



UNIVERSITY OF
LIVERPOOL

Innovate UK
Technology Strategy Board

Intelligent, real-time hyper-local, screen-based OoH marketing

Market Research Report | Real-time Data Delivery Models

November 2017



INTELLIGENT, REAL-TIME HYPER-LOCAL, SCREEN-BASED OOH MARKETING

Market Research Report | Real-time Data Delivery

Funded by The Innovate UK

November 2017

This report is prepared as the main output of WP1 which aims to understand the context of hyper-localised [OoH] marketing through a deep customer and business dynamic analysis, including current and future needs/behaviours and regulatory frameworks. This report entails the background insight for us to proceed with WP2 before we proceed with the development of new interaction scenarios

Report is written and designed by:

Prof. Richard Koeck
Dr. Tuba Kocaturk
Gulnaz Aksenova
Peter Woodbridge
Alastair Eilbeck

OUTLINE

INDUSTRY CONTEXT DIGITAL OUT-OF-HOME ADVERTISING.....	2
IoT [Internet of Things].....	5
Digital Screens and the Built environment.....	5
Marketing Ecosystem for Outdoor Media.....	6
WORKING EXAMPLES OF HYPER-LOCAL REAL-TIME DATA DOOH.....	9
INDUSTRY NEEDS AND BEHAVIOURS.....	15
Data as Driver.....	15
Types of Interactions.....	17
Audience Behaviour.....	18
Personalisation.....	20
ETHICAL AND LEGISLATIVE FRAMEWORKS.....	22
USER NEEDS AND BEHAVIOURS.....	24
EXPERIENTIAL AND PARTICIPATORY MARKETING.....	24
The problem of Experiential Marketing.....	26
Consumers Behaviour.....	27
Consumer Behaviour in the Context of Billboard Advertising.....	28
ASYNCHRONOUS FIELD OBSERVATIONS AND COLLECTION OF BEHAVIOURAL DATA IN SPATIAL CONTEXTS.....	29
Site 1: Lime Street Station [Gateway/City Node], 8:30 am.....	29
Site 2: Church Street [Retail Centre/Site], 9:00 am.....	32
Site 3: Liverpool One [Private Shopping District], 9:30 am.....	33
Summary of analysis.....	34
COMPETITOR ANALYSIS. COMPANIES OPERATING IN THE AREA.....	36
INDUSTRY THREATS AND CHALLENGES.....	39

What is intelligent,
real-time
hyper-local,
screen-based
OOH marketing?



INDUSTRY CONTEXT (DIGITAL OUT-OF-HOME ADVERTISING)

According to Magna Global, the global spend for programmatic digital display advertising is estimated to reach \$53 billion by 2018 and it is widely assumed that Out-of-home (OOH) advertising will play a meaningful part in that growth (Magna Global Forecast Update, 2016). Further, according to forecasts from the Advertising Association and Warc, OoH ad spend in the UK broke the £1 billion barrier in 2014, and was predicted to grow by 4.8% in 2016 (5 Trends in Global Advertising for 2016, Warc 2016).

Outdoor media include all advertising methods that utilise publicly posted signs as a means of delivering messages to broad audiences. Notable examples of this advertising media include billboard (Le., advertising via posted signs along roadways and other transit paths), transit (Le., advertising via postings on buses, trains, taxis, and other transit vehicles), street furniture (Le., advertising via postings on bus shelters, city benches, and other stationary, public furnishings), and alternative outdoor advertising (Le., advertising via skywriting, advertising inflatables, stadium advertising, and other unusual treatments that do not fit within the prior three categories) (Outdoor Advertising Association of America 2006). In 2005, clients in America spent approximately \$6.3 billion on outdoor advertising (Outdoor Advertising Association of America 2006). This same year, outdoor advertising accounted for a 2.3% share of U.S. national advertising expenditures, which totalled \$271 billion (Newspaper Association of America 2007).

Looking to the future of the marketplace for OoH advertising, the research consultancy Kinetic underwent a major research study and report called 'On the Threshold of Change: The Future of Out of Home Media in the UK: The industry, consumers and technology to 2020' (2011). The research was conducted with both industry stakeholders as well as the general public. It's key findings indicated that:

- Digital Screen OOH revenues will account for a quarter of total OOH Signage revenues by 2020
- Consumers DO want to interact more with digital screens.
- OoH will segment into two dual sectors; Broadcast OOH and Targeted OOH. Targeting by consumer type offers both higher engagement levels will therefore add value to the medium.
- Interactive OOH (iOOH) and Poster to Mobile will emerge as new specialisms as advertisers seek

- Daypart, retail proximity and real-time planning will revolutionise the relationship between Out of Home and advertisers.
- Digital screens in established Out of Home locations will double over the coming decade; significant impetus will be given to some roadside and bus 6 sheets after 2015.
- Smart posters capable of recognising and reacting to consumer type will become commonplace.
- The number of digital sites (UK), capable of running more advanced and natively digital experiences is growing, illustrated in the following diagram:
- Outdoor billboard advertisements are capable of increasing awareness.
- Mobile Digital Adspend continues to dominate advertising revenues

Format	2011	2015	% change vs 2010	2020	% change vs 2010
Roadside 96s	–	–	–	–	–
Roadside 48s	31	60	93.5	400	1190.3
Premium/Iconic	31	75	141.9	100	222.6
Roadside/bus shelter 6s	–	200	–	7,000	–
Retail mall	1,359	1,800	32.5	2,000	47.2
Retail other (inc POS)	14,561	16,000	9.9	18,000	23.6
Airport	971	1,050	8.1	1,180	21.5
London Underground	1,407	1,407	0.0	1,600	13.7
Rail	238	350	47.1	380	59.7
Other transport	30	60	100.0	60	100.0
Taxis	1,250	2,250	80.0	6,000	380.0
Bus	–	20	–	750	–
Other environments	52,725	60,000	13.8	70,000	32.8
TOTAL	72,603	83,272	14.7	107,470	48.0

Figure 1: Number of Digital Sites [[Kinetic Report, 2011](#)]

Despite such strong figures, there is another side of the coin which illustrates how much OoH market is under pressure from online and digital formats and as such is in acute need of innovation. According to Magna's Global Advertising Forecast report from 2016, the bulk of net market growth in 2016 (\$26 billion out of \$27 billion) came from digital ad sales. More than 90% came from two ad formats --- online search and social media, with companies such as Google and Facebook together controlling more than half (54%) of total digital advertising market (vs 44% a year ago).

	Adspend 2016 (£m)	2016 v 2015	Forecast 2017	Forecast 2018
		% change	% change	% change
Internet	10,304	13.4%	8.5%	7.6%
of which mobile	3,866	45.4%	30.4%	20.8%
TV	5,277	0.2%	-0.5%	3.0%
of which spot advertising	4,730	-0.5%	-1.4%	2.4%
of which broadcaster VoD	197	12.6%	13.7%	11.0%
Direct Mail	1,713	-10.4%	-7.5%	-6.0%
Out of Home	1,106	4.5%	3.4%	2.3%
National newsbrands	1,101	-10.0%	-7.4%	-7.2%
of which digital	230	4.9%	1.9%	1.4%
Regional newsbrands	1,021	-13.2%	-8.6%	-8.3%
of which digital	193	-3.4%	0.2%	1.0%
Magazine brands	877	-6.8%	-5.1%	-4.6%
of which digital	282	0.2%	3.3%	3.7%
Radio	646	5.4%	3.3%	2.6%
of which digital	28	35.0%	21.3%	18.7%
Cinema	257	8.0%	5.3%	3.6%
TOTAL UK ADSPEND	21,372	3.7%	2.5%	3.3%

Figure 2: [Marketing Week, 2017](#)

As illustrated above (Source: [Marketing Week](#)), Out of Home represents a very limited market for a number of advertisers where digital and mobile ad-spend continue to account for the majority of spending and growth in the market. [Location-based mobile marketing](#), which uses personal data collected and technology such as location services to personalize ads, often via search engines, based on user preference, known habits, or location is growing. Some mobile advertisements may appear only when a mobile user is in close proximity to a certain store or service provider and this market continues to develop as location-based services and technologies advance. This thus represents a further complexity in the business ecosystem for contemporary advertisers and businesses working in this market that has multiple and layered interaction points between consumers and brands.

In a recent interview Amit Sarkar, COO of Kinetic Worldwide shares his views on OoH media in the emerging market of India (Best Media Info, August 11, 2015). He draws attention to the fact that while the OoH market in the past was largely a 'static medium', today's market is evolving towards a technology-enabled 'ecosystem' that connects with consumers on the go. He concludes: 'We are routing consumers to the Internet, activations, radio, and TV through the use of billboards. OOH been a broader term, I take the liberty of saying that there is lot of technology-driven innovations like NFC, QR, Augmented Reality, Geo Tagging, Facial Recognition done at malls, airports, cinema halls, and many other touch points where there is high proximity of consumers' (Best Media Info, August 11, 2015).

Augmented Reality is poised to enter the mainstream; according to one estimate, spending on [AR technology will hit \\$60 billion in 2020](#) which adds a further potential disruption to the outdoor media ecosystem.

This illustrates well the need of what Spark Compass' CEO Erik Bjontegard describes as one of the key objective of his company - the need to link the physical with the digital, or, as in this case the need to provide innovation to

the OoH market which is capable of linking it a huge amount of contextual data, user behaviour, knowledge and ultimately revenue streams between online and physical media. For this to happen, companies operating in traditional OoH market will need to think about new forms of “transaction”, which, according to Magna Global Forecast Update (2016), has had three phase in the past; the shift from carbon copy and Royal Mail; the shift from Excel and email (early 1990s); and shift to demand-side platforms (DSPs), supply-side platform (SSPs) and application programming interfaces (APIs).

An important element to the most recent shift in markets is the increasing technical possibility to tap into real-time data and the providing of contextual, localised data. This is where Spark Compass’ digital platform could play a significant role; in the sense that the SP can provide not only intelligence to data (by connecting data sets from a wide range of sources) that ultimately lead to new market opportunities and transactions based on three characteristics:

- mobile usage
- real-time data
- geographic location

IoT (Internet of Things)

Based on a range of IoT adoption rates, economic and demographic trends, and the likely evolution of technology over the next ten years, the economic impact of IoT applications is by McKinsey to be from \$3.9 trillion to \$11.1 trillion per year in 2025 (2015). Where the actual impact falls on that range will depend on a number of factors, including declining costs of technology and the level of acceptance by consumers and workers. The next-largest setting in terms of potential impact would be cities, where IoT applications have the potential for an impact of as much as \$1.7 trillion per year in 2025. (McKinsey Global Institute IoT report 2015). This could completely transform the potential relationship between people, place and technology.

DIGITAL SCREENS AND THE BUILT ENVIRONMENT

Advancements in projection mapping technologies (such as the realistic presentation of images), their adaptability to three-dimensional forms of built structures, as well as remote manageability of contents (ag4, 2006; Tscherteu, 2008; Haeusler, 2009), have allowed a steady proliferation of electronic architectural surfaces in the built environment. The “video walls” have been added as a fifth on the list of what were formerly four key elements of construction: “wood, steel, glass and concrete” (Blueprint, 2005: 32). The development of media façades as means of communication has particularly privileged advertisers’ attempts at addressing pedestrians in urban space, a practice as old as cities.

The proliferation of digital technologies in planning, design and communication infrastructure has, more recently, inspired yet another kind of argument, which is fed by utopian, rather than critical, views of ubiquitous computing as “an absolute disembedding from the material world” (Sassen, 2006: 488). This perspective has given way to theoretical imaginations of “liquid” cities (Novak, 1991), configured upon “space [that] does not separate structures, but is a field linking sites together” (Crang, 2000: 307, 308). It is assumed that in a “city of bits” people would happily live “freed from the constraints of physical space” (Mitchell, 1995: 115).

Broderick (2005) succinctly state the challenge of marketing communications in the passage that follows. “The challenge of marketing communications is to communicate the right message, in the right way, to the right people, in the right place, at the right time!” (Pickton and Broderick 2005, p. 6).

The strengths of outdoor marketing are commonly referred as; being relatively inexpensive, high reach and frequency; capitalising on increasingly mobile society, 24-7 visibility; numerous creative possibilities; precision targeting capabilities. Whereas, the weaknesses are referred as the following: location availability limitations, message length limitations, message alteration inflexibility, environmental distractions, interactivity limitations, difficulties determining return on investment (Vanden Bergh and Katz (1999), Shimp (2003))

The aforementioned arguments represent a series of challenges, but a potentially highly scalable and impactful market proposition for Spark Compass’s product.

Marketing Ecosystem for Outdoor Media

Whilst there will be variations, this model shows the general approach to how outdoor and indoor media space is packaged and sold. There are several points of interaction (among the stakeholders) that demonstrate a complex business ecosystem. What is significant here is that often a range of sites and locations will be sold as a package to client-side marketers, often on the basis of historic footfall data.

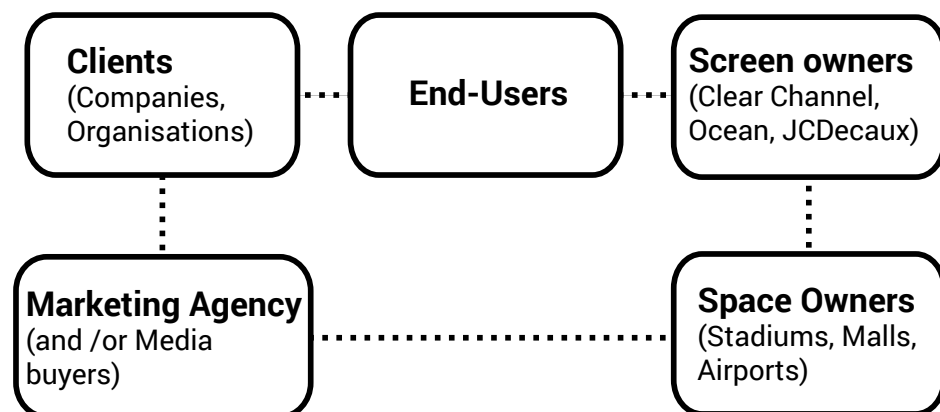


Figure 3 : OoH Ecosystem

Business-to-business (B2B) applications can create more value than pure consumer applications. It is estimated that B2B uses can generate nearly 70 percent of potential value enabled by IoT (McKinsey, 2015). There is large potential for IoT in developing economies. Over the next ten years, a higher potential value for IoT in advanced economies is estimated because of higher value per use. It is estimated that the users of IoT (businesses, other organizations, and consumers) could capture 90 percent of the value that IoT applications generate. For example, the value of improved health of chronic disease patients through remote monitoring could be as much as \$1.1 trillion per year in 2025.










Sized applications	Potential economic impact \$ billion annually		Assumptions	Potential value gain ¹
	Total = \$930 billion–1.7 trillion			
Air and water monitoring		403–693	Value of lives lost to pollution ~\$7.6 trillion/year	15% reduction
Adaptive traffic management		223–504	Time spent in cars/looking for parking ~\$3.9 trillion/year	10–15% less time in traffic; 10% reduction in congestion from smart parking
Autonomous vehicles (fully and partially)		204–235	Auto deaths, injuries \$3 billion; ~\$800 billion in fuel; 311 million hours in traffic/ searching for parking	~40% accident reduction (90% in fully autonomous), 10–15% fuel /CO ₂ savings
Resource/infrastructure management		33–64	\$1 trillion/year for electricity and water, plus street lighting and infrastructure maintenance	35% fewer electric outages; 50% reduction in water leaks; 10% reduction in theft
Disaster/emergency services		24–41		xxx
Public transit schedule management		13–63	Up to 70% of commuting hours are buffer time	Reduction in buffer time via connected bus/train data; condition-based maintenance
Human productivity (organization redesign, monitoring)		3–6	~\$670 billion in mobile and knowledge worker wages	5% productivity gain for mobile workers, 3–4% for knowledge workers
Crime detection and monitoring		14–31	~\$440 billion cost of crime	20–22% reduction
Smart solid waste pickup		5–9	~\$65 billion/year cost	23% productivity improvement

Figure 4 - Cities: Potential direct economic impact of \$930 billion to \$1.7 trillion per year by 2025
[[McKinsey report, 2015](#)]

A dynamic industry is evolving around IoT technology. Like other technology waves, there are opportunities for both incumbents and new players. Digitization blurs the lines between technology companies and businesses; makers of industrial machinery, for example, are creating new business models, by using IoT links and data to offer their products as a service. The below figure gives an overview of the potential economic impact of IoT in 2025.

Based on a range of IoT adoption rates, economic and demographic trends, and the likely evolution of technology over the next ten years, the economic impact of IoT applications is by McKinsey to be from \$3.9 trillion to \$11.1 trillion per year in 2025 (2015). Where the actual impact falls on that range will depend on a number of factors, including declining costs of technology and the level of acceptance by consumers and workers. The next-largest setting in terms of potential impact would be cities, where IoT applications have the potential for an impact of as much as \$1.7 trillion per year in 2025 (McKinsey, 2015). The below figure 4 gives an overview of the potential economic impact of IoT in 2025.

WORKING EXAMPLES OF HYPER-LOCAL REAL-TIME DATA DOOH

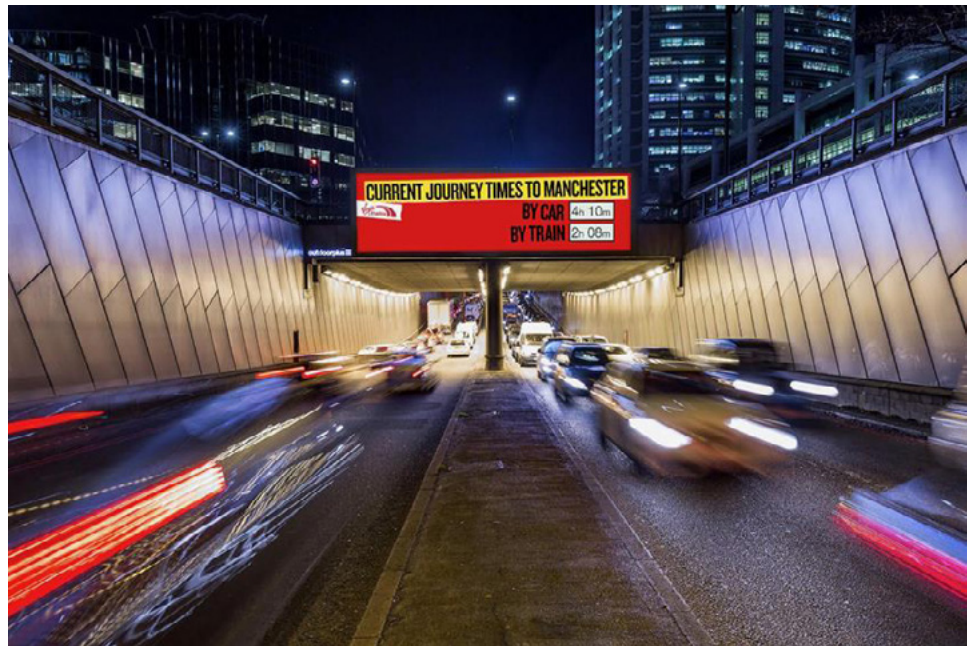


Figure 5 - Virgin Trains Real Time Campaign [London, Birmingham, Leeds]

Figure 5: Virgin Trains Real Time Campaign (London, Birmingham, Leeds) that uses current road Journey Times to show how much quicker people would make their journey if they took the train. The campaign also has a temporal dimension in that it is activated when the roads are more busy (Location aware media). Created by [Manning Gottlieb OMD](#) and [Anomaly](#) and produced by [Grand Visual](#).

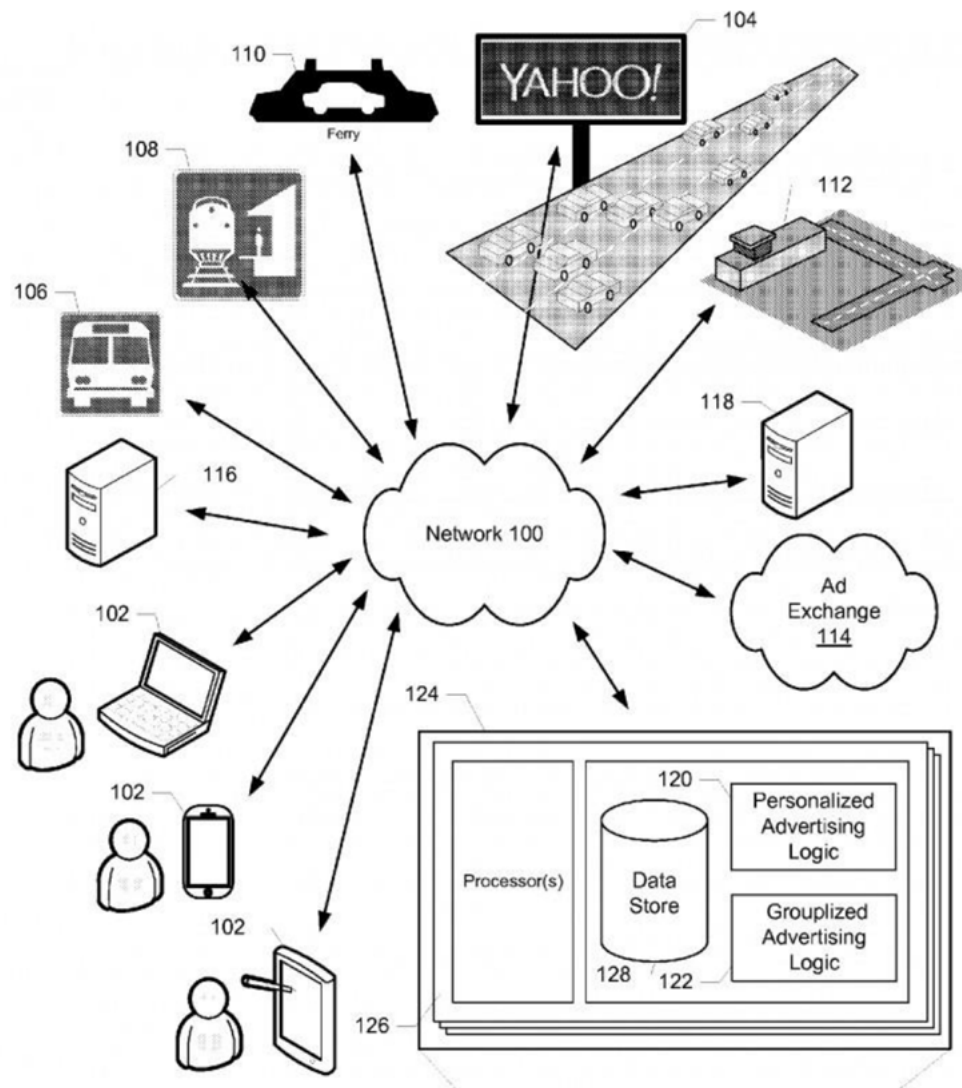


Figure 6 - Virgin Trains Real Time Campaign (London, Birmingham, Leeds)

Figure 6: Yahoo has applied for a patent for a "smart" billboard that would represent a leap forward in data collection for outdoor advertising. According to a [blueprint](#) the U.S. Patent and Trademark office, the billboard would collect data through innovative sensors, cameras and microphones—a first for the medium. Not only could the data be sold to advertisers to help craft highly targeted creative for the billboard, it could be processed and read in real-time, giving the advertiser the ability to dynamically alter the creative depending on audience makeup and behavior (Behaviour-driven).



Figure 7 - British Airways 2014 Lookup Campaign

Figure 7: British Airways 2014 Lookup Campaign uses local flight data to dynamically integrate the content of the ad with context in the real world. created by OgilvyOne (Location-based and Location-aware).



Figure 8 - Women's Aid 2014 campaign

Figure 8: Women's Aid 2014 campaign 'If you can see it, you can change it' (created by WCRS and Ocean Outdoor) that uses face recognition sensors to dynamically change the content based on how many people are engaging with the advertisement. (Location-aware).



Figure 9 - Coded by VCCP for O2

Figure 9: An example of 'playable' advertising. O2 (Agency VCCP) is hiding coded messages in a billboard on Shoreditch High Street, London. A new code is hidden every day, which will lead participants to a secret location in the area. The first person to crack it every day will be rewarded with a OnePlus 3 phone. Not location specific, although obviously trying to appeal to a tech-savvy demographic from the area.



Figure 10 - Buses go digital with Exterion Media and Google

Figure 10: Exterion Launches a New 'Digital Channel' in London. Each bus will carry a digital screen on its side. The technology allows brands to run imagery and copy that is pertinent to the locations of the buses, for instance according to nearby shops or London landmarks. Google is using the buses to promote its newly-unveiled Pixel 2 smartphone, running a three-month campaign that displays geo-targeted messages to bus passengers across the UK capital. The campaign was conceived, planned and booked by Talon and OMD through Exterion Media.

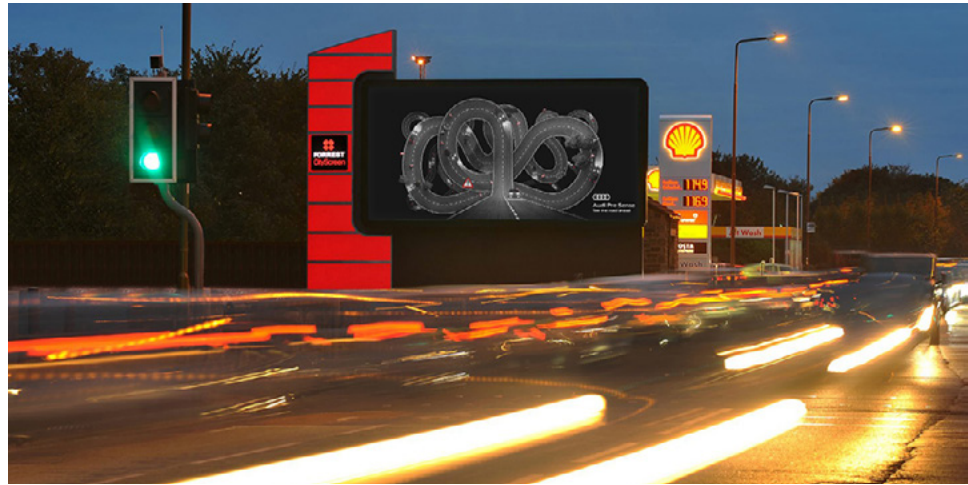


Figure 11 - Audi Unleashes Tactical, Data-Driven Roadside Campaign

Figure 11: Created by BBH and produced by Grand Visual, Audi is running outdoor ads in the U.K. that use data from current driving conditions to promote different aspects of its driver technology, reports UK's 'Creativity'. The campaign uses traffic, time and weather data to trigger content that is contextually relevant at each location. For example, when the traffic is heavy, the creative will alert drivers to Audi's "Pre-Sense" feature, its in-built technology package for predictive safety. During adverse weather, creative will change to feature "Quattro-on-demand," its all-wheel drive technology designed for rain, snow or hail conditions. The campaign is running on 211 screens, across nine U.K. cities, and uses the tagline "Audi as your sixth sense."



Figure 12 - The Waitrose Spring campaign

Figure 12: The Waitrose Spring campaign, created by Adam & Eve DDB, 2016 introduces a live cam video displaying its farms in real time (Location-augmenting).

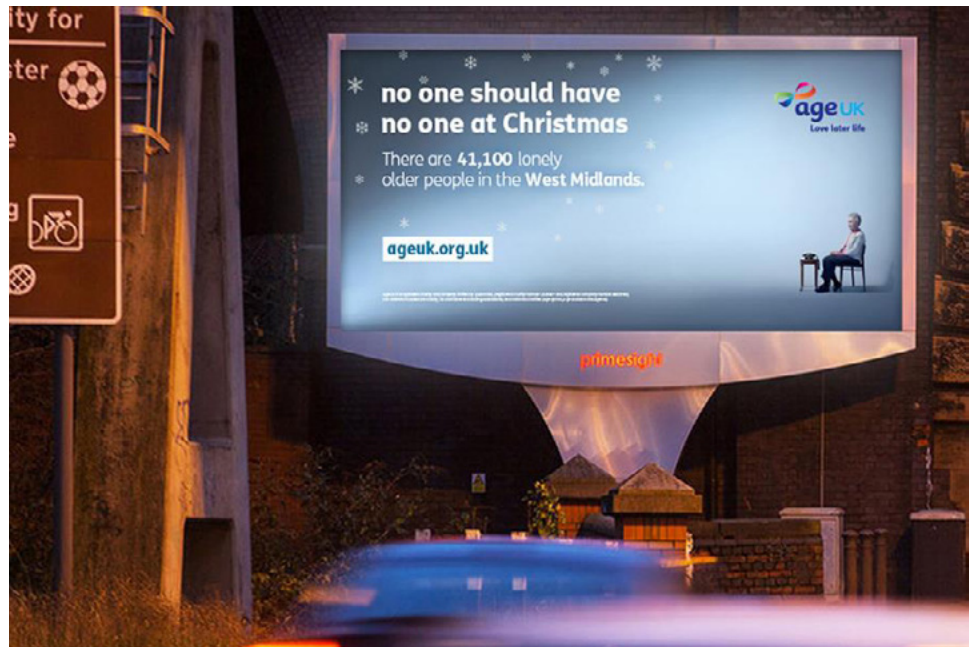


Figure 13 - Age UK “No one should have no one at Christmas” by Grand Visual

Figure 13: Local Data campaign by Age UK (Produced by Grand Visual 2016). Winner of several OOH Data Awards. The campaign was planned and booked by Talon and runs across Primesight, Signature and Clear Channel roadside D4,8 networks. (Location-based and Location-aware).



Figure 14: The world’s first programmatic OOH Campaign

Figure 14: The world’s first programmatic OOH campaign, using the best of online and digital OOH technology to realise the true power of OOH as a digital media channel. Using real-time audience insights, integrated technology and contextual creative, Grand Visual delivered more effective OOH advertising and unprecedented buying efficiencies, proving the case for digital OOH as the next frontier for the programmatic market (by Grand Visual, Talon, OMD).

INDUSTRY NEEDS AND BEHAVIOURS

The Industry is rapidly evolving the way digital screens are used, to create a more personal experience for consumers and merging online and offline behaviour and interactive hardware. These new screen approaches are categorised as 'connected' or 'smart' screens, as they are both online and take advantage of much of the underlying technology and software deployed on smart-phones. To match the evolution of the technology, the industry is having to quickly adapt its processes and related systems in several key areas. According to a recent report from Exterior (2015), the personalisation of technology and the interactive behaviours it encourages are redefining OOH's role including an amplification of many of OOH's traditional strengths and providing a world of new opportunities for brands to engage in new ways with consumers. The same report compares the earlier and current approaches to OOH as "once a 'notice and do' medium, now it's a 'think and feel' medium... triggering interaction and launching experiences." (From 'The Outdoor Media Experience is Changing. Exterior Report 2015)

Data as Driver

Data is the primary driver behind more intelligent content, how it is delivered and also how its effectiveness is analysed. This can include environmental data (advertising umbrellas when its raining), transactional data (connecting content displayed on a media owners screen with a brands back-end inventory and e-commerce platforms) and data collected by the screens themselves that can provide valuable demographic insights around the attention and behaviour of people in the vicinity of the screens. Notable examples from this year include the NSW Cancer Institute using real-time UV levels to deliver sun-safe messages in Australia, and Amazon's people-powered DOOH activity for Catastrophe in the US, which used live twitter polls to trigger themed trailers based on audience preference.

Route¹ points out two of the most prominent issues surrounding the utilization of data in current market, i) issues of interoperability, and ii) connecting different data sources:

"This requires improved data structures and encoded transaction rules, both of which the OOH industry is actively engaged in developing, having launched SPACE as the core inventory database in autumn 2015. The unique data-management application – which stores, categorises and standardises

¹ a research organisation responsible for providing OOH Audience Measurement to the UK Market

every piece of OOH inventory within the UK market – means the transfer of data will be improved, and makes automation and programmatic ripe for growth in 2016.” (Patel, 2016)

A recent article summarises the three important developments for transaction technology, supported by online platforms, currently active in OOH (Warc 2016):

1. “Pull-to-trade” links the inventory management systems of media owners to their major trading partners and enables partners to pull details of suitable inventory by format and location, as well as providing a real-time assessment of classic poster inventory availability.
2. “Click-to-buy” enables the open purchase of a billboard through online search, transaction and artwork provision. Several software companies have developed interfaces to make this work. The system effectively operates as a self-service shop enabling easy access to new customers, as well as improved efficiency. It is already in use in some markets around the world.
3. “Download-to-digital” is seeing companies develop plug-ins that connect online digital trading desks to the outdoor digital inventory.

In 2017, Advertisers’ Attention goes to: Data-Driven, AR/VR, Marketing Automation

In 2017, which of the following digital marketing technology will draw attention and attract focus?

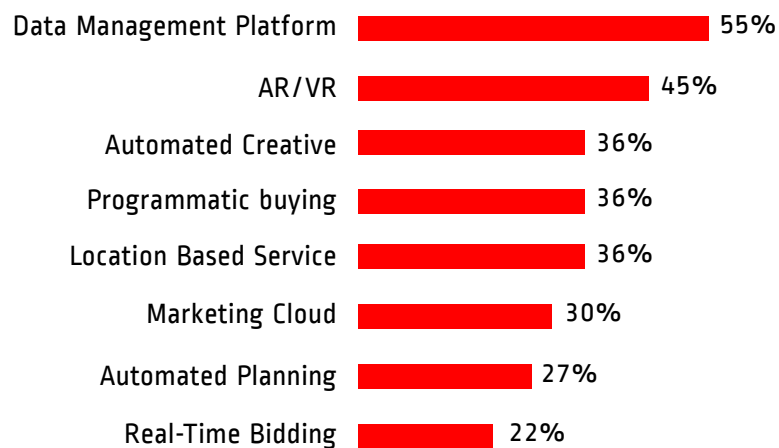


Figure 15: Diagram Highlighting focuses for Advertisers [Source Admaster Mobile Survey, 2017]

Current Digital OOH also makes it possible to sync advertising across multiple channels. Lucozade’s “Find Your Flow” campaign is a good example of this cross-fertilisation, as it effectively syncs radio spots with digital billboards, enabling drivers to see content contextualised by what is happening in their cars.

OOH’s ability to act as a primer for more interactive channels is more commonly recognised today. Research from BrandScience confirms this, with their finding that increased investment in OOH (as part of mix communication strategy) drives ROI (return on investment) for advertisers. More specifically, the report recommends that, for sales effect alone, grocery retailers should use OOH as the lead medium for spendings under £25 million a year. (Source: 5 Trends in Global Advertising for 2016, Warc 2016)

Types of interactions

Many of the digital posters installed in cities are now being equipped with a variety of cameras and sensors to enable a peer-to-peer connection between people their smart phones and screens. Creating a platform to facilitate dynamic, intelligent, personalised and interactive content. However neither the sophisticated content nor the understanding of how to change people’s attention is mature enough yet to see its widespread adoption. The public who have grown accustomed to DOOH delivering simple video advertising will need the industry to invest in compelling interactive content to change this perception.

Kinetic’s own consultation with industry experts reveals that most stakeholders regard the interactivity between digital posters and smart-phones as the single biggest opportunity and challenge for the industry in the years ahead. If the Out of Home industry can develop a consistent and effective approach to poster-to-mobile brand campaigns, it could spawn a new segment within the medium, interactive Out of Home (iOOH). (Source Kinetic, 'On the Threshold of Change: The Future of Out of Home Media in the UK: The industry, consumers and technology to 2020' (2011)

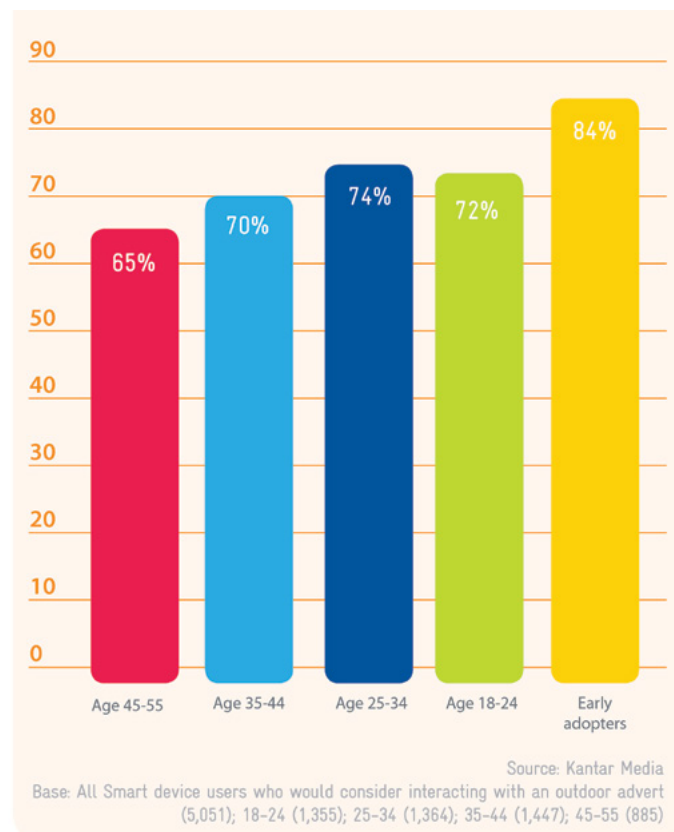


Figure 16: Smart device users who would consider interacting with OOH advert [[Exterior Report, 2015](#)]

Most stakeholders consulted by Kinetic were doubtful about how widespread the implementation of interactive technology would be in the short term. Uncertainty, about which specific technology will unlock mass-market interactivity between smartphones and posters, is also notable. (Source Kinetic, 'On the Threshold of Change: The Future of Out of Home Media in the UK: The industry, consumers and technology to 2020' (2011))

"Interactivity on Out of Home campaigns allows brands to make an emotional connection with the consumer in a public space and at a time when consumer action is possible." (Exterion 2015)

Industry research shows that generally OOH is seen as a welcome intrusion and users would welcome interacting with OOH on their mobile devices.

Whilst it is clear from the above diagram that people are willing to interact with OOH, the value exchange is something that brands really need to think about when expecting engagement in this way:

"Brands have to deliver on the expectations they generate. Our respondents were very clear; if you provoke their curiosity, you had better not let them down! Our study found that if people are persuaded to interact and are not sufficiently rewarded, the effect can be negative." (Source: Exterion Report).

The following diagram illustrates some considerations around value exchanges that need to be thought about. Which identified that in addition to basic fact finding/information sharing needs, the audience also expects a 'value exchange' in terms of monetary and entertainment:

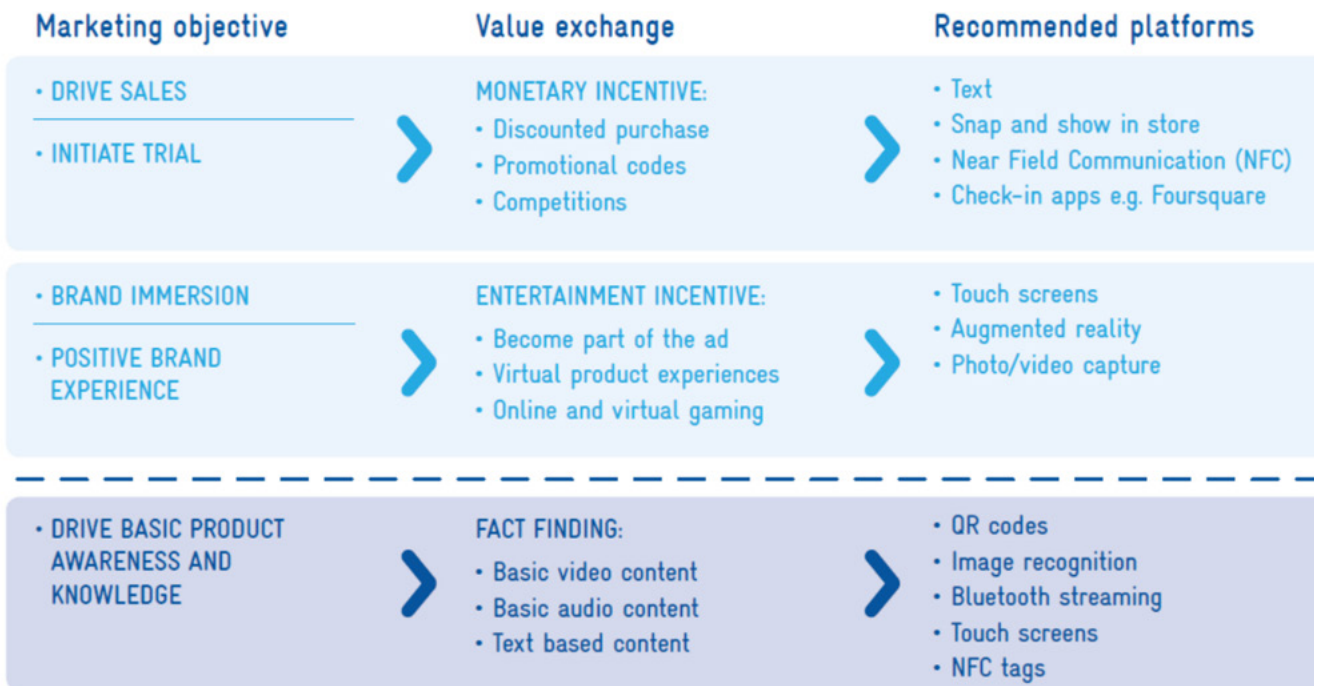


Figure 18: Sharing via social media [[Exterion Report, 2015](#)]

Audience Behaviour

Key to understanding the effectiveness of any DOOH content is monitoring how it affects people's behaviour. There are several key metrics employed by the industry. These are measured through automated traffic analysis of the

people passing by the screens and includes statistics on gender, age, dwell time and attention. The last two are critical to the success of campaigns and increase of less than a second is considered significant. (TILO report, 2014)

Two critical factors influence the potential for engaging consumers with interactive poster experiences. The first is dwell-time, the industry term used to describe the average length of time consumers stay in a location and are exposed to a poster. The second is the speed at which the installed technology can download or receive data from a consumer’s handset. Clearly selecting specific locations based on dwell-time and matching those locations with the appropriate technology, is essential. The vast majority of roadside poster sites are not high dwell-time locations, but bus-shelters and many transport and shopping environments have higher dwell-times, whilst some retail, airport and transport (cross-track) have considerable engagement times. Amplification is also an important factor when advertising can actively engage people in an experience. For example, as outlined in Exterior report (2015), 55% of all respondents with a social media profile have used social media to share information about promotions or offers whilst Out of Home. 74% of Early Adopters (who have a social media profile and are smart device users) shared promotions with their friends strongly indicating that this type of behaviour is only set to continue.

“Smartphone owners notice more outdoor advertising than others, suggesting that the integration of outdoor and digital in marketing campaigns could provide a promising advantage for marketers,” says Roy Morgan’s New Zealand general manager Pip Elliott. The below figure displays a useful example of this, summarizing the findings of a research conducted in Indonesia, comparing what percentage of people notice different OoH types according to phone ownership.

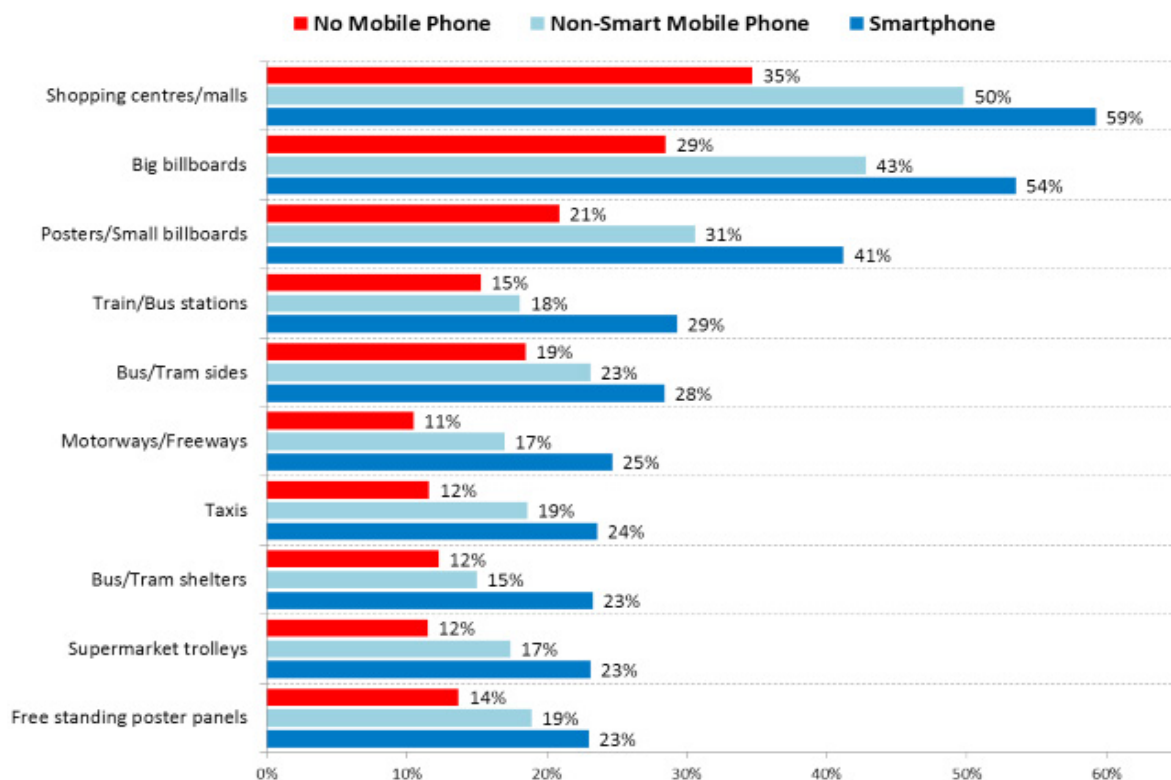


Figure 19: [% of people noticing outdoor advertising types by mobile phone ownership](#)

Personalisation

Personalisation can involve consumers or their behaviour passively or actively identifying themselves to screens and affecting the content they receive. On the one hand this can mean users actively volunteering their online profiles to access a very tailored experience similar to standard online behaviour. On the other hand the screens themselves can understand and make assumptions about the people in front of the screens. This could involve identifying characteristic of the person's (age, gender, sentiment) or by analysing the context (location, time of day, environment). For example a screen at a bus stop might decide that the people nearby are waiting for the next bus and that most people taking that bus may be going to a particular location, so could serve an advert about that location.

This development is not the result of conspiracy to remove people from collective experiences. It is instead an unintended side effect—a negative externality—of how advertising, big data, and content production have come to co-exist over the past two decades. (Source: Advertising, Big Data, and the Clearance of the Public Realm: Marketers' New Approaches to the Content Subsidy by NICK COULDRY).

The success of search engines and social media platforms in the exchange process underscores the lessened leverage that traditional content producing companies now have. Marketers make it clear that publishers have to offer them more and more data about their audience members if publishers want to be players in the exchanges. That often requires publishers to hire companies such as Audience Science to manage such information as well as slice and dice it so that particular sponsors can buy access to only specific types of audiences that matter to them and personalize their messages accordingly. The new leverage that the advertising industry can exercise over publishers is also leading to the blurring of the church-state separation between editorial and advertising material in many publishing operations. Sponsors see the weakened state of publishers as a way to negotiate direct insertion of their products into media content that does not look like an advertisement. (Source: Advertising, Big Data, and the Clearance of the Public Realm: Marketers' New Approaches to the Content Subsidy by NICK COULDRY, 2014).

Discourse and actions within the media system point to three dynamics of content personalization that are causing the world's people see in their digital travels increasingly to diverge depending on demographic, psychographic, locational, and other behavioral points of information that advertisers or publishers carry about them. The first dynamic, the most pervasive so far, involves publishers working with advertisers to personalize the commercial messages they receive around the editorial matter. Based on these constructions, people receive different prices for the same products, and different discounts for competitive products. The ads they receive also may present different stories and types of people—and therefore different views on the world—depending on the target and the persuasive message (Turow 2006). A clear example of this differentiation due to microtargeting is personalized digital political campaigning. During the 2012 U.S. presidential race, marketers for the Obama-Biden team used data-mined information about Democratic voters to determine what issues to present to them, how often, and when (Turow, Delli Carpini, Draper, & Howard-Williams, 2012).

The second dynamic, growing strongly since 2010, is what marketers call native advertising (DVorkin, 2013). A native ad is textual, pictorial, and/or audiovisual material that supports the aims of an advertiser (and is paid for by the advertiser) while it mimics the format and editorial style of the publisher that carries it. A basic version is the sponsored tweet that Twitter integrates into the streams of people who use it and whom the sponsors deem useful to receiving the messages. More elaborate are entire articles written by firms specializing in "seeding" native advertising articles so that the right people will see them. One such company, Social Seed (2012, para. 3), describes its mission for Samsung to "amplify their seductive motion content" through a video that would "achieve press placements and organic, editorially-focused traffic in several global markets." It accomplished the goal with 125,000 views through "35 placements on highly targeted sites, such as Gizmodo." Moreover, the Samsung-driven editorial matter ignited "significant engaged commentary." (Couldry, 2014)

As publishers become used to advertisers' microtargeting and as native advertising becomes a part of their everyday landscape, it is easy to see how publishers might develop this third dynamic: They will begin to vary their own material based on their visitors and what they know about the visitors. Advertisers have for over a decade been using techniques for testing whether ads with certain features will draw engagements or clicks. It is not much of a stretch to expect that, facing growing advertising competition from search engines and social networks, straightforward content publishers will use their data to change articles or videos on the fly based on what they know of visitors. (Couldry, 2014)

ETHICAL AND LEGISLATIVE FRAMEWORKS

The Advertising Standards Authority (ASA) is the UK's independent regulator of advertising across all media. It applies the Advertising Codes, which are written by the Committees of Advertising Practice (CAP). They are mainly dealing with issues The Data Protection Act defines the guidelines for the use of personal data. An increasingly important user question here is defining the fine line between invitation and intrusion. The outdoor advertising environment has its own rules, regulations and prohibitions. This ranges from rules governing planning permission for displaying ads, to self-regulatory rules guiding the content of the ads themselves. Before advertising outdoors, permission must be granted by the owner of the ad site in question, and by the local planning authority responsible for that area. More detailed information regarding the current outdoor advertising rules are accessible [online](#).

The Interactive Advertising Bureau has developed a number of standards to ensure industry wide adoption and cross-compatibility of systems and content. One example that might impact upon this project is the [Dynamic Content Ad Standard](#)

USER NEEDS AND BEHAVIOURS

Prominent technological developments over the past 20 years have impacted upon changes in the urban environment. Particularly the Smartphone, that has radically changed the connection between people and their environments. There are a number of factors that will be influential in determining possible future relationships between Digital Out of Home and consumers. Firstly, there is a significant growth in the number of people who spend time outside of their homes. Additionally, the drastic increase in the number of smartphone users is already radically changing the connection between people and their environment.

In order to gain a clearer picture of consumers' attitudes towards digital posters and their propensity to interact with them, Kinetic conducted consumer research including 1,000-strong representative panels in London and nationally in February 2011. The potential to be entertained or to access retail promotions have been found as the two most immediate attractions to digital posters. The research revealed around half of consumers (47% nationally; 51% in London) said they would download money off vouchers for retailers from digital sites to their mobile phone. (Source Kinetic, 2011)

A report by Exterior, looking into the interactive future of advertising, identifies user context as highly significant. For example, providing temporary distractions whilst people are 'in-between' spaces, i.e. walking and waiting in the urban context, and likely to engage more when they are alone. (Source Exterior Report 2015).

EXPERIENTIAL AND PARTICIPATORY MARKETING

There are several reasons behind the potential declining impact of traditional models of advertising users in the 21st Century. "Mass customization and flexible manufacturing subsume the concept of mass production and mass advertising," wrote two marketing professors in 1994 in the ominously-titled paper "The Death of Advertising." (Rust 1994). At a time where the digital world was just coming into being, this paper argued for a more digitally native way of thinking about advertising that works with the medium specificities of two way communication platforms, rather than simply as a one way communications medium. Interestingly they predicted that by 2010, much of advertising's role and methods will have assumed this new model and their predictions can be largely validated through the huge shift that social networking and search, and the rise of 'native advertising', created from 2008 onwards.

A recent study that was exploring the types of advertising that new generations are demanding has looked at Digital Advertising and the way that it often repels users by being too much a one-way medium, rather than a medium of exchange and conversation. Millennials and the generation that follows it (generally termed generation Z) are often the demographic that brands want to appeal to and they currently comprise 46.4% of the total US market. The two generations exhibit different traits, but both value community, conversation, and authenticity. They hate being spoken down to and not being given a voice. Having grown up with an ever-increasing array of participatory media channels, they especially hate undeserved impositions on their time and attention sometimes referred to as distraction advertising. A recent study titled "74% of digital natives tired of brands shouting at them" found that a majority of 16- to 39-year-olds stop using social networks where they feel like they're just targets for advertising. "They want it to be a conversation, they want to engage," Rob Tarkoff, president and CEO of Lithium Technologies (who sponsored the study), told SFGate. "It has to be a two-way interaction if brands want to succeed. It can't be one way any longer." This study reveals that for a successful new model of advertising to emerge that it will need to consider questions around participation, experiential, community, conversation and authenticity. (Source: Lithium Report 2016).

Interestingly a number of reports have noted about a recent rise in a shift of industry spend towards 'experiential' forms of marketing that are sharable, participatory and rooted in strong conceptual creative. Illustrating a potential fundamental shift in consumer psychology around how they want to engage with brands. Many companies are engaging with this concept of experience in both retail, events as well as mass marketing campaigns. Nike Plus, Red Bull's Events strategies and Apple's 'Town Square' store strategies are all examples

of this type of marketing that offers an experiential 'lived' and participatory component. This chimes with Pine and Gilmore's notion that we are shifting towards an 'Experience Economy' in their seminal work titled *The Experience Economy: Work is Theatre & Every Business a Stage* 2011. Jeremy Dalton, a consultant at PwC, conceives of this notion as a shift from 'Storytelling' to 'Story Doing' (Campaign, 2016) and that brands will need to create experiences that move far beyond the limitations of single-channel media content broadcasting. This leads to the importance of considering OoH and its potential to become an 'experience' that goes beyond simple notions of communication and messaging.

This notion also resonates with Vargo and Lusch's (2004) model of contemporary marketing that highlights the co-creational aspects of marketing as a co-production. In their seminal article, Vargo and Lusch (2004a) argue that marketing has moved from a goods-dominant view (characterized by the centrality of tangible outputs and discrete transactions) to a service-dominant (S-D) view, where intangibility, exchange processes and relationships are central (the basic characteristics of the S-D logic articulated by Vargo and Lusch are outlined in the following table:

Distinguishing factors	Service-centred dominant logic characteristics/ Foundational premises (FPs)
Primary unit of exchange	<p>People exchange to acquire benefits (e.g. knowledge and skills) accruing from specialized competences or services. Knowledge and skills are operant resources.</p> <p><i>FP 1 Service is the fundamental basis of exchange</i> <i>FP 2 Indirect exchange masks the fundamental basis of exchange</i></p>
Role of goods	<p>Physical goods are transmitters of operant resources; they are 'intermediate' products that are used by other operant resources (customers) as appliances in value-creation processes.</p> <p><i>FP 3 Goods are a distribution mechanism for service provision</i> <i>FP 4 Operant resources are the fundamental source of competitive advantage</i> <i>FP 5 All economies are service economies</i></p>
Role of customer	<p>Customer is a co-producer of service. Marketing is the process of doing things in interaction with the customer.</p> <p><i>FP 6 The customer is always a co-creator of value</i></p>
Determination and meaning of value	<p>Value is perceived and determined by the customer on the basis of 'value in use', resulting from the beneficial application of operant resources. Firms can only make 'value propositions'.</p> <p><i>FP 7 The enterprise cannot deliver value, but only offer value propositions</i></p>
Firm-customer interaction	<p>Customer is primarily an operant resource. Customers are active participants in relational exchanges and co-production.</p> <p><i>FP 8 A service-centred view is inherently customer-oriented and relational</i> <i>FP 9 All social and economic actors are resource integrators</i> <i>FP 10 Value is always uniquely and phenomenologically determined by the beneficiary</i></p>
Source of economic growth	<p>Wealth is obtained through the application and exchange of specialized knowledge and skills. It represents the right to the future use of operant resources.</p>

Figure 20: Characteristics of the service-dominant logic and foundational premises [Vargo and Lusch 2008]

The problem of Experiential Marketing

One issue for experiential marketing faced by advertisers and brands however, is often questions of scale, and being able to scale up the effectiveness of events. Experiential marketing tends to focus on unique, one-off events or campaigns that are difficult to scale outside of a particular locality or place, and whilst they can often gain amplification through social media sharing channels that extend their reach, impact and impressions, 'reproduction' is often difficult due to the costs of replicating the experience of unique and place-based events. This is restated in the following comment:

"What historically has been meant by 'experiential' were these very low-reach, high-immersive experiences...On a per-user basis, those have historically been some of the most powerful ad experiences; however, they have no efficiency, no scalability." Shumaker, VP of [Advertising Solutions at Unity Technologies](#) says. But that's about to change. While immersive experiential advertising has traditionally taken place offline—at launch events, in stores, and on the streets—new spatial technologies have created a digital infrastructure that can place experiential marketing campaigns on our screens in ways that are potentially mechanically reproducible. "In digital form, this experiential marketing is deliverable at-scale, exactly as designed," Dazin says., and continues: "If traditional programmatic advertising is moneyball, interactive immersive advertising is the [Home Run Derby](#)."

Games engines based advertising is one possible answer to this. So for example in IKEA's latest 'Ikea Place' app customers can "try out" virtual furniture in their homes through placing them in rooms (or any public space) via their phone or tablet, and if they like how it complements the space, order on the spot. "It's unimaginable how different this is—that you can actually see the piece of furniture in your house before you buy it, that you can engage with items and interact," [Shumaker says](#).

With the games engine at the centre of advertising strategies, it offers the ability for content to be compiled based on contextual awareness of the user, the context and the environment that the advert is consumed in-- adding a potential experiential layer to mass-advertising campaigns. A recent example of this is a project by The Mill in London, that enables real time data to dynamically reconstruct a car at the 'user-end' in real-time (see <https://www.polygon.com/2017/3/1/14779608/blackbird-ar-epic>). Several other organisations are experimenting with similar approaches, often know as 'Object-Based Broadcasting' methods which imply an end-screen compiling the experience.

Consumers behaviour

The demographic characteristics exhibited by individuals play significant roles in their associated consumer buying behaviours. Such characteristics include gender, race, age, income, and education. The VALS lifestyle categories combine multiple elements of consumer lives (e.g., income, education, beliefs), yielding insights into the buying behaviours of those particular individuals who exhibit such combinations. Such categorisations are particularly useful for segmentation activities as the combination yields more information than that offered by characteristics observed independently (SRI Consulting Business Intelligence 2003). Ultimately, understanding lifestyle factors can assist marketers in understanding consumer values and how they impact buyer behaviour (Michman, Mazze, and Greco 2003, Solomon 2004).

Personality

- Four personality theories have been utilised by marketers to describe consumers: (1) psychoanalytic theory, (2) social-cultural theory, (3) self-concept theory, and (4) trait theory.

Psychological Factors

Motivation:

- Maslow's hierarchy
- Settle and Alreck's horizontal needs include achievement, independence, exhibition, recognition, dominance, affiliation, nurturance, succorance, sexuality, stimulation, diversion, novelty, understanding, consistency, and security (Settle and Alreck 1989).

Perception Consumer Consumer:

- According to Wells, Burnett, and Moriarty (2003), perceptions are shaped by three influences: (1) the physical characteristics of the stimuli, (2) the relationships of the stimuli to their surroundings, and (3) the person's state of mind (p. 107). Because perception is influenced by a person's state of mind, perception is essentially a personal trait.

Learning decision-making response:

Attitude:

- The individual's behaviour is influenced both by his or her own perspectives, along with those of his or her referents, such as family and friends, which ultimately dictates the exhibited behaviour (Ajzen and Fishbein 1980, Schiffman and Kanuk 2004).

Rogers identified five adopter categories-innovators, early adopters, early majority, late majority, and laggards-based on innovation adoption characteristics exhibited by consumers (Rogers 1995).

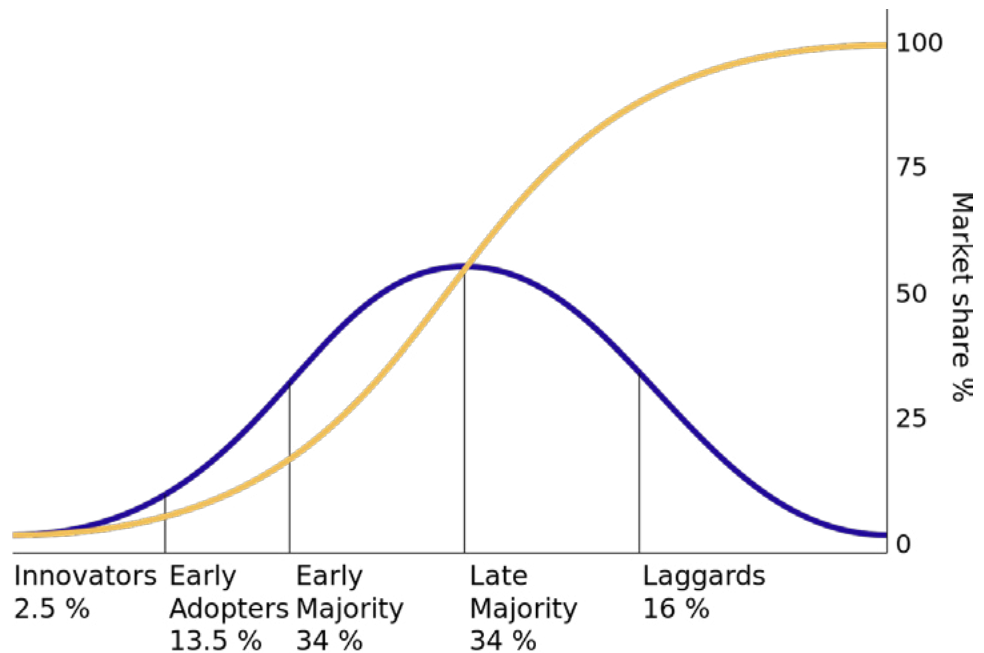


Figure 20-21 Rogers' Diffusion of Innovation Curve.
[Rogers and Everett, 1995]

Consumer Behaviour in the Context of Billboard Advertising

Unfortunately, the study of consumer behaviour has been almost entirely neglected in the sparsely populated literature of billboard advertising. The lack of attention regarding elements of consumer behaviour by billboard advertising researchers is likely the result of (1) the very limited literature of billboard advertising, as discussed in 2.5, which might be just short of the maturity necessary to influence researchers to more deeply explore the medium, probing elements of consumer behaviour and (2) the outdoor advertising industry's view that beyond geographic segmentation, (3) opportunities to segment on the basis of gender, age, Income and etc. are limited if they exist at all.

ASYNCHRONOUS FIELD OBSERVATIONS AND COLLECTION OF BEHAVIOURAL DATA IN SPATIAL CONTEXTS

We have collected and analysed behavioural data in 3 different spatial contexts. The analysis sought to explain patterns of human (end-user) behavior in relation to spatial context where digital screens were placed. Field observations have been conducted in three spatially distinct sites (Gateway/City Node, Retail Centre/Site, Private Shopping District) and have been fully recorded with a 360 camera for further comparative analyses by all team members.

The method used was non-systematic observation to avoid preconceptions about the observed behaviours in order to discover all the relevant factors. Therefore, our observation was rather Exploratory and was essentially in the form of abstractions and generalizations. Abstraction means that empirical observations were translated into concepts; generalization means arranging the material so that it disengages from single persons, occurrences etc. and focuses on those structures (dynamic invariances) that are common to all or most of the cases. In this particular case, there was not a clear borderline between observation and analysis of the collected data. Below are the brief descriptions and characteristics of the 3 sites that had been observed and the abstractions/generalizations that had been extracted.

Site 1: Lime Street Station [Gateway / City Node], 8:30am



Figure 23: Position of the digital screen – far across square

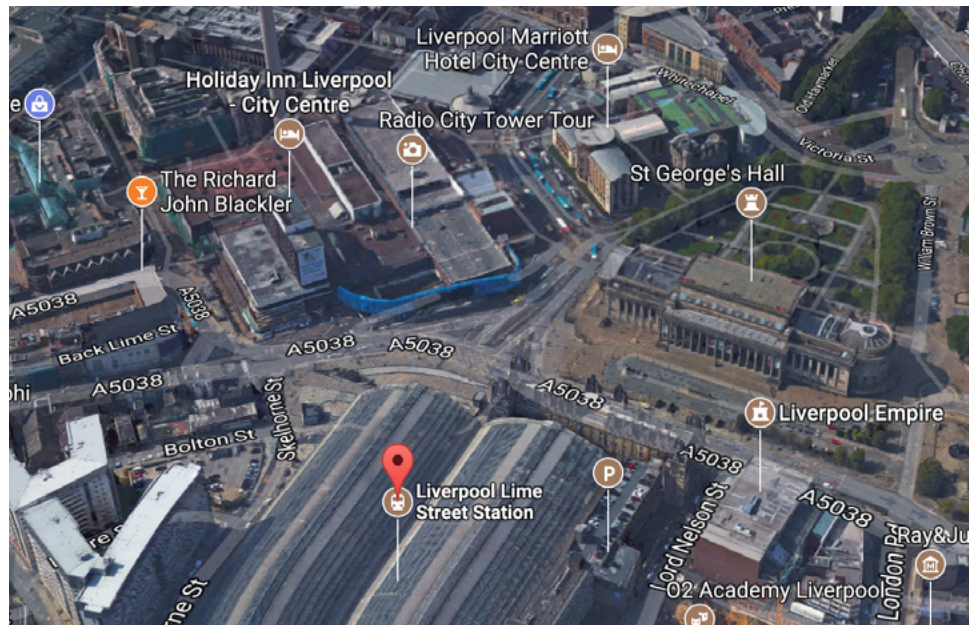


Figure 23: Position of the digital screen – far across square

Location description: Location was set up outside Liverpool’s main train station; major point of arrival for visitors and commuters. In Lynchian terminology this could be called “node”; a point where people enter and leave the city. The location also functions as a gathering place for people, particularly later on in the day. There is also a public square visible from the screen (St George’s Plateau), where public city events take place. A road/traffic junction intersects the view between the station and the screen.

People/Place Users: commuters; arriving at Liverpool, going to work / school; their occupation; most people move; some stop to look at watch or wait for something. Some people carry travel bags.

Mode of transport: private cars, public transport and pedestrian

Screen content: highly visible prominent digital display; showing recognisable international brands/messages. City also uses the display to advertise events, particularly in the cultural sector.

Observations:

Node function.

- As a node site, it would be common to assume that visitors in this place might be in need of wayfinding functions.

Public transport. Deck buses; dominant; physical footprint and noise:

- Noise – could screens deliver directional sounds; speakers imbedded where people sit in the opposite walkway
- Public transport is significant here, with buses making up a considerable proportion of traffic flow

Kinetic elements:

- traffic and definite flow; directional movement that alters at regular intervals, content could take more advantage of mimicking and interacting with that flow

Mobile devices:

- A significant number of people look at mobile devices; they could control or have interactions with the screens – good way to engage people

Screen:

- When people come out of the station, they immediately turn left and their eyelines move away from the screen; They do not look straight at screens although some people notice it (they look at it briefly because their eyes detect screen with moving images). there is little anchoring between the place and the content on the screen
- This is a large screen; but distance is large, so this limits its effectiveness
- Screen delivers information without context
- Screen is not localised

Real-time data at this site can be potentially derived from demographics and geographic data from environment:

- noise
- weather
- amount of people
- proximity to screen
- speed of people
- gestures and facial expressions
- traffic
- license plates
- shopping bag brands
- colours (does this change throughout the day-- are commuters more likely to wear certain colours)
- relational data/Invisible data from buildings // e.g. use of doors

Data that can be collected from the mobile devices:

- Google analytics /search data
- mobile data usage
- use of social media data and Apis
- age, gender and visible demographic data
- movement data
- identify where they come from
- what apps installed
- school / university calendar / term

Other data (some of it is historic, not-real time data)

- local demographics and economic data
- local behaviour
- local and national news contexts
- risks, crime, health, income and other statics

Location data

- Position of public transport; like a bus driving > impact on visibility / proximity to screen
- Weather > impact on dwell time; people sitting on street
- Time of day/week/season > determines what type of people and how many people arrive
- Season/temperature > same as above
- Wind > same as above
- Mode of transport arrives (e.g. train or bus) > gives info on demographic
- Location of all trains; point of departure > gives info on demographic
- Time; different people would commute at different times > gives info on demographic
- What sort of major event is taking place in city > what sort of people arrive in city

Site 2: Church Street [Retail Centre / Site], 9:00am

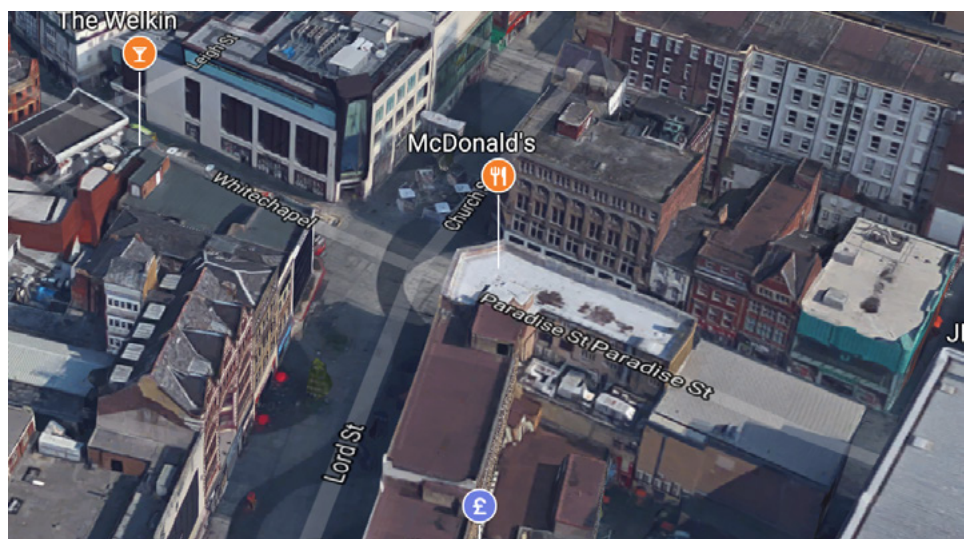


Figure 24: Position of the digital screen

Position of screen: High up above retail shop frontage, vertically orientated screen. In the evening the screen makes a significant impact on the lighting in the area

People: at this particular time of day there are no shoppers; and is mainly commuters; workers cleaning up the street and servicing the retail function of the area through; servicing the shops; all people move; nobody stops; some people carry shopping bags. A prominent Fast food chain is opposite, with seats facing directly out of the window towards the screen.

Screen content: visible; recognisable brands/message

Mode of transport: pedestrian

Main observations: A lot of delivery trucks on the street; due to the time of observation. There was almost no connection recorded between the screen and people (perceptual or content-wise). Shoppers were spotted with branded bags and most shops had just opened. Fewer people checked their phones (in comparison to the previous site) most likely in connection with a predetermined destination in their mind, with the intention to reach from A to B (instead of exploring).

Location Data: Data that would potentially be specific to this location would be money transactions, purchasing choices (collected at tills), capturing demography of people passing by at different times of the day, or every day (e.g. locals). There is a possible connection to be made between smaller screens with a larger screen.

Site 3: Liverpool One [Private Shopping District], 9:30am

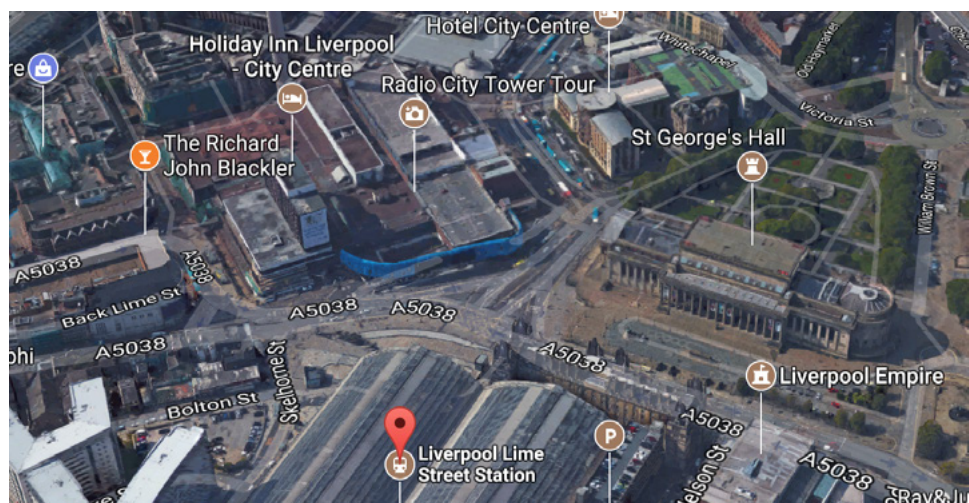


Figure 25: Position of the digital screen

Location description: We are in the middle of a major privately owned outdoor shopping area, called Liverpool One. We are surrounded by at least 4 small urban screens (furniture); people pass them in close proximity; yet the screens are not always in the line of sight with people. A few hundred metres away, but hidden from sight, is a major bus station.

Screen: Position eye level

People: Not so many young people at this time of the day; people had started shopping and major department store had already some shopper activity; people do seem to take notice of the screen.

Screen content: not visible; not recognisable brands/message-- mostly brands and advertising that immediately relates to the retail outlets in the centre where the products could be bought. The digital billboards are not providing enough value to the people passing by, therefore they are considered as passive objects in the context.

Mode of transport: Pedestrian

Additional observations: Very similar to the previous site.

Summary of analysis

Through the analysis of three cases in three different locations in the center of Liverpool, there are important factors have been derived from the observations:

Temporal Factors: Time of Day, Time of Year define who and when commutes or walks by the place. It also is a predictor if more people would be in the public space in front of the screen. Day of the week is a significant predictor of shoppers and their willingness to spend money. Time of the day, for example lunch time, can predict the most likely purchase transactions. At night, the demographics of people also change as well as their activity and spatial habits. Hourly moment of people / density / how many people are on the street

Environment Factors: Weather, noise, pollution, and other environmental factors can be collected to define further

Traffic Factors:

- Direction the commuters take; trigger of information; trajectory
- Drivers waiting at traffic lights
- Number of cars / direction

Proximity:

- **Movement.** Average time people waiting / being stationary / sitting
- **Public.** The pace of public and proximity within the space determine movement rhythms
- **Activity factors:** Activities of the audience define largely the behavioural patterns. Willingness for people to spend money depending on type of person what when and how she does it
- **Spatial Factors:** context and function of the context also defines connections and proximity to other adjacent contexts

Public Datasets can provide additional information about the context and usage of the place such as traffic timetable: Open City data? Train & Public transport data?

Data:

- Data derived from mobile phones: profile, demographics, purchase history, pre installed apps, etc
- Data can explain cultural patterns of behaviour, how the space is used is also cultural. influence – includes cultural demographics
- **Data is local or even hyper local** /Tone – local voice // local knowledge (e.g. red/blue)
- Emotional data; how can it be captured; social media capture

Function of the screen:

- **Content of screen could alternate;** from advertising to more informative messages, and with links to local geography (wayfinding)
- **Connection between screen content and physical** -- e.g. Where can I buy?

Overall, there is a strong link between the activities that are taking place in large cities in various places, such as football games, and the local functions. Real time data derived not only from the context but also from other interrelated events can help to predict whether the public space will be occupied by a large crowd or be empty.

COMPETITOR ANALYSIS: COMPANIES OPERATING IN THIS AREA

Spark Compass is a young company which aims to bridge the gap between digital and physical environments, focusing on what CEO Erik Bjontegard calls "augmented intelligence"; in relation to the digital out-of-home (DOOH) advertising market -- hyper-local, contextualised and real time intelligence.

This market is clearly emerging and a lot of different actors have emerged in the last 5 to 10 years. Although the market is not yet dominated by any platform, the business environment is very competitive and very much tied in to existing OoH ecosystems. There are many emergent companies such as Spark Compass which hope to bridge the aforementioned gap in relation to indoor and outdoor DOOH marketing. Indeed, at total of 339 companies are listed in [Proximity Directory](#) that are indirect competitors to Spark Compass, while 40 of them seem to be direct competitors.

The companies and their activities highlighted in the following, will illustrate current trends in relation to the implementation of IoT based systems and mobile technologies in this market.

Google has recently announced what they have called "[Physical Web](#)"; a system imbedded in their browser technology that allows the discovery of smart objects, which broadcast relevant URLs to nearby devices (see ReadMe file on the [Physical Web GitHub page](#)). The Physical Web is an open approach to enable quick and seamless interactions with physical objects and locations "Our core premise is that you should be able to walk up to any 'smart' physical object (e.g. a vending machine, a poster, a toy, a bus stop, a rental car) and interact with it without first downloading an app. The user experience of smart objects should be much like links in a web browser: i.e., just tap and use" (<https://github.com/google/physical-web>). Google also developed an open standard that will eventually be built into the OS of every smartphone and tablet. they also have a certified Location Service provider, Location Sciences, offering an industry-leading location technology and AI platform that enables to accurately attribute, verify and understand real-world consumer actions.

Google has also developed [the world's first programmatic OOH campaign, called Google Programmatic](#), using the best of online and digital OOH technology to realise the true power of OOH as a digital media channel.

Using real-time audience insights, integrated technology and contextual creative, they delivered more effective DOOH advertising and unprecedented buying efficiencies, proving the case for DOOH as the next frontier for the programmatic market. Google Programmatic has increased relevance of OOH media by 54% and media value by 47% delivering 15 million impressions in 80 locations (video transcription data). They also upgrade user targeting with real time signals such as weather, traffic data and sporting events. If the conditions were not right, the media space buyers did not buy media space ensuring people only saw messages when they were relevant.

Google, which is also working on a related technology that that can be used for indoor retailing through image recognition, called [Google Lens](#), is not the only global company trying to enter this market. Facebook has trialled beacons to enhance experiences for local retailers in the USA (see [Entrepreneur](#)). In this context it worth mentioning that Facebook has an ecosystem that interacts directly with over 2 billion users, so building out such experiences within their network would likely dominate the market, particularly give Facebook's connection and ease of access to the wider advertising ecology. According to recent Facebook blogs, 90% of sales still take place in physical stores. They state that people rely on their mobile phones to navigate both online and offline shopping journeys and expect interactions with businesses to be more relevant, meaningful, and actionable.

In summary, the sheer size, market presence and activity of companies like Google and Facebook in this emerging market poses a considerable threat to any startup in OOH marketing sector. In addition, a series of smaller, yet companies with global reach, are present in the market as well. Here are some of the more notable examples. [BlueDot](#), a San Francisco based startup, developed Patented Geolines™ technology, an end-user and client centric design that also aims at bridging physical with digital by building a business model based on purchase transaction and data analytics in retail sector.

[A UK based Proxama](#), developed a cutting-edge mobile location data collection system with proprietary machine learning analytics to create new value and insights from location information. The technology was used by [Exterior Media](#) to fit beacons across 500 buses by advertising business Exterior Media in the hope of monetising over 300,000 bus riders every day. The system sends in-app messages via Bluetooth depending on what trigger zones people are travelling in.

[OfferMoments](#), UK based startup, developed SAAS, Software as a Service technology platform, that is pioneering Out of Home Advertising by transforming "boring" screens into an interactive experiences where the adverts are customised to the end-user. Their clients are Debenhams, Virgin media and Monsoon.

[Sparta Digital Buzzin App](#) developed in UK focuses on 'Smart City' concept and includes the ability to stumble upon events and cultural activity in the city with the use of Augmented reality and beacon technologies. It was developed in collaboration with CityVerve, Manchester's IoT smart city demonstrator, deployed at city scale to deliver transformative benefits: to create new businesses and jobs for Manchester, improve transport, healthcare and education and provide safer environment for citizens.

Competitor Business Approaches:

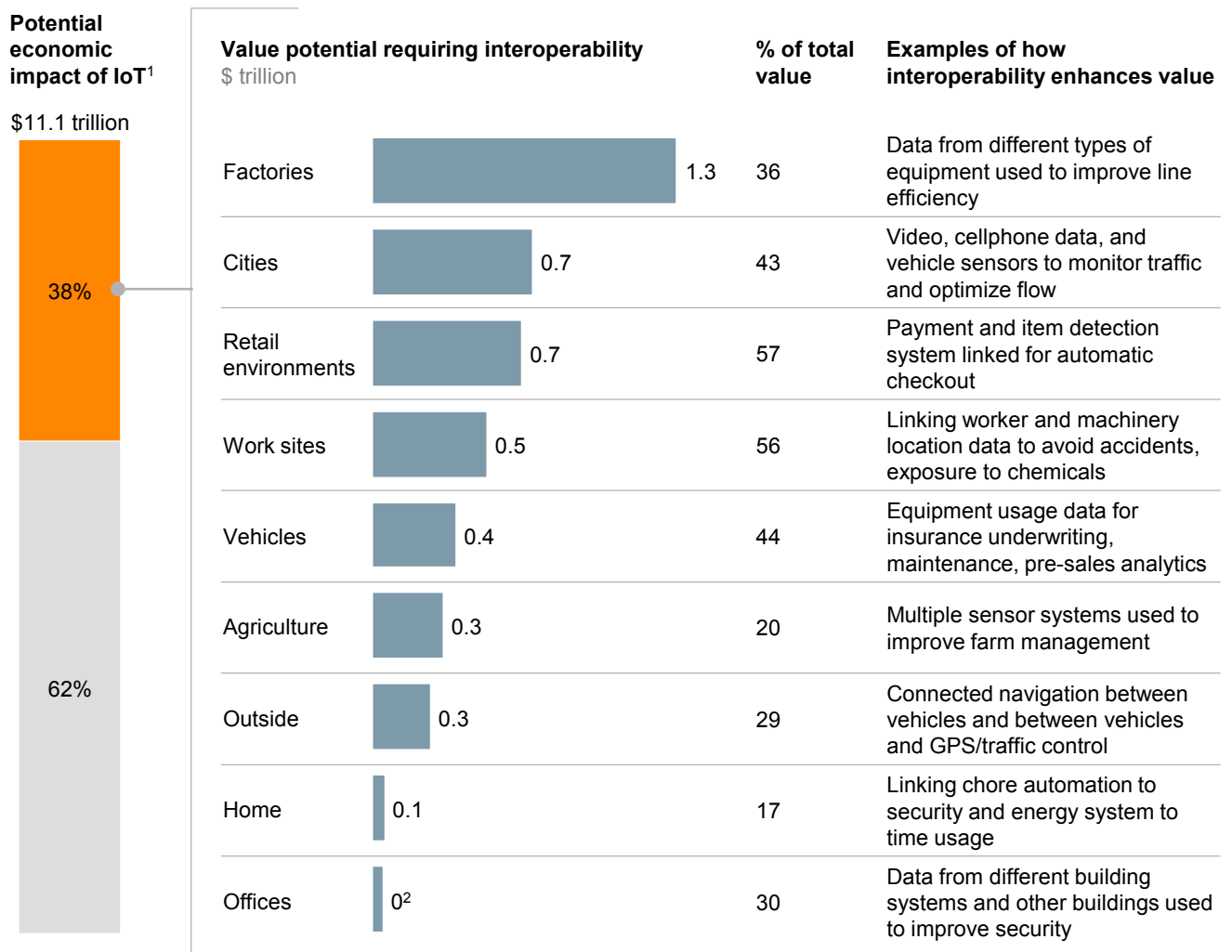
Company Name	Development	Business approach
<u>BlueDot, USA</u>	Patented Geolines™ technology in retail sector for indoor and outdoor marketing	Client and end-user centric design, no spam and no adverts, bridging physical and digital, sales marketing - retail sector. Monetization via purchase transaction and data analytics, self-service platform that allows your business customers to directly customize locations
<u>Exterion Media with Proxama, UK</u>	Installed beacons in 500 buses in London to to access targeted content on the move	Mainly coupon and textually based, no multimedia content. Monetisation and experiences on the London buses-- enhancing an existing infrastructure (transport)
Snatch	An AR based treasure hunt platform, with offers and prizes for participants. Recently gained £4million investment	Highly user-driven experience, supported by data and technology infrastructure. Top brands on board as part of the investment campaign
<u>Facebook Trialing Beacons, USA</u>	Facebook platform	Enhance experiences for local retailers. Facebook Is giving out free Bluetooth beacons to businesses
<u>Sparta Digital, UK</u>	<u>Buzzin App developed in collaboration with CityVerve, Manchester's IoT smart city demonstrator.</u>	Buzzin uses Augmented Reality platform to allow users to explore the city in a new, interactive and entertaining way. Focused on 'Smart City' concept - with city based stakeholders. Includes the ability to stumble upon events and cultural activity in the city.
<u>Offer Moments, UK</u>	Dynamic billboards that change as you walk by indoor and outdoor	Smart billboards are already installed in large shopping centres and national retailers. Adverts are customised and personalised
<u>Tamoco, UK</u>	Developed proximity network. The network connects brands, networks and apps through an easy to use online platform.	Connects online with offline, ranked in Proxbook's quarterly report on proximity marketing and smart cities. It also takes into consideration the number of sensors deployed and their geographic presence.
<u>RNFdigital, UK</u>	our BEAM, Mobile Customer Engagement Platform. Transform mobile into your most effective channel with next-generation, supercharged apps - supercharged strategies	BEAM allows you to deliver engaging digital content to your app users based on their profile, behaviour and location. It as supercharging your apps. BEAM can be integrated with any app whether built by RNF or not.
<u>Ivoucher, UK</u>	Intelligent Voucher Marketing Software	Developed intelligent voucher marketing solutions for companies large and small
<u>Airspace, UK</u>	Developed Context Management System mainly used indoor	The system is designed to help increase engagement, increase loyalty and understand visitors better to maximise your investment in mobile technology.
<u>Google, USA</u>	The Physical Web, Location Service provider, <u>Location Sciences.</u>	A smart object broadcasts relevant URLs that any nearby device can receive. No apps, just a search engine
Google, USA	Google Programmatic	The world's first programmatic OOH campaign, using the best of online and digital OOH technology to realise the true power of OOH as a digital media channel. Using real-time audience insights, integrated technology and contextual creative, it delivers more effective OOH advertising. Such agencies as <u>OMD</u> , <u>Talon</u> have already deployed it.

INDUSTRY THREATS AND CHALLENGES

For OOH marketing industry to deliver its maximum economic impact, certain conditions would need to be in place and several obstacles would need to be overcome. Some of these issues are technical. Some are structural and behavioral—consumers, for example, need to trust IoT-based systems, and companies need to embrace the data-driven approaches to decision making that IoT enables. In addition, regulatory issues need to be resolved, such as determining how autonomous vehicles can be introduced to public roadways and how they will be regulated and insured. Regardless of its immense advantages and benefits, the global OOH industry still faces some threats and challenges when placed at par with other advertising media. The most common ones include:

- **Interoperability** among IoT systems is critical. According to ([Mckinsey, 2015](#)), It is required to capture 40 percent of the potential value, for example from Internet of Things. Interoperability is required to unlock more than \$4 trillion per year in potential economic impact from Internet of Things use in 2025, out of a total potential impact of \$11.1 trillion across the nine settings (human, home, retail, offices, factories, worksites, vehicles, cities and transportation/shipping); To unlock this value, multiple systems require to work together. Adopting open standards is one way to accomplish interoperability. However, big players on the market can dictate the terms since they have a large control of the big data market. For example, Figure 3, Mckinsey, 2015 report further emphasises that cities might capture up to 43% of value generated through interoperability.
- **Multiple stakeholders** are required to participate in order to capture the value. However, who will take the leadership is a question.
- **Large and powerful incumbents** will most probably outperform the challengers in providing new platforms that are tapped into already existing networks. Certain contexts are controlled by certain stakeholders. The Internet of Things give rise to new business models and bases of competition, both for the companies that use IoT systems and for those that supply IoT technology
- **Privacy and confidentiality.** The types, amount, and specificity of data gathered by billions of devices create concerns among individuals about their privacy and among organizations about the confidentiality and integrity of their data

- **Security.** New OOH technological solutions create many more opportunities for potential breaches, which must be managed.
- **Intellectual property.** A common understanding of ownership rights to data produced by various connected devices will be required to unlock the full potential of OOH.
- **New startups** tapping into the OOH market will compete with a variety of stakeholders, therefore too wide and too open approach may not be the best strategy.
- **Public Policy.** New regulations have to be implemented to support new platform-based business creation. There are also significant data laws coming into effect in the UK in 2018 that will limit the use of personal data.



1 Includes sized applications only; includes consumer surplus.

2 Less than \$100 billion.

NOTE: Numbers may not sum due to rounding.

SOURCE: Expert interviews; McKinsey Global Institute analysis

Figure 26: Nearly 40 percent of economic impact requires interoperability between IoT systems [[McKinsey report, 2015](#)]

**INTELLIGENT, REAL-TIME, HYPER-LOCAL, SCREEN-BASED OOH MARKETING
Market Research Report | Real-time Data Delivery Models**

The University of Liverpool, November 2017
Sponsored by Innovate UK

Prof. Richard Koeck
Dr. Tuba Kocaturk
Gulnaz Aksenova
Peter Woodbridge
Alastair Eilbeck

For further questions, please, contact Prof. Richard Koeck [rkoeck@liverpool.ac.uk]
or Dr. Tuba Kocaturk [T.Kocaturk@liverpool.ac.uk]