data can be used in new and more advanced ways, too many people are being left behind who don't realize how they could be doing far more with their data. Even though web analytics has become table stakes for most businesses with any kind of online presence, it still remains vastly underutilized and often misused.

The purpose of this primer is to close this knowledge gap among those individuals who are dependent on digital data in their current roles as marketers, business managers, and executives but may not be well-versed on how data is collected or should be used. Being more conversant and knowledgeable about web analytics will help you to better partner with the individuals who are experts on these tools, which will be critical to your shared success. If you've taken the time to read through the sections of this document, you should have a better grasp of the following:

- What web analytics is and what it can do for your business
- The origins of web analytics and how it has matured as a technology over time
- How your online business strategy and goals define what should be measured
- Commonly used web metrics and business model-specific KPIs
- How various data collection methods and technologies work
- The steps involved in an effective digital measurement process

With these newfound insights at your disposal, the next step is to engage and put them to work. You can read all about how to drive a car, but until you actually sit in the driver's seat and drive, all of the rules and instruction won't resonate with you (or sink in). This ebook covers the basic principles of web analytics, but it's only a start. The next steps may include training on your specific product as well as gaining a clearer understanding of your organization's specific measurement strategy (metrics, dimensions, reports). Someone at your company should be able to explain to you what's being currently measured and how to correctly interpret the reports. That's when the fun can begin as you partner with analytics practitioners to drive digital performance forward.

If you're interested in this field of analytics and looking for more insights into how you can take full advantage of web analytics as an analyst or aspiring one, consider reading my book, *Web Analytics Action Hero* (Adobe Press, 2011). By laying out the basic concepts and fundamental principles of web analytics, this primer serves as a prequel to that book. *Web Analytics Action Hero* reinforces

many of the same principles I've introduced in this primer and then expands upon them. While rich in action hero metaphors, it highlights the importance of shaking the reporting rut and outlines an analysis framework or approach that helps individuals and their organizations to drive action and value from web analytics. Even though the book is primarily geared towards analysts and data-driven marketers working in mid- to large-sized organizations, it can be a valuable resource to anyone seeking to enhance online performance through data and generate action-packed results.
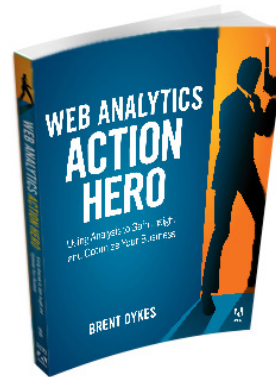
I expect the digital analytics industry to further evolve as new technologies emerge and unforeseen challenges appear that demand adaptations in your approach to measuring digital performance. As such, I envision this document may need to be occasionally updated from time to time. If you have enjoyed this primer and would like to know when a new edition is available, please follow me on Twitter at @analyticshero or visit my website, www.analyticshero.com. I always welcome your feedback on this document and look forward to hearing of your success with web analytics. I'll leave you with one last piece of sage advice on the material I've shared with you from an action hero I admire:

> ## "Absorb what is useful, discard what is not, add what is uniquely your own."
> **Bruce Lee**

Good luck in your digital analytics journey!

Glossary

AJAX (Asynchronous JavaScript and XML): A collection of technologies that allow web applications to update content without reloading the entire web page.

AOV (Average Order Value): The average value of an order placed on an e-commerce site. It is calculated by dividing the total online revenue by the number of orders received.

API (Application Programming Interface): A set of standards and instructions for accessing a web-based software application. A software company will provide an API so developers can design tools that integrate with its service.

Attribution: The process of accrediting or allocating success to the various preceding touch points (campaigns, channels, pages, and so on).

Audience reach: The estimated total number of people that can be covered or touched by a company's digital properties.

Average page depth: The average number of pages viewed during a visit.

Average visit duration: Amount of time spent on the website by visitors (doesn't include time spent on exit pages).

Bot (short for robot): A computer program that runs automated tasks over the Internet. They are used for both productive (web crawling by search engines) and malicious (collecting email addresses by spammers) purposes.

Bounce rate: The percentage of single-page visits (visits in which an individual saw only one page and immediately exited).

Clickstream: A series of mouse clicks or interactions that occur when visitors navigate through a web property.

Conversion rate: The percentage of visitors (or visits) that reached a particular goal or outcome.

Cookie: A text file placed on a visitor's computer through a web browser to retain information.

CRM (Customer Relationship Management): A system for managing all the interactions that a company has with its customers, whether sales or service-related.

CSS (Cascading Style Sheets): A style language that defines the layout and presentation of HTML documents.

Digital analytics: The process of measuring digital initiatives and using the data to improve performance.

Dimension: A set of attributes that categorize the numeric results into meaningful groupings such as products, countries, or time.

DNS (Domain Naming System): An Internet service that translates the user-friendly alphanumeric domain names into the actual IP addresses that are used by web servers.

DNT (Do Not Track): A web browser setting that indicates to websites and advertising networks that the user does not wish to be tracked.

DOM (Document Object Model): An application programming interface (API) for valid HTML and well-formed XML documents. It defines the logical structure of documents and the way a document can be accessed and manipulated.

Domain name: A user-friendly hostname that you enter into a web browser to access a website on the Internet.

Exit rate: The percentage of visits that terminated on a particular page.

Expiration: The length of time in which a variable will track information on a particular value.

First-party cookie: A cookie that was set from the same domain or subdomain as the website being visited.

Flash: A software platform created by Adobe that is used for creating Rich Internet Applications, interactive ads, streaming video players, and games.

Histogram: A vertical bar chart that displays the distribution of the data or how often something occurs.

Hit: Any HTTP request sent to the data collection server of a web analytics system.

HTML (Hypertext Markup Language): A standardized tagging system that specifies the elements and structure of text documents so words and images can be displayed as web pages in web browsers.

HTML5: The newest specification for HTML that is still being developed and adopted. It offers better performance for apps, cross-device support, and rich media integration.

HTTP (Hypertext Transfer Protocol): A standard that web browsers and servers use to communicate when transferring different files (text, images, video) on the World Wide Web.

HTTPS (Hypertext Transfer Protocol Secure): A secure version of HTTP that relies on an encrypted protocol called Secure Sockets Layers (SSL) to access secure webpages such as within an e-commerce checkout process.

IP address (Internet Protocol address): An identifier used for a computer, device, or server located on the Internet.

JavaScript: A popular scripting language used in tagging websites.

Key Performance Indicator (KPI): A metric to measure your performance against an organizational goal or objective.

Key-value pair: A set of two linked data items: a key or parameter that is a unique identifier for some type of data and a specific data value (key1=value1, country=canada).

Landing page: The first web page that someone sees after she clicks on an online ad or search results listing.

Macro conversion: A key outcome or desired end goal for website visitors (for instance an online order or application submission).

Metric: A quantitative measurement of online activity.

Micro conversion: An activity that represents a key step or milestone in the conversion process, often preceding a macro conversion (for example, entering the checkout stage before placing an order).

Name-value pair: See key-value pair.

Pay wall: A subscription model where individuals pay to gain to access premium content such as articles or videos.

Persistence: The process of retaining a variable value for a particular visitor across a single session or multiple visits.

PII (Personally Identifiable Information): Any data that could be used to identify a specific person such as a name, social security number, or email address.

Query string: Part of the URL after the path and preceded by a question mark; used to pass data to web applications.

Referrer: A website that directed a visitor to another website through a HTTP link.

RIA (Rich Internet Application): A web-based application that delivers features and functionality similiar to that of desktop applications. These applications are built in platforms such as Adobe Flash, Microsoft Silverlight, Java, and AJAX.

SDK (Software Development Kit): A set of tools that are designed to help developers build applications for a particular software platform.

SEO (Search Engine Optimization): The practice of ensuring a website can be found in search engines for words and phrases that are relevant to what a website offers.

Tag: A piece of code used to collect data.

Third-party cookie: A cookie that is being set with different domains from the one being visited (for example, external ads served by an ad network platform).

TMS (Tag Management System): A tool designed to manage the deployment and maintenance of JavaScript tags across various web properties.

URL (Uniform Resource Locator): The web address of a website or web page (http://www.example.com).

Variable: A piece of code used to collect a data element using a key-value pair (var1=value1).

Visitors: The number of unique users that have come to your site during a specific reporting period.

Visits: The number of times or sessions that visitors have been to your site.

Web browser: A software tool used to locate, retrieve, and display online content. Popular web browsers include Google Chrome, Microsoft Internet Explorer, Mozilla Firefox, and Apple Safari.

Web server: A system that delivers files via the Internet to web browsers (client) so they can render web content for end users.

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