THE IMPACT OF BIG DATA ON YOUR FIRMS MARKETING COMMUNICATIONS: A FRAMEWORK FOR UNDERSTANDING THE EMERGING MARKETING ANALYTICS INDUSTRY

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ABSTRACT

This paper studies how the emergence of big data is driving the adoption of broader and increasingly sophisticated quantitative analysis techniques across media channels by large, medium and even smaller sized firms. A new ecosystem of marketing and advertising service firms is emerging. This ecosystem provides information processing services which impact marketing organization spending patterns in much faster time intervals than ever seen in the history of modern marketing. The findings of this study are a direct result of semi-structured interviews of stakeholders in the advertising analytics and related industries during the summer of 2014. This paper is the first paper of a two part series; it provides a consolidated framework and typology intended to help companies and researchers understand the structure of this ecosystem. The second paper will provide detailed quantitative information related to the performance of these marketing information processing services and the required marketing budget to participate. It will also provide insights into qualitative opportunities and challenges that marketing organizations face operating in a big data world.

INTRODUCTION

This paper studies how the emergence of *big data* is driving the adoption of broader and more sophisticated quantitative analysis techniques across media channels by large, medium and even smaller sized firms. A new *ecosystem* of marketing and advertising service firms is emerging. This ecosystem provides information processing services which impact marketing organization spending patterns in much faster time intervals than ever seen in the history of modern marketing. The findings of this study are a direct result of semi-structured interviews of stakeholders in the advertising analytics and related industries during the summer of 2014. This paper is the first paper of a two part series; it provides a consolidated framework and typology intended to help companies and researchers understand the structure of this *ecosystem*. The second paper will provide detailed quantitative information related to the performance of these marketing information processing services and the required marketing budget to participate. It will also provide insights into qualitative opportunities and challenges that marketing organizations face operating in a *big data* world.

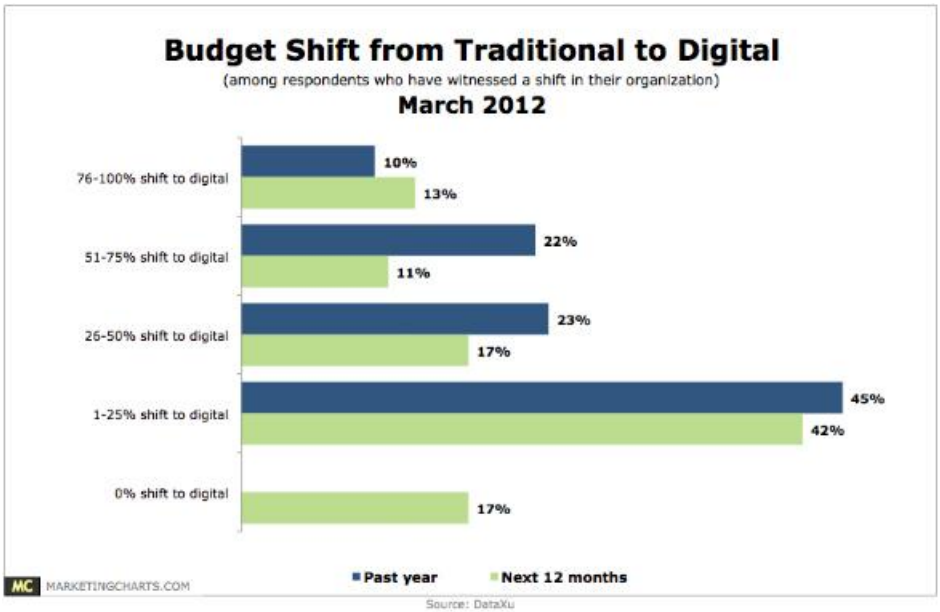
The emergence of *big data* has produced massive amounts of information related to all kinds of business activity. In January of 2014 the Ellen MacArthur Foundation, in collaboration with McKinsey & Company, had the following to say at the World Economic Forum: “Information

technologies (IT) play a key role in enabling the transition towards circular business models. This role ranges from tracing materials and products, organizing reverse logistics and accelerating innovation (with crowdsourcing and information sharing) to mining *big data* (for mapping resource and value flows and tracking indicators to measure progress) (WEF, 2013).

Additionally, the worldwide web consortium (W3C) has been facilitating the evolution of the internet from a so-called web 2.0 world (characterized by interaction and collaboration) to a semantic web or so-called web 3.0. The W3C is the international standards body of the World Wide Web. According to the W3C, "The semantic web provides a common framework that allows data to be shared and reused across application, enterprise, and community boundaries." The term was developed by Tim Berners-Lee for a web of data that can be processed by machines. (Berners-Lee, T. et-al, 2001) Berners-Lee is often referred to as the inventor of the worldwide web and is the currently the overall Director of the W3C.

This semantic web evolution to web 3.0 is well in progress, and as a result, various entities are collecting and using knowledge about network users - ostensibly for the users' convenience and benefit. This networked data collection is often referred to as *big data* (Lohr, 2012; Manyika et al, 2011; McAffee and Brynjolfsson, 2012) and is readily available to marketers and advertisers. Progressive marketing companies are obtaining access to this data and focusing their attention on individual and collective consumer habits and preferences. Those same progressive organizations are also shifting more of their advertising budgets to online marketing (Nielsen/IAB, 2012; Moorman, 2014; SoDA Report, 2014). The shift is happening because online advertising can be more cost effective and consumers are spending more of their time consuming media in online vs. traditional (i.e. TV, terrestrial radio, print) venues. See Figure 1 below.

Figure 1: Budget Shift from Traditional to Digital



The top storyline from 2012 in Advertising Age is simply titled *Data Dominates*. It is summarized as follows:

> *"Not since the phrase "social media" have two words so overtaken our industry. From the Barack Obama re-election campaign to Unilever to Sony, everyone is panning the data rivers for marketing gold. And unlike other "ad land" trends, the consensus seems that this one is relevant to the bottom line. You can't get by with a guru for big data. You need an actual scientist -- and those are some of the most sought-after pros in the land."* (Advertising Age, 2012)

Who are these most sought-after pros' in the land? What do they do? These are important questions. The combination of social media and big data advances, along with the shift in advertising budgets from traditional to online media channels makes this line of research important. These are the questions this paper explores and attempts to answer.

LITERATURE REVIEW

Big Data

The era of *big data* is underway. Computer scientists, physicists, economists, mathematicians, political scientists, bio-informaticists, sociologists, and other scholars are clamoring for access to the massive quantities of information produced by, and about people, things, and their interactions (Boyd and Crawford, 2012).

Big data has no absolute definition. Lev Manovich, in a recent article, states that *big data* has been used in the sciences to refer to data sets large enough to require supercomputers, but what once required such machines can now be analyzed on desktop computers with standard software. There is little doubt that the quantities of data now available are often quite large, but that is not the defining characteristic of this new data *ecosystem* (Manovich, 2011).

Paul Zikopoulos and his team of IBM writers state the following in their book titled *Understanding big data*. "*Big data* is somewhat of a misnomer since it implies that pre-existing data is somehow small (it isn't) or that the challenge is sheer size (size is one of them but there are often more). In short the term *big data* applies to information that can't be processed or analyzed using traditional processes or tools." (Zikopoulos, et al, 2011).

The most comprehensive academic definition we prefer is the one posited by Danah Boyd and Kate Crawford. They define *big data* as a cultural, technological, and scholarly phenomenon that rests on the interplay of 3 factors as follows:

1. ***Technology:*** *maximizing computation power and algorithmic accuracy to gather, analyze, link and compare large data sets.*
2. ***Analysis:*** *drawing on large data sets to identify patterns in support of economic, social, technical and legal claims.*
3. ***Mythology****: the widespread belief that large data sets offer a higher form of intelligence and knowledge that can generate insights that was previously impossible with the aura of truth, objectivity, and accuracy* (Boyd & Crawford, 2012).

Creating the availability of *big data* is a trend which has been officially supported by the W3C for many years through its support of the semantic web.

> *"The Semantic Web is a collaborative movement led by the international standards body of the World Wide Web Consortium (W3C). The standard promotes common data formats on the World Wide Web. By encouraging the inclusion of semantic content in web pages, the Semantic Web aims at converting the current web, dominated by unstructured and semi-structured documents into a "web of data". The Semantic Web stack builds on the W3C's Resource Description Framework (RDF)*" (W3C, 2011).

There has been some confusion about the terms "semantic web" and "web 3.0". According to prominent technology blogger Akhilesh Sharma, the "semantic web" is sometimes appropriately used as a synonym for "Web 3.0", although each term's definition varies (Sharma, 2011). Regardless of what definition is most suitable to the reader, the importance of the semantic web and/or web 3.0 in the growth of *big data* is hard to deny. It should be noted that Tim Berners-Lee and Tim O'Reilly (a prominent media and internet publicist) had a very public dispute over the meaning of web 2.0 for many years before finally settling on the term and concept. In the modern era, technology appears to progress faster than clear definitions of current phenomenon such as *big data* and its applications to business and society.

The implications of *big data* go much further than the PC or even the mobile phone. Paul Zikopoulos and his team of writers for IBM state the following:

> *"Quite simply, the Big Data era is in full force today because the world is changing. Through instrumentation we're able to sense more things, and if we sense it we tend to store it (or at least some of it). Through advances in technology, people and things are becoming increasingly interconnected – and not just some of the time, but all of the time. The interconnectivity rate is a runaway train"* (Zikopoulos et al, 2011).

With *big data* increasingly growing in importance, the challenge to organizations is to learn how to use it to improve marketing performance. The answer, in part, lies in predictive analytics. Predictive analytics are not new as they have been used in the public health, environmental and national security surveillance industries to name a few (Maged et al, 2010). Predictive analytics are now being applied to integrated marketing communications (IMC) and this is driving more media online. According to recent reports from Duke University and the Society of Digital Agencies (SoDA), advertisers are shifting significant budgets away from traditional media advertisers to a variety of online media channels (Moorman, 2014; SoDA Report, 2014).

Advertising Analytics

Corporate sponsors are demanding more accountability and measurement of the impact of their advertising campaigns regardless of the form they take. Historically, online advertising has primarily been used as a vehicle to generate a direct response transaction and less as a tool for building brand equity. This trend is changing and the movement to using online advertising for brand purposes will shift a higher percentage of advertising budgets to online venues. The Nielsen 2013 Online Advertising Performance Outlook Report validates this view about digital media as a brand development channel:

> *"Digital media continues to develop as a branding medium, growing beyond its roots as a channel of interest solely to direct response marketers. Today, it appears that branding in the online medium appears to have come of age, as spending for online brand advertising in 2013 is projected to rival that of direct response advertising. What's more, growth projections for branding exceed those of its performance-based sibling" (Nielsen, 2013).*

Advertisers, for the most part, are still operating in a "swim lane" mode of evaluating advertising campaign performance. This means that each media channel's performance is evaluated more or less as an independent silo or "swim lane". With the advent of powerful, enabling *big data* technology, the concept of measuring one media channels' "assist power" to another media channel (i.e. TV's assist in bolstering social media' effectiveness) is becoming more

practical. As online becomes a critical brand vehicle integrated performance measurement intuitively becomes more important (Nichols, 2013).

Note that there is also data readily available for analyzing traditional media performance such as TV in an integrated manner with online channel performance. An excellent example is the Nielsen Cross Platform Ratings Service which was released in the USA in October of 2012 (Nielsen, 2013). Additionally, increased computing power and continuing standardization of data formatting online via semantic web conventions is making it easier to derive data related to traditional usage (Blomqvest, 2014).

The above trends in the competitive marketing environment are leading to an emerging advertising strategy called Advertising Analytics 2.0. Wes Nichols, co-founder and CEO of MarketShare a Los Angeles based global predictive analytics company, posits:

> *"The days of correlating sales data with a few dozen discrete advertising variables are over. Many of the world's biggest companies are now deploying analytics 2.0, a set of capabilities that can chew through terabytes of data and hundreds of variables, in real time, to reveal how advertising touch points interact dynamically. The results: 10% to 30% improvements in marketing performance"* (Nichols, 2013).

METHODS

Based on the above literature review, and the impending significant rise of interest in big data and advertising analytics, the current paper attempts to discover and analyze more about this emerging market space. In particular, it attempts to unveil specifics about the *ecosystem* of firms in the *big data* arena as it relates to marketing communications and advertising. The study approach was to identify companies that were operating in this space and conduct primary exploratory research in the form of semi-structured interviews with ranking officers and "subject matter expert" employees representing these firms.

The following three criteria were used to select companies to contact for an interview:

1. Companies that appeared on a Google search with the following keyword combinations on May 15, 2014:

   "Advertising Analytics Companies",
   "Interactive Attribution Vendors"
   "Predictive Analytics" + Advertising
   "Data Management Platform"
   "Demand Side Platform"
   "Real Time Bidding" + Advertising

2. Companies that appeared in the Forrester Wave™ Reports dealing with external *big data* and Analytics. Forrester Wave™ companies in segments with a primary focus on internal data analytics, internal data mining, and warehousing were excluded.
3. Partners appearing on websites of the firms identified in selection methods 1 & 2 above.

ANALYSIS

Researchers were successful in completing 24 interviews, obtaining at least 3 interviews from each segment identified. Using this information, a consolidated framework for understanding the emerging *ecosystem* of players in the IMC *big data* space was developed. It should be noted that much of this data is available in expensive private industry reports which are generally at a very granular level and need to be consolidated. Private industry data depicting organizational

interaction (with each industry subsector), although it may exist, was not found. It should be clear that the framework for this study is a snapshot of a rapidly evolving *ecosystem* which may look much different in 3-5 years. Findings from the research are segmented and presented below as five typologies:

1. Big Data Investors
2. Demand Side Platforms (DSP) and Real Time Bidders (RTB) Providers
3. Data Management Platforms (DMP)
4. Media Mix Modelers (MMM)
5. Digital and Full-Service Agencies

Typology 1 - Big Data Investors

The first finding uncovered in this study is that large investments have been made in *big data* start-ups in the past 3 years. Many researched target companies were acquired in either 2013 or 2014. This prompted a search for recent merger and acquisition news to supplement this study. More than 16 acquisitions of privately financed start-ups that have taken place in the past 4 years with 10 acquisitions (62.5%) occurring in 2014. Clearly, investment activity is active and picking up speed, as seen in Table 1. The term *big data investor* seems appropriate for firms in this first typology. These firms are investing billions of dollars in *big data*.

Table 1
TYPOLOGY 1 – BIG DATA INVESTORS

BIG DATA INVESTOR	ACQUIRED COMPANY	ACQUISITION DATE	DEAL VALUE
Adobe	Demdex (DSP) Omniture (MMM)	1/18/11 11/27/09	$58,000,000 $1,800,000,000
AOL	Convertro (MMM)	5/6/14	$101,000,000
Centro	SiteScout (DSP)	11/5/13	$40,000,000
DataXu	JasperLabs	4/24/14	Undisclosed
Ebay	ClearSaleing (MMM)	3/28/11	$2,400,000,000
Ensighten	TagMan	3/18/14	Undisclosed
Google	Invite Media (DSP) Adometry (MMM)	6/3/10 5/6/14	$81,000,000 Undisclosed
IgnitionOne	Knotice (DMP)	3/19/14	Undisclosed
IBM	Coremetrics (MMM)	6/15/10	Undisclosed
Lotame	AdMobius (DMP)	3/18/14	Undisclosed
Neurostar	Aggregate Knowledge (DMP)	3/19/14	$119,000,000
Oracle	Blue Kai (DMP)	2/24/14	$350,000,000
Rakuten	DC-Storm (MMM)	5/29/14	Undisclosed
Rocket Fuel	X + 1 (DMP)	8/5/14	$230,000,000

Big data investors come in many forms. The larger ones are typically from the high tech or media sectors. One example of a high tech big data investor is Google. Google is into products and services that drive internet traffic and internet ad revenue. Other high tech investors include Adobe - an innovator in content enabling software, Oracle - a leader in customer relationship management (CRM) systems, and Ebay - a pioneer in online buying and selling of products. A notable media conglomerate is Time-Warner Inc. which recently acquired Convertro and Nielsen. Nielsen operates Catalina Services - a firm specializing in media mix modeling.

Typology 2 - Demand-Side Platform (DSP) and Real Time Bidding (RTB)

During the interviews, and particularly with the agencies, it became clear that the methods by which advertising services are being bought and sold are changing. So-called demand-side platforms (DSP's) are a major force in driving that change. A DSP is used to purchase advertising in an automated fashion. DSP's are most often used by advertisers and agencies to help them buy display, video, mobile and search ads. A second typology for our classification system emerged - the DSP that facilitates the buying and selling of the media.

DSP's are highly contentious in the advertising community because they are disruptive. Advertising traditionally has been exchanged by human buyers and sellers in a manual process which is costly and subject to human error. DSP's help make that process cheaper and more efficient by removing humans from parts of the process, eliminating the need, for example, to negotiate ad rates and manually process orders. DSP's claim significantly lower costs for ad buys.

According to survey respondents, almost all ad networks now offer some sort of DSP-like product or real-time bidding (RTB) capability. There is also a shift in the industry where DSP's are beginning to look a lot like ad networks - buying up inventory, repackaging it, and reselling it to advertisers at a premium. DSP's may simply be the next generation of ad networks. Table 2 shows key players in the DSP space along with the companies (in parenthesis) which are acquiring them.

Table 2
TYPOLOGY 2 – DEMAND-SIDE PLATFORMS (DSP) AND REAL TIME BIDDING (RTB)

Indicative Demand-Side Platforms
Accordant
Centro
DataXu
Invite Media (Google)
Demdex (Adobe)
MediaMath
Rocket Fuel (listed on NASDAQ)
SiteScout (Centro Acquired 11/13)
Turn

Typology 3 - Data Management Platforms (DMP)

During the interview process the sheer volume of data the analytics firms and agencies had available to them from 3rd parties was quite noticeable. One interviewee claimed to hold above 85% of the active cookies in the USA at any given time! DMP's integrate customer CRM data and any of the following: large public databases, broadcast feeds from Nielsen or Rentrack, economic data, public competitor data and more. These 3rd party inputs to the analytics models provided our next typology the *Data Management Platform or DMP*.

Progressive marketers want to merge their own customer data with that of third parties to better segment and target audiences. DMP's typically rely on third-party cookies to help target segments and link third-party behavioral data to first-party data and personal information. There are privacy concerns and the industry segment is evolving in the function it provides. These firms currently look like data warehouses in the sense that they are collecting more data than they are delivering. However, they also appear poised to continue to push more value added data out as the industry evolves. At that point they may more closely resemble data factories. There also

seems to be some consolidation of DMP's with DSP's. Some DMP's are also launching DSP services and visa-versa. Table 3 below identifies indicative DMP's with the acquiring companies in parenthesis.

Table 3 **TYPOLOGY 3 – DATA MANAGEMENT PLATFORMS (DMP)** **Indicative Data Management Platforms**
Audience Optics (Accordant)
Media Optimizer (Adobe)
Aggregate Knowledge
Blue Kai (Oracle)
CoreAudience
eXelate
nPario
Turn
X+1 (Rocket Fuel)

Typology 4 - Media Mix Modelers (MMM)

For purposes of this study, the broadcast centric media mix modeling (or so-called top down media mix) companies were intentionally excluded because most of their customers spend large amounts of money on television. A key interest of the research team was to find out what was available for small and medium sized firms and for online analysis.

It was discovered that about 50% of the online-focused attribution and predictive analytics service companies also integrate traditional (specifically broadcast) data into their analyses. They use what is called a bottom-up approach where they build their models around the online media mix of the client. This is done in an effort to meet their marketing goals which are typically measured by cost per acquisition (CPA) or click through rates (CTR). They are, however, able to overlay feeds from traditional media to establish the impact of broadcast on the online media performance and visa-versa.

Findings from the current research also showed that the firms excluded from the study are currently linking more aggressively to the online world. These top-down media mix modelers are from TV audience measurement systems such as Nielsen or TiVo (TRA Inc.). With this information, another typology was identified as *media mix modeling* with an extension of two sub-classifications. The first sub-classification is *bottom-up* media mix modeling which emphasizes online data first or in some cases only works with online data. The second group is *top-down* media mix modeling companies with their roots in TV. We expect these sub-categories to become blurry over time as the importance of online increases. Table 4 below identifies indicative media mix modelers (MMM's) with the acquiring companies in parenthesis.

Table 4 TYPOLOGY 4 – MEDIA MIX MODELERS (MMM's)	
INDICATIVE BOTTOM-UP MEDIA MIX MODELERS	INDICATIVE TOP-DOWN MEDIA MIX MODELERS
Adaptive Audience	IRI
Adometry (Google)	Marketshare
AT Internet (Europe)	Nielsen Catalina Solutions
C3 Metrics	OMD Brand Science
Convertro (AOL)	ThinkVine
DC-Storm (Rakuten) (Europe)	TiVo (TRA Inc.)
DataSong	
Encore Metrics	
Visual IQ	

Typology 5 – Agencies (Digital and Full Service)

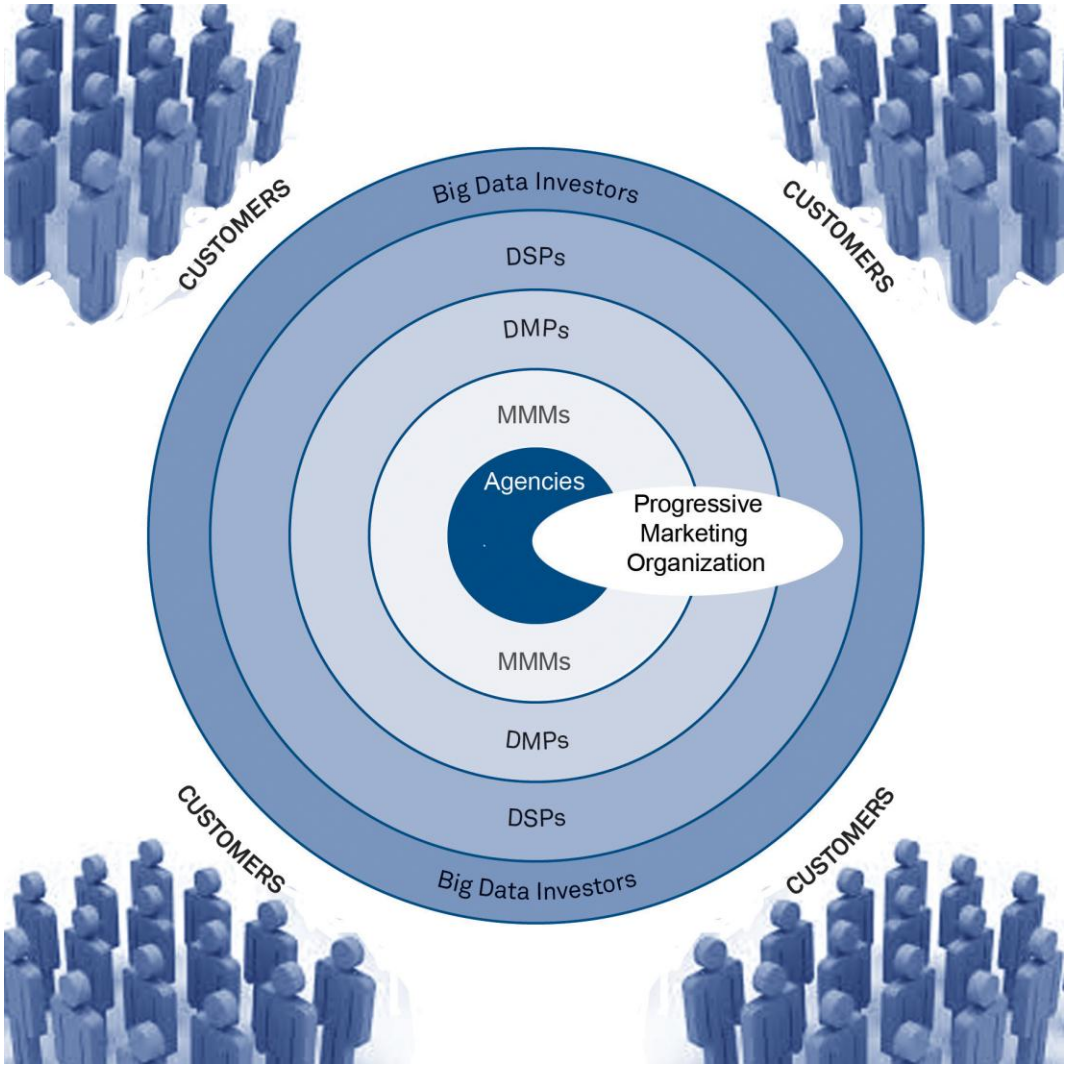
Agencies have always been an integral part of the marketing industry. With the rising influence of online, the model of what an advertising agency is and what it does is clearly in flux. Due to the changing online needs of the clients two predominant agency models appear to be on the rise. The first is a *digital agency* which focuses primarily or exclusively on internet advertising content creative and techniques. The second is a *full service agency* that provides creative strategy and traditional offerings; however they also maintain a digital practice with subject matter experts in a variety of online skills. *Full service* agencies may also have partnerships with the previously identified players in our posited framework. At times the full service agencies may also partner or sub-contract to the *digital agencies*. Agencies in both categories were interviewed in the current study. Indicative agencies which may or may not have been interviewed and are identified in Table 5.

Table 5 TYPOLOGY 5 – AGENCIES (DIGITAL AND FULL SERVICE)	
INDICATIVE DIGITAL AGENCIES	INDICATIVE FULL SERVICE AGENCIES
360I	22 Squared
C4-Analytics	Booyah!
Icrossings	Havas
Performics	JWT
PM Digital	Leo Burnett
Purple Rock Scissors	OMD
Resolution Media	Razorfish
Rise Interactive	Weiden and Kennedy
Sq1	Zenith Optimedia (Publicis Groupe)

In addition to the typologies, it is important to remember that all the firms in the *ecosystem* are working to better connect their progressive marketing clients to existing and potential customers. The progressive marketing organization is central to the system and may or may not have the ability to interface directly with each type of firm for purposes of marketing communications. Reaching customers to achieve the goals of the progressive marketing organization is paramount for all the players in the ecosystem. Customers are pervasive and the system manipulates the marketing messages they receive. Figure 2 provides a consolidated classification framework for understanding key players in the big data ecosystem and a graphical

overview of the potential interaction touch points a progressive marketing organization should consider and when engaging this *ecosystem*.

Figure 2: Classification Framework for Big Data Ecosystem



FRAMEWORK OVERVIEW AND CONCLUSION

The order of the concentric circles of this framework is not by chance. It can be argued that *big data* investors want influence over the customers and will get it if they invest wisely. DSP's are positioned just inside of *big data* investors and are critical because ultimately the media buy dictates who sees the content and when they see it. This is probably why Google invested in the Invite platform as early as 2010. In a *big data* world, information is king and that is why the DMP's are the next concentric circle in the *ecosystem*. These firms have the data, and they effectively are the data warehouses of the external world in which the organization operates. There is also the potential that the DSP's and DMP's will merge into one circle as the *ecosystem* evolves.

Having data is important, but it is not useful unless you can make sense of it. There is clearly overlap between the analytic capabilities of the DMP's and the new age analytics firms – that may or may not change as the ecosystem evolves. That being said, these media mix modeling companies (MMM's), whether bottom-up or top-down, allow customers to make sense of *big data* and make better marketing decisions. Agencies occupy the innermost circle of the ecosystem - they are currently in flux and redefining themselves so that they can add more value to (and extract more benefit from) other players in the system.

The progressive marketing organization is depicted as an ellipse so it can touch all the players (concentric circles) except the *big data investors*. This demonstrates the potential interactions progressive marketing organizations must contemplate when developing an IMC strategy. Many firms are too small to have direct relationships and expertise in the tools used by the DMP's, DSP's and MMM's and must rely in part (or fully in some cases) on advertising agencies to fill this gap. Choosing an agency, however, has become much more complex in light of the recent developments in advertising.

In conclusion, progressive marketing organizations must now choose between a complex array of agency models and then determine to what extent they should have direct client relationships with the each set of players in the *ecosystem*. The strategies that they implement will most likely be a function of budget, internal resources, level of sophistication of the firm, and the industry sector in which they operate. The intent of this paper was, first and foremost, to review the concept of *big data* as it applies to marketing communication, and to make sense of the evolving ecosystem around big data by developing a big data analytics firm typology. Hopefully that objective was accomplished - along with a further clarification of how that ecosystem could potentially impact the way progressive marketing organizations optimize marketing communication channel performance. A follow up paper will drill down into the specific set of factors a progressive marketing organization should consider when making strategic decisions about how to engage this dynamic and growing marketing *ecosystem*.

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