

The Future of Political Campaigning

Jamie Bartlett
Josh Smith
Rose Acton

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76 Vincent Square, Westminster
London SW1P 2PD
020 3878 3955

hello@demos.co.uk
www.demos.co.uk

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INTRODUCTION

This report examines current and emerging trends in how data is used in political campaigns. It is divided into three sections. The first looks at the state of the art in data and technology in relation to online advertising. The second sets out how these approaches are currently being applied in political campaigning, and projects how it might evolve in the next two to five years. The third section sets out what we consider to be the main risks associated with these trends.

It is important to note that we draw on publicly available sources - notably academic articles, consulting reports and analytics companies themselves. Therefore, we are not able to review proprietary new technology that has yet to be made public.

This paper has been directly informed by 37 academic papers, 37 industry papers, 77 pieces of related material and company websites and five patents.

STATE OF THE ART

Data

Key trends

- The next few years will see a proliferation of data on consumer demographics, behaviour and attitudes - including health and location data collected through smartphones and the growth of internet enabled devices.
- Companies see the collection, combination and analysis of diverse datasets as an important source of value. Key to this value is the ability to connect and analyse previously discrete datasets.
- While this analysis of connected datasets will offer new insights to companies, it also poses serious challenges to the privacy of individuals, and is likely to allow surprising and intimate inferences to be made.

Increase in volume and scale

The amount of data created worldwide is growing exponentially. IBM estimates that 90 per cent of the data that exists today was created in the last two years, with around 2.5 quintillion bytes of data produced each day from almost every sector of the economy.¹ The International Data Corporation predicts that, by 2025, the world will create and replicate 163 zettabytes – or 163 trillion gigabytes - of data every single year.²

Much of this growth is due to the use of 'big data', a term referring to the storage and analysis of large, complex data sets.³ The growing significance and value of big data has been driven by a number of recent technological developments, in particular the affordability of computational power and data storage capacity.⁴ Platforms have been developed to store data from various sources, including sensors, apps, geographical location, images, videos and user behaviour, and allow this information to be queried together. The real value of this approach is the insight and patterns that can be derived from the relationships between data points.⁵

The raw materials for big data platforms is likely to be increasingly supplied by sensors and devices, often referred to as the 'Internet of Things' (IoT). IoT technology can be loosely defined as a network of 'smart', internet enabled sensors and devices, able to communicate with each other and collect data about their use. In 2017, there were 8.4

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billion connected IoT devices worldwide, projected to increase to 30 billion by 2020.⁶ This technology is being applied across a broad range of sectors, from healthcare and household devices to smart cities.

The majority of emerging IoT products are targeted at the consumer market. A 2017 report by TechUK predicted that, by the end of that year, two thirds of IoT applications would be consumer-facing, and found that 80 per cent of respondents own at least one connected device.⁷ Over the next few years, it is likely that we will see this technology proliferate in homes, in the urban environment, and carried around by the public.

Surveys show that consumers are keen to use IoT devices in the home. TechUK found that 42 per cent of respondents were interested in smart energy, and 39 per cent in home monitoring and control.⁸ By 2021 it is estimated that the connected home will be made up of an average 8.7 devices, and by 2020 every person will create 1.7MB of data every second.⁹ A recent IBM blog illustrates the potential benefits of a 'smart home', especially in respect of assisted living for the elderly, which can build up a model of the resident's regular habits and schedule, and enable anything unusual to be flagged and a warning sent to care providers.¹⁰

A 2017 YouGov survey found that consumers are also increasingly adopting 'wearable' devices, such as fitness trackers. In 2017, the percentage of UK citizens who own a wearable device was 17 per cent, up from just 2 per cent in 2012.¹¹ These devices are often able to measure and collect a range of data concerning a user's lifestyle and health, including fitness, dietary habits and quality of sleep. This data is already being used by industry, with some insurance companies using information from tracking devices to adjust premiums.¹² Given current consumer attitudes, we expect greater adoption of wearable technology over the coming years. Some analysts believe under-the-skin chips will also become commonly used – not only to track vital health data, but also to unlock doors, authenticate transactions and identity, make payments and even sense magnetic fields.¹³

This technology is not limited to consumer devices. Multiple UK 'smart city' projects are using IoT technology to improve the infrastructure and running of urban areas. For example, the University of Bristol and Bristol City Council have been collaborating on the 'Bristol is Open' project,

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installing a city-wide network of fibre-optic cables, Wi-Fi, 3G and 4G mobile broadband and a 'mesh network' of 2,000 lampposts communicating via radio frequency. The goal is to provide a test-bed for new IoT projects, connecting sensors in the field with data sets and computing resources.¹⁴ Other councils, including Cardiff and Glasgow, are experimenting with similar techniques.¹⁵

The growth of IoT might change the way we engage with existing technology. In particular, the role of the smartphone is being increasingly challenged. A 2018 Accenture report found that 43 per cent of people believe phones will be replaced by wearables, and 40 per cent of smartwatch users already interact less with smartphones today. Two thirds of those who use a digital assistant - a demographic predicted to double over 2018 - say they use their smartphone less now they own a digital assistant.¹⁶ These newly adopted technologies are often accompanied by novel data platforms - for example Alpine.ai, which allows businesses to create content for Amazon and Google Assistants using existing corporate data.¹⁷

Brands have begun to exploit IoT, for example through the use of 'connected products'.¹⁸ A recent report by Mindshare trialled connected food products and other household goods able to communicate information and deliver content to consumers; for example, triggering smartphone notifications to warn consumers that food is about to expire. They found people were positive about this new technology.¹⁹

As the IoT matures, new metrics and data points will become available. This is especially true in the healthcare sector, with devices in development which could allow the public to measure their blood pressure, glucose levels, and even the state of their mental health.²⁰ These new systems will result in new datasets that contain significant detail about citizens' personal lives, health and habits. The growth of this data collection raises a number of serious concerns. Researchers have long warned of the vulnerability of IoT devices to cyber-attacks and data exfiltration.²¹ Even in the absence of unauthorised access, ownership of data created by IoT devices is unclear. For each device, the owner, the manufacturer and the software developers - as well as any companies paid to analyse or aggregate the data it collects - may all have an expectation to access some of the data produced.²²

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Commercial availability

The increased availability of data is widely viewed as a valuable commercial opportunity to drive efficiencies, improve products and create new markets and services.²³ It is therefore becoming a business imperative to collect, aggregate and analyse data.²⁴ To help unlock the value of data, the last few years have seen a growth in companies looking to make it easier for organisations - from consumer brands to political parties - to derive value from the data they hold, or have access to.

A 2015 McKinsey report outlined the three main ways companies are accessing data.²⁵ Firstly, data can be **bought**. Companies like Experian or Acxiom offer large consumer databases, claiming to contain information on customers 'purchasing habits, lifestyles and attitudes.'²⁶ These can be matched with internal company databases through identifiers such as credit card details or telephone numbers. Panel data from companies like Nielsen and Compete provide access to the activities of 2 million consumers, providing granular views of behaviour, such as records of web pages visited and consumer purchases made over a certain time period. "Traveling cookie" data from Google's 'AdSense' program build a digital footprint for consumers, based on their logins at popular sites (for example, on airline sites or Facebook). Once the customer logs in, the cookie follows that customer across other websites. Aggregator companies, like Datalogix, combine this data across hundreds of logins and match it back to a database of more than 100 million households.²⁷

Second, companies can **request** data from customers. McKinsey advises retailers to 'encourage customers to self-identify by logging in to the website, using a loyalty card in store, or identifying themselves when calling customer care.'²⁸ Finally, companies share data through a **partnership**. For example, Visa have partnered with retailers to introduce highly targeted location-based offers to consumers as they make purchases - scan your Visa at a Gap to make a purchase, and get offers on your smartphone for retailers within walking distance.²⁹

Combining data sets

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The value of big data often lies in bringing together large and disparate data sources. IoT data, social media data, geolocation data and browsing history all provide the raw materials for this combination. This aggregative approach has been embraced by governments as well as corporations. While urban big data is still in its infancy, a partnership between the MIT Media Lab, Andorra's government and international companies has been set up, aiming to understand and improve the dynamics of tourism, commerce, human mobility, transportation systems, and environmental impact.³⁰ One project - the Tourist Recommendation System - integrates data from cell phones, social media, bank transactions, energy consumption and transportation to study the flow and behaviour of people. This analysis is then used to predict tourist movement around Andorra, and to develop a targeted system guiding tourists to attractions, with the aim of increasing revenue.

The combination of data sources at scale raises serious privacy concerns. A trade-off exists between obtaining the functional benefits of combining data and the danger of revealing potentially sensitive information. This is particularly true in the case of consumer devices. Amazon's 'home assistant' device Echo, for example, is sold with camera and voice set to be 'always on' by default, listening permanently for a 'wake word' which, if detected, will prompt it to capture data to send to Amazon. Smart TVs, including those sold by Sky and Fire TV now include similar voice activation mechanisms.³¹ Combining this data with information purchased or gathered from other sources makes it difficult for consumers to understand how their data is being collected and used, and therefore for them to provide effective consent or make informed decisions.³²

Targeting

Key trends

- Recent years have seen an explosion in data which can be used to target advertising, including location, IP, browsing data, and information collected from devices and wearables.
- Advanced techniques in data analysis have enabled marketing to move from area or platform-based approaches to campaigns which target individual users across multiple devices and locations.
- Novel analysis techniques are able to infer detailed demographic characteristics from seemingly impersonal data. These characteristics can then be used to profile

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individuals in ways which are difficult to measure, and difficult for consumers to opt out of.

- The next few years are likely to see a move to increasingly automated marketing, where valuable individuals or groups are tracked, measured and targeted by machines, potentially using machine-generated content.

Overview

Targeted advertising relies on collecting and analysing big data. Two types of actors in particular play an important role in the data ecosystem: data brokers, who collect and aggregate data, and data exchanges, which allow advertisers to bid for often time-sensitive data about consumers.

Data exchanges often trade in staggering quantities of information. BlueKai Exchange, which is run by Oracle and calls itself the world's largest data marketplace, offers 'data on more than 300 million users offering more than 30,000 data attributes.' The exchange processes more than 750 million data events and transacts over 75 million auctions a day.³³ This is often referred to as programmatic advertising – a new, automated method for buying and placing advertisements on digital media, using algorithmic processes to find and target a customer wherever they go.³⁴ According to a report from Forrester, programmatic marketing will account for the majority of all digital advertising spending within the next few years. The process involves real-time 'auctions' that occur in milliseconds, allowing bidders to 'show an ad to a specific customer, in a specific context.'³⁵

Despite the existence of large trading platforms, personal data useful to advertisers is often collected and stored by companies, rather than openly traded. These 'data silos' are typically controlled by large companies such as Facebook, Microsoft and IBM, who have tended to capitalise on data without selling the data itself, but instead by allowing indirect and temporary access to it and inferences made upon it.

Some acquisitions in recent years are thought to have been driven by the value of the data held by a company (for example, Microsoft's purchase of LinkedIn in late 2016).³⁶ As transferring personal data

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between companies and across borders becomes more strongly regulated, we expect this trend to continue over the coming years.

Location targeting

The vast majority of the UK population is now using devices able to record their location. On top of wearable devices with 'onboard' geolocation technology, a 2017 Deloitte survey found that 85 per cent of the UK population own or have access to a smartphone, and the company predicted this year that this number will surpass 92 per cent in the next 5 years.³⁷

This trend has been accompanied by upgrades to global geolocation infrastructure, notably the European Satellite Agency's 'Galileo' system, which is already accurate to around 1 metre, and will increase the accuracy and reliability of location services within Europe as satellites are added to the system over the coming years.³⁸ Satellite-enabled technology is a growing market: the organisation 'IoT UK' predict that the global satellite Machine-to-Machine (M2M) and IoT market will reach 5.8 million in-service satellite M2M/IoT terminals by 2023.³⁹

A large number of mobile applications are making use of location technology, asking for (and often being granted) permission to precisely geolocate their users. In 2015, the Pew research institute found that 281,000 Android apps - 26 per cent of all applications on the app store at the time - requested permission to access a user's precise location. In 2016, a technology company who provide location services for applications found that of 1 million phones using their services, 90 per cent had location services enabled at the device level, and 52 per cent had allowed the applications to access their location data.⁴⁰

The ability to access a user's precise location is seen as a great boon by marketers seeking 'increased relevance' to the browsing public, especially since similar techniques can be used to anticipate, for example, where a motorist is likely to be going.⁴¹ Geo-fencing, a form of mobile advertising which targets customers present in a given space, is increasingly seen by marketers as a way to bridge the digital and offline world.⁴² One example of this is the use of Bluetooth-enabled 'beacons', which make short-range connections to devices and send out

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corresponding messages; for example, pinging a special offer to a customer who has been loitering near a product for some time.⁴³

Detailed location data can also increasingly reveal how users are moving, which can be used to infer other demographic characteristics. For example, General Motors was granted a patent in March 2018 which describes the use of 'vehicle trace data', including 'operator detection information, driving route information, operator driving behaviour information, media accessory usage information, and multimedia content usage information' to infer characteristics including the age, gender and income of the driver. These characteristics would then be used to target advertising at the vehicle e.g. through messages on an in-car console.⁴⁴

The ability for companies to precisely locate a user, sometimes over long periods of time, carries potential risks to that user's privacy. This data is also difficult to anonymise and protect, and a number of cases have been identified where applications involving location functionality could be manipulated to disclose the position of other users.⁴⁵ Notably, some consumers are also taking steps to protect their privacy online, driven by a wish to reduce their exposure to location-based advertising.⁴⁶

One widely used approach to geolocation is through IP address, a ubiquitous identifier assigned to any device connecting to the Internet. IP addresses alone, however, are not usually sufficient to identify a given user, due to a number of factors. For instance, home and commercial networks, including public Wi-Fi hotspots, often use a single 'public' IP address for multiple devices, meaning the members of a household, or patrons of a pub, will all connect to a service with the same address. These public addresses typically belong to, and can be traced to, Internet Service Providers (ISPs) or companies.⁴⁷ IP addresses are also changeable - most consumer electronics are also allocated 'dynamic' addresses using DHCP, a protocol through which an IP will be assigned to a device for a fixed length of time, then reallocated as necessary.

Despite these difficulties, IP addresses are still useful to marketers, and can be a useful part of a marketer's targeting arsenal. IP addresses can often be used to infer the location and travel habits of a user when accurate geolocation data is not available. In cases where an IP address is not alone sufficient to pinpoint a user, tracking can often be

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achieved by combining the address with other identifying data; for example, the presence of tracking cookies, or the precise website visited from an address.⁴⁸

The IoT location services market is rapidly growing,⁴⁹ and marketers are beginning to see the potential in combining IoT devices and location tracking, for example to offer timely location-based offers. One possible future for IoT and location-based marketing is outlined in a recent blog by IBM, which suggests a combination of data on diet, sleep and exercise could be used by a supermarket to send healthy food offers at the nearest store.⁵⁰ The Royal Academy of Engineering warned recently that IoT devices posed a particular new risk to privacy in the way that a person's location could be more easily identified through analysis of devices.⁵¹

Increasing granularity

The broad trend is towards ever more granular audience segmentation. Facebook and Google provide a number of tools that allow companies to segment their audiences and target their adverts. Facebook tools include the 'data file custom audience' (enables advertisers to reach existing customers on Facebook using information those advertisers already hold e.g. the customer has already given their email), 'website custom audience' (enables advertisers to target people on Facebook who have visited their website, through use of the Facebook Pixel) and 'lookalike audiences' (this enables advertisers to reach new people on Facebook who are likely to be interested in their business because they are similar to existing audiences).⁵²

This final tool is of particular interest. According to Salesforce, lookalike audiences are created 'based on extensive social graph data including demographics, interests, social connections, and newsfeed activity.'⁵³ The ability to tailor these 'lookalike' audiences is becoming increasingly granular. In 2017, Facebook added 'value-based lookalike audiences' for commercial businesses which, according to the site 'creates an additional weighted signal for people most likely to make a purchase after seeing your ad.'⁵⁴ Google also offer similar tools, called 'customer match targeting', allowing marketers to find their customers using an email, phone number or address.⁵⁵

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Several companies are developing similar approaches. Companies such as Outbrain, a content discovery platform, describe a three step process where they first 'identify a Custom Audience as a "seed"' followed by a 'Personal Interest Profile [which] reveals your seed audience's interests and reading and watching habits', finally creating a lookalike audience which 'adapts in real-time based on live campaign learnings and performance.'⁵⁶

More broadly the trend is toward finer and smaller audience targeting. SimMachines, a machine learning software company, has developed what it calls a 'dynamic predictive segmentation'. SimMachine's chief marketing officer recently set out how 'Dynamic Predictive Segmentation provides clients with highly precise, contextually relevant and inherently actionable insights as to the motivating drivers behind a customer's predicted behaviour at machine learning speed and scale.'⁵⁷ Marketo is using AI both to segment audiences as well as to deliver tailored content.⁵⁸ Other companies such as Intent Targeting are looking to create 'incredibly sophisticated and granular audiences.' Intent Targeting claims to provide 'more context and more information than any segmentation or audience building engine before.'⁵⁹ These tools provide marketers with highly targeted, and granular data, allowing advertisers to narrowly define their target segment.

The end goal of this trend towards segmentation might be to target consumers as individuals. According to the chief marketing officer of Unilever, the future will be 'segments of one.'⁶⁰ Similarly a 2016 CapGemini report asks 'if it still makes sense to use micro-segmentation when today it is possible to target customers directly and individually with the help of data science and new technologies.'⁶¹ A 2018 paper titled 'Facebook's Advertising Platform: New Attack Vectors and the Need for Interventions' raises concern over the potential this granular targeting has to enable privacy violations, showing that Facebook's Audience Insights tool, which provides advertisers with details of who their ad reached, 'can be run on audiences as small as one person - and when run, provide insights that include 2,000+ categories of information.'⁶²

One key aspect of this increasing personalisation is cross-device targeting, which tracks people rather than devices. This approach recognises that the same person uses multiple devices and seeks to establish 'a person-centric view of a user across devices.'⁶³ It, Evan Neufeld says in *Journal of Advertising Research*, is becoming 'mandatory

practice'.⁶⁴

According to the US Federal Trade Commission companies use a combination of methods to identify and reach consumers.⁶⁵ There are broadly two types of cross-device targeting: deterministic and probabilistic.

- **Deterministic targeting** identifies people by tying devices to a common persistent identifier — such as a name or email address. These unique identifiers are collected when consumers provide details at websites, for example when creating a log in.
- **Probabilistic targeting** works by first identifying various devices (for example, through a cookie, hardware identifier, or device fingerprint), and then comparing collected information about those devices for common identifiers to infer a likelihood of whether those devices are used by the same person. Common identifiers might include IP addresses, location or browsing patterns. Estimates on the accuracy of probabilistic device correlations range as high as 97 per cent.⁶⁶

Through the use of probabilistic targeting, companies are increasingly able to correctly link devices even in the absence of a persistent identifier such as email addresses or user name. This - combined with the fact that cookie blocking software or third-party connections may not prevent companies collecting other identifiers such as IP address - can make it difficult for consumers to opt out of cross-device tracking. The consultancy McKinsey describe how AI-based cross-device targeting increasingly allows companies to optimise this probabilistic tracking over time through a 'self-learning' process. The company considers this to be a potentially important development, to help 'provide real-time offers targeted to individual customers'.⁶⁷

Facebook and Google both offer cross-device targeting on a deterministic basis. Some companies offer a mix of deterministic and probabilistic methods.⁶⁸ One example is Lotame, a data management platform. Lotame sets out how it thinks cross device targeting adds value to marketing campaigns: 'Let's say you have a user bored at work looking up your product online. You can follow them with your marketing throughout the rest of their day. You can target them during their evening commute on their phone with a relevant ad. Then, later, when

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sitting on the couch you can serve them a relevant ad via their television. Finally, before they doze off, you can serve them another ad on their tablet.'⁶⁹

The variety and ubiquity of IoT devices will also affect a marketer's ability to target audiences through multiple aspects of their behaviour, with some commentators heralding the IoT as 'the future of marketing.'⁷⁰ Advertisers like BannerFlow are positive about the opportunity provided: 'What's certain is that the IoT will provide new data, touchpoints and opportunities, which both ad tech, and users of ad tech, must use to make experiences more personal, relevant and targeted.'⁷¹ One academic paper seeking to define and explore the possible applications of advertising using IoT (we believe the first paper of its kind) sets out how IoT will 'open up a novel, large- scale, pervasive digital advertising landscape,' concluding that there should be an IoT advertising platform just like the existing platforms for internet advertising.⁷²

Companies investing in developing new cross-device targeting methods often seek to protect their advances through patents, which can offer some useful insight into how the technology might develop. In the context of the move towards targeted advertising via IoT, it is notable that companies are seeking to future-proof their cross-device targeting methods. A patent submitted by Gula Consulting LLC (on cross-network user behavioural data) states that 'although embodiments of the present invention are described herein in the context of the Internet, the present invention is not so limited and may be used in other data processing applications'.⁷³ Intent IQ's patent on television advertising specifies that television advertising can be targeted based on the user profile collated from multiple online devices, only one of which needs to be directly associated with the set-top box (the device that connects a television and a signal source).⁷⁴ Yahoo! Inc's patent on cross device targeting sets out how once they have mapped a user to their devices, they can pull up a profile of that user to relate the user's likes and dislikes to target specific ads to that user on any of the user's devices, whether or not the user is logged in.⁷⁵ This patent also specifies that patterns of how the person uses the internet while online, like the font they use for typing and the arrangement of their applications, can be used to identify users.⁷⁶

It is likely that there will be an explosion of competition for this market: with Amazon and Google facing competition from Sonos, Samsung,

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Apple, Microsoft, and possibly Facebook.⁷⁷ Amazon, for example, holds a patent that describes an algorithm that can listen to entire conversations, using 'trigger words', such as like and love, to build a profile of customers.⁷⁸ The document states the system could then offer 'targeted advertising and product recommendations'.

There is a potential tension between personal privacy and choice and the goals of cross-device targeting. (Intent IQ's patent on television advertising highlights this explicitly).⁷⁹ Academics have recently noted that cross device targeting can reveal a more complete picture of a person and, thus, 'become more privacy-invasive than the siloed tracking via HTTP cookies or other traditional and more limited tracking mechanisms.'⁸⁰ To add to these privacy concerns, the practice of cross-device tracking is difficult to monitor, since companies can make determinations of device correlation on their own servers in a manner opaque to end users and regulators.⁸¹

The metrics used to identify individuals often arise from surprising sources. Using indicators such as the speed of typing, duration of keypresses and typing errors, Performetric (a technology company aiming to improve workplace wellbeing) has developed software capable of detecting patterns associated with mental fatigue. Both keyboard and mouse interaction metrics combine to create a unique profile that provides the user with recommendations that aim to improve mental health.⁸²

Ability to potentially improve the effectiveness of communication

The production and evaluation of advertising content - particularly in the fields of focus groups and split testing - has been supercharged by AI tools such as Facebook's Dynamic Creative and Albert.ai.⁸³ These allow content producers to create and test vast numbers of adverts to find the optimal combination of design features for a given ad campaign, and for a given target audience. By using engagement metrics such as view times, click-through rates, and sales conversions, these tools allow producers to pinpoint the design feature that resonates best with certain groups, be it the colour of a 'click here' button or a particular image.

In one example of this, a product by Dynamic Creative allows advertisers to provide a maximum of five variations each for titles, images, text, descriptions, and 'calls to action'. An algorithm is then used to

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automatically generate a series of ad variants based on these components.⁸⁴ By providing the basic structure and building blocks of an advert, this system automates the process of evaluating content, delivering the best performing combinations broken down in terms of audience segments. This allows advertisers to carry out many more experiments 'in the field' than would be possible if manually generated and tested.

This approach does not involve the production of entirely novel content. All of the constituent tools, however, exist for personalised messaging to become (near) fully autonomous; though these technologies are still at an early stage of development. With the integration of broad data sources and AI-generated text, video and audio (discussed below) some advertisers are making the first steps to directly personalised automated advertisements.⁸⁵ IBM's Watson Advertising have piloted several advertising campaigns with Toyota, GSK and Campbell's Soup, which bring together personal data, user engagement, and dynamic content generation.⁸⁶ Campbell, for example, have used this approach to advertise soup when weather data in a local area indicates it is cold or raining, and to suggest a set of dishes and recipes given an ingredient provided by a user. This system can learn dietary preferences through repeated interactions - for example, users likely to be vegetarian can be offered suitable recipes.⁸⁷

Other large companies have shown signs of researching automatic generation of advertisements. In 2017, the senior digital director of Coca Cola signalled his intention to use AI to help generate music and scripts.⁸⁸ A recent blog for IBM suggested that Watson Cognitive Computing would be able to serve an advert to a particular individual it knows has recently bought a fridge. Given this knowledge it would generate an advert involving the fridge and given the individual's particular brand loyalty 'dynamically swap in a product they love — such as Coke for Pepsi — into the video the consumer is watching to create a powerful, personalized brand experience.'⁸⁹

Some targeted advertising aims to use people's networks to pique interest. The idea is that if people you know, or who share your interests - are talking about something, you may be more likely to buy it. One approach, employed by Facebook, is to send the same messaging to every member of a family.⁹⁰ One method for leveraging this network effect is through the identification of influencers, a technique already

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commonplace in marketing. Influencers range from celebrities to bloggers to families, and are recognised by brands as valuable ways to improve brand messaging and recognition, and ultimately improve sales. According to David Yavanno, a digital marketing specialist, employing AI to identify key influencers within a given group of people is likely to become increasingly important over the coming years.⁹¹ Similarly Lyle Stevens, CEO of influencer marketing firm Mavrck, predicts that software will soon automate the task of identifying influencers and encouraging them to post content.⁹²

Artificial intelligence

Key trends

- Existing technology has already allowed AI systems to outperform human experts in a number of tasks, and AI technology is likely to surpass human competence across a growing range of domains in the near future.
- Recent developments in AI have allowed systems to produce original and realistic visual and audio content, a capability which blurs the line between human and machine-produced content, and is set to improve.
- Evolving techniques in deep learning are enabling systems to decide, for themselves, how to make detailed inferences from highly abstract datasets. This is likely to create revealing information about users, even though the datasets themselves may contain little or no personal data.

Artificial intelligence, machine learning and deep learning

Artificial Intelligence (AI) can be loosely defined as a branch of computer science which studies and develops systems able to perform tasks which would typically require human intelligence. The technology has recently enabled important breakthroughs in diverse fields, including language translation, navigating roads and playing games.⁹³ A recent survey asked 352 experts in the field whether and when they expected AI systems to outperform humans over a variety of tasks, including performing surgery and writing bestselling books. Researchers responded that there was 'a 50 per cent chance of AI outperforming humans in all tasks in 45 years, and of automating all human jobs in 120 years.'⁹⁴

Most current AI systems are 'narrow' applications – specifically designed to tackle a well-specified problem in a single domain.⁹⁵ (The possibility and challenges of superintelligent AI systems, which would be competent across all relevant domains, are beyond the scope of this

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paper. There is currently no consensus on the likelihood or timeline of the development of superintelligent AI.)⁹⁶

One branch of AI which has seen significant recent developments is machine learning, an approach which allows systems, given enough data and time to train, to learn how best to solve a problem or imitate human decision making. The approach reduces dependence on subject matter expertise - a machine learning system could be trained to work out how to recognise a smartphone user by the sound of their voice, for example, without requiring an expert in speech to sit down and develop a strict set of rules to follow.

Recent, well-documented advances in machine learning have enabled machines to compete with or outperform humans at complex tasks. For example Oxford University have developed a system able to lipread better than human professionals, and researchers at Stanford have trained a system to be able to identify skin lesions at a level on a par with human dermatologists.⁹⁷ Many people in Silicon Valley believe that machine learning is the next big thing. Andrew Ng, former chief scientist at Baidu, reckons that there isn't a single industry that won't shortly be 'transformed'. Indeed, over the last year alone, inroads have been made into tasks including driving, bricklaying, fruit-picking, burger-flipping, banking, trading and automated stock-taking. Legal software firms are developing statistical prediction algorithms that can analyse past cases and recommend trial strategies. In recruitment, tools to analyse CVs are now routinely used by companies to help them filter out obviously unsuitable candidates.

Some of these breakthroughs have been achieved through the application of deep learning, a branch of machine learning which enables machines to learn not only how best to classify a given input, but also to work out what the important features of that input might be.⁹⁸ A notable aspect of deep learning is its ability to draw from large, diverse datasets, and make surprising inferences from seemingly innocuous data. In a recent example, researchers at MIT have published a paper which uses deep learning to accurately infer a phone owner's age and gender using only metadata concerning their phone calls; e.g. the time a call was made and its duration.⁹⁹ As datasets owned by companies increase in size and complexity, and further public datasets become available, deep learning will allow companies to draw increasingly

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detailed inferences about their customers, and connect data in ways that may not occur to human analysts.

Machine learning is a vibrant academic field, and recent years have seen the development of new techniques and methods, each with their own strengths and applications. These include Convolutional Neural Networks (CNNs), which have enabled advances in deep learning, and Generative Adversarial Networks (GANs), notably employed by Deepmind's image generation software, which can be used to synthesise, or 'hallucinate', original and realistic images, including of human faces.¹⁰⁰

Recent advances in this field are expected to accelerate development. These include improvements in unsupervised learning techniques, which remove the need for systems to be trained on large sets of labelled data, and the increasing availability of specialised hardware, including 'tensor units', which are custom built for use in machine learning.¹⁰¹ As the battery life of smartphones increases over the next three to five years, machine learning capability is expected to move from data centres to devices; especially useful for applications, such as in-camera image recognition, which benefit from low latency. Huawei announced in 2017 that they were developing an AI-tuned mobile processor,¹⁰² and Google has recently released a mobile version of their TensorFlow platform.¹⁰³

Possible future applications for AI are diverse and contested. A good overview is given by Nick Bostrom, the director of Oxford University's Future of Humanity Institute. In addition to likely positive applications, such as a reduction in road accidents as machines begin to help us drive, Bostrom expresses concern over possible uses of autonomous weapons, the prospects of new forms of government and private surveillance. Increased reliance on complex autonomous systems for many essential economic and infrastructural functions may create novel kinds of systemic accident risk or present vulnerabilities that could be exploited by hackers or cyber-warriors.¹⁰⁴

Sentiment analysis, image recognition and links to mood

Sentiment analysis seeks to understand a person's position, attitude or opinion towards a specific topic, person, or entity, and has many applications from companies seeking to understand how consumers

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understand their brand to political polling.¹⁰⁵ These approaches typically employ Natural Language Processing (NLP), a type of machine learning which analyses unstructured text.

As in other areas of AI, the key challenge for NLP is to convert messy human data - the text of a social media post, for example, or a YouTube video - into a discrete measure of sentiment. Analysing the sentiment of a sentence as a human would, however, is a deceptively difficult problem.¹⁰⁶ Wrapped up in an assessment of whether a post is positive or negative are challenges not only of detecting emotive language, but also disambiguating the senses of words, identifying sarcasm and working out where each sentence actually ends.

One result of these difficulties is that the ability for machines to accurately assess sentiment in general remains elusive. The authors of a study published in 2018, which attempted to apply 6 separate state-of-the-art sentiment analysis tools to a novel dataset (responses to questions on the software discussion site Stack Overflow) were forced to publish negative results after no tool was able to reach a satisfactory level of accuracy. 'Our results' write Lin et al., 'should warn the research community about the strong limitations of current sentiment analysis tools.'¹⁰⁷

Recent advances in the science, however, might help overcome some of these limitations. One approach, termed 'multimodal sentiment analysis', brings in non-text modalities, including speech and vision. This method is arguably well-suited to modern social media use, where content increasingly incorporates video and images as well as text.

Current research in multimodal analysis is focussed on three key areas: spoken reviews and vlogs, human-machine and human-human interaction, and visual sentiment. A key strength of this approach is the ability to study *inter-modality* dynamics: the interactions between language, sight and sound that change the perception of the expressed sentiment. 'Emotional analysis' is one variant of this approach, where emotions are extracted from images and video via facial-expression analysis, or from speech or text, with the aim of quantifying emotional reactions to what we see, hear, and read. Providers include Affectiva, Emotient, and Realeyes for video, Beyond Verbal for speech, and

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Kanjoya for text. Adopters in this rapidly expanding market include advertisers, media, marketers, and agencies.¹⁰⁸

Combining different data points to determining mood or sentiment holds considerable potential. As noted in one recent paper, 'physical states such as running or walking can be inferred from accelerometer data; colocation with other devices can be detected using Bluetooth; geolocation can be established using Wi-Fi, Global Positioning System (GPS), or Global System for Mobile (GSM) triangulation; and social interactions can be measured by records of text messages and phone calls. These data can be recorded by dedicated apps, such as EmotionSense, which measures emotional states based on the speech patterns and matches it with physical activity, geolocation, and colocation with other users.¹⁰⁹

There are a number of commercial actors similar to EmotionSense employing sentiment analysis in their products. Affectiva, spun out of MIT's Media Lab, develops software which claims to track sentiment and emotion-tracking, and are moving towards fully multimodal sentiment analysis, detecting emotion 'the way humans do, from multiple channels.'¹¹⁰ Similarly in the smartphone market, Beyond Verbal specialise in voice sentiment analysis to ensure that AI-driven Personal Assistants are 'emotionally aware as well as more in tune to the customers' needs and expectations.'¹¹¹

One of the next wave developments in retailing might be the use of facial recognition technology – and possibly biometric data – to analyse patterns of behaviour and respond accordingly. A customer standing in a shop and looking confused, for example, might be offered guidance through a text message.¹¹² Both Beyond Verbal and Emotion Sense suggest their technology can be used to tailor content recommendations - for music or restaurants, for example - based on consumer mood and reactions to stimuli.

Psychographics

'Psychographic' techniques aim to determine the specific personality types, attitudes, values, and interests of users, and to produce content that is informed by that user's specific personality profile. For several years companies have seen this approach as a potentially important

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source of insight to supplement demographic data. In its broadest sense, psychographic techniques have been in use for many years; personality based profiling using surveys, market research and focus groups has a long history in advertising.¹¹³

The key new development in this field (from the perspective of this paper) is the use of digital data to derive psychographic insight, often at very large scale. The big data explosion has vastly increased the amount of data available for psychographic profiling. This data-driven approach has become popular in advertising in recent years, stimulated in part by falling engagement rates with traditional targeting techniques, in part by recent findings that (unsurprisingly) people with different personalities tend to exhibit different purchasing behaviours.¹¹⁴

One method employed in this form of psychographics is to ask people to undertake personality tests, and then cross-reference the results against online behaviour or online data (for example, Facebook likes). By drawing a correlation between the two, it is then potentially possible to determine personality profiles from other users' online behaviour alone. Psychographic data can also be inferred from records of a subject's behaviour online. Even an understanding of a customer's search terms, or a list of their likes on Facebook, can be processed to offer some broad insight into whether they might be extrovert, enjoy travelling, or so on.

In 2013 Dr Michal Kosinski et al published a paper showing that a user's Facebook likes can be used to quickly and accurately predict sexual orientation, ethnicity, religious and political views, personality traits, intelligence, happiness, use of addictive substances, parental separation, age and gender.¹¹⁵

How well targeting based on inferred personality models actually works is hard to determine, though Dr Kosinski *et al*'s recent paper suggests that this approach can improve the performance of marketing. Through the use of psychologically tailored advertisements, their study reached over 3.5 million individuals, and found that persuasive appeals that were matched to people's extraversion or openness-to-experience level resulted in up to 40 per cent more clicks and up to 50 per cent more purchases than their mismatching or un-personalized counterparts. Interestingly, this study may underestimate the effectiveness of this approach - Kosinski *et al* approximated people's psychological profiles

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using a single Facebook Like per person, instead of predicting individual profiles using people's full history of digital footprints, which could prove more effective.¹¹⁶

The ongoing trend of integrating diverse datasets into psychographic techniques is likely to improve the effectiveness of these techniques. As Deloitte's *2017 Tech Trends* report explored, insight-rich data can be gathered from a host of sources - transactional systems, industrial machinery, social media, IoT sensors - as well as from and from non-traditional sources such as images, audio, video, and even the deep web.¹¹⁷ The continued increase in available data - including social data - promises ever deeper insight into personality based profiling, which is likely to drive a marked improvement in ad engagement. In a recent analysis of the effectiveness of these techniques, Kosinski *et al* argue that the availability of new datasets will help progress the field:

'As more behavioural data are collected in real time, it will become possible to put people's stable psychological traits in a situational context. For example, people's mood and emotions have been successfully assessed from spoken and written language, video, or wearable devices and smartphone sensor data. Given that people who are in a positive mood use more heuristic—rather than systematic—information processing and report more positive evaluations of people and products, mood could indicate a critical time period for psychological persuasion. Hence, extrapolating from what one does to who one is likely just the first step in a continuous development of psychological mass persuasion'.¹¹⁸

Other techniques are also being applied to online data in an attempt to investigate the inner lives of users. Social media data, for example, can be used to better understand a user's mental health. In one recent paper, Choudhury *et al* argued that Twitter has potential as a tool for measuring and predicting major depression in individuals, with their tool providing 70 per cent classification accuracy (i.e. seven in ten that were correctly identified as depressive were in fact depressive - although this measure does not include how many false positives were also found). Additional studies show that characteristic language use patterns associated with depression may allow for the detection of mental illness. While the findings from these studies are still preliminary, there is evidence to suggest that automated detection methods applied to large-scale

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monitoring of social media may assist with future screening procedures.¹¹⁹ This is likely to create significant ethical challenges.

There are very few papers which examine in detail the likely evolution of psychographics. However, one probable area of growth - based on current trends - is the further integration of new forms of data. This would entail building algorithms which use, for example, smart device use, Fitbit data, cookie (i.e. web-browsing) data, health app data – and cross referencing it against people's known personality profiles. It is probable that new correlations will be found between online behaviour and personality types, from data sets one would not normally associate with personality profiles. These inferences may be so complex that it would be hard to determine what key data signals were.

Automated content generation

One important development in AI in recent years is the ability to generate content automatically (one version of this is called 'Natural Language Generation', or NLG). While previous content generation relied on rules based approaches, a number of companies are now building NLG AI.¹²⁰ NLG can include e-mail, text messages, summaries, and translations (providers include Arria, Narrative Science, Automated Insights, Data2Content, and Yseop).¹²¹

Research in relation to NLG is generating promising results, particularly in terms of the authenticity of the text. A recent research paper, published by Tang *et al*, proposed a novel approach for context-aware NLG to produce 'natural' fake reviews.¹²² They found that fake reviews were judged to be real 50 per cent of the time by human judges, and 90 per cent of the time by a state-of-the-art fake review detection algorithms.¹²³ Commentators predict a future, in a few years' time, where NLG and NLP will go hand in hand to generate narratives in real time based on unstructured data (text, pictures & videos).¹²⁴

Some companies see this as an opportunity to disrupt the digital content industry.¹²⁵ For example, Narrative's AI product claims to help companies generate 'millions of narratives per day' far more cheaply than human content producers.¹²⁶ In one recent report for Oxford University, Nic Newman reports that three-quarters of Editors, CEOs, and Digital Leaders are planning to actively experiment with AI to support better content

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recommendations and to drive greater production efficiency. The Times and Sunday Times are building a recommendation service called James, which aims to personalise each edition in terms of format, time, and frequency.¹²⁷

One new approach called Generative Adversarial Networks (GANs) may speed up the rate of improvement. Using GANs, two AI systems can spar with each other to create ultra-realistic original images or sounds. This gives machines something akin to a sense of imagination, which may help them become less reliant on humans. Some analysts have noted the rapid improvement of artificially generated faces, using this technique.¹²⁸ Perhaps predictably, this has also been accompanied by concerns about how it also creates 'alarmingly powerful tools for digital fakery'.¹²⁹

Commercial availability and cost

The consultancy firm PricewaterhouseCoopers has recently predicted that global GDP will be 14 per cent higher in 2030 as a result of AI, with increases in labour productivity and consumer demand.¹³⁰ One factor driving this economic value is the increasing availability to a range of actors, outside of technology and academia, of state-of-the-art AI software. The *MIT Technology Review* has named widely available AI as one of their 'breakthrough technologies of 2018,' highlighting recently developed cloud-based offerings from Google (TensorFlow; which is also open-source) and Microsoft and Amazon (Gluon).¹³¹ These cloud-based services are likely to decrease the cost and technical requirements for companies wanting to experiment with AI, allowing companies from diverse sectors to apply the technology to a variety of different datasets.

Despite this opportunity, a 2017 McKinsey report suggests that it may be some time before AI is widely adopted by enterprise. Over the short term the companies found most likely to invest in (and benefit from) AI are likely to be large enterprises 'at the digital frontier'; those in sectors like telecommunications, financial services and healthcare who are likely to have already implemented data processing technology. Amongst those more reluctant to engage, McKinsey found that 'poor or uncertain returns were the primary reason for not adopting,' suggesting that various less technical sectors are likely to need to see a viable use case for the technology before they commit.¹³²

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Based on current trends, we believe that while the economy as a whole may take some time to work out how best to deploy AI, open tools like TensorFlow are likely to encourage researchers and startups to develop and experiment with new methodologies in a range of fields. By lowering the bar to entry into AI, the increasing availability of these tools is likely to drive the next wave of innovation, as well as a new generation of methodologies for measuring and targeting populations.

USE IN POLITICAL CAMPAIGNS

This section examines current and potential uses of the above technologies in political campaigns. Given many of these technologies are still developing, much of this section involves speculation on how some of them might be applied in the coming years, rather than reflection on how they are used now. We distinguish between current and *possible* uses throughout. Further, while we do not comment on the likely effectiveness of these techniques, it should be noted that the effectiveness of any campaigning is itself unclear - a recent meta-analysis of 49 studies about political campaigns in general found that contact from political campaigns had very little impact on voters' choices.¹³³

Current state of play

While Donald Trump's campaign during the 2016 US election received a lot of media coverage for its use of big data analytics, similar approaches have been used by a number of campaigns in recent years. During the EU referendum in the UK, Dominic Cummings estimates that Vote Leave ran around one billion targeted adverts in the run up to the vote, mostly via Facebook. Like Trump's campaign, they sent out multiple different versions of messages, testing them in an interactive feedback loop.¹³⁴ In the 2017 UK general election, the Labour Party used data modelling to identify potential Labour voters, and then target them with messages.¹³⁵ Through the use of an in-house tool called 'Promote' which combined Facebook information with Labour voter data, senior Labour activists were able to send locally based messages to the right (i.e. persuadable) people.¹³⁶ There are a host of similar examples from other countries around the world too.¹³⁷

Elections are becoming increasingly 'datafied', with advertising and marketing techniques being offered by a network of private contractors and data analysts, offering cutting-edge methods for audience segmentation and targeting to political parties all over the world. Many of these techniques were first developed in the commercial sector - as pointed out by Chester and Montgomery in a 2017 paper, 'electoral politics has now become fully integrated into a growing, global commercial digital media and marketing ecosystem that has already transformed how corporations market their products and influence consumers'.¹³⁸

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For years, political campaigns have combined their own data on voter behaviour with commercial data sets available from data brokers, in order to build more detailed profiles of voters. Several firms also offer assistance in mining and targeting voters, including so called 'marketing clouds' offered by, among others, Adobe, Oracle, Salesforce, Nielsen, and IBM.¹³⁹ These services collect and analyse data about individuals from a wide variety of online and offline sources, which can then be used to target potential voters, either through 'ad exchange' systems or directly through large social media platforms.

UK political parties have begun to invest in data talent, implementing data management approaches described above in order to more effectively target voters.¹⁴⁰ The Labour party has used NationBuilder, while the Liberal Democrats have opted for NGP VAN, a platform employed by the U.S. Democratic Party to increase voter turnout. These software platforms allow political parties to target individual members of a given constituency, allowing for more targeted messaging.¹⁴¹

It is reasonable to assume that political campaigning will continue to evolve, and will adopt many of the state-of-the-art techniques being developed in marketing and advertising technology. The allocation of political campaign budgets supports this assertion. For the year 2015, the first year in which digital spending was reported separately by the Electoral Commission, around 23 per cent of the total spend was digital, with the majority of this being spent on Facebook.¹⁴²

We have identified seven key trends in this area, looking how data analytics are being used in political campaigns already, and how it might develop in future.

Trend 1: Detailed audience segmentation

Increasing customer segmentation allows audiences to be divided into ever smaller groups on the basis of granular information about their demographics, behaviour and attitudes. As Martin Moore and Damian Tambini set out in their recent paper on social media power and election legitimacy, 'of particular interest to political strategists and campaigners is the fact that data-driven campaigns offer superior targeting and audience-segmentation capabilities. Campaigns can get the messages they think will be most persuasive to people who are undecided but

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likely to vote, in the constituencies that might swing the election, or key voters in a referendum.¹⁴³

The move towards increasing atomisation of voters is reflected in the features offered by new commercial products. In 2016, for example, global ad giant WPP's Xaxis system launched 'Xaxis Politics.' This claims to be capable of 'reaching US voters across all digital channels' and to 'segment audiences by hundreds of hot button issues as well as by party affiliation', including via 'real-time campaigns tied to specific real-world events'.¹⁴⁴ Another example is L2, a data company specialising in data enhancement, who offer 'voter file enhancements' where 'all records in the national voter file are passed through dozens of processing steps'. This includes 'lifestyle data enhancements' (including data on income, occupation, education, likely marital status, ethnic and religious identification, likely primary language, magazine category subscriptions, pet ownership and so on) and 'modelling enhancements' (including 'self-reported views on issues including: gay marriage, gun control and immigration').¹⁴⁵

One important development in targeting is the continued improvement of 'lookalike' modelling to identify potential supporters and voters. These are sometimes called 'peer groups' or 'persuadables' and allow political campaigners to reach new people on Facebook (or elsewhere) who are likely to be interested in their party because they are similar to existing audiences. The use of lookalike audiences is already commonplace in the political world. The Facebook 'lookalike' service was used extensively by the Trump campaign, and recent research on the Dutch 2017 national election campaign finds that 'nearly all campaigns use its lookalike audiences function to find new potential voters'.¹⁴⁶ Moore and Tambini raise concerns about the potential uses of this segmentation, writing that 'this profiling procedure may inadvertently result in different messages being targeted on the basis of protected characteristics, such as ethnic or religious grouping'.¹⁴⁷

Customer segmentation is becoming more sophisticated, and drawing on more data sources to create ever more granular categories of people, and promising new insight into user motivation and beliefs.¹⁴⁸ It is reasonable to assume that these new techniques will shortly be employed in political campaigns, whereby user data from IoT devices in particular are used, twinned with machine learning, to gain ever more in-depth segmentation of potential voters.

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An important voter demographic to persuade will be 'influencers'. Research by Nielsen finds that friends remain the most credible form of advertising among consumers, and the enlisting of key influencers - even at a relatively low level - to promote brand messages is already commonplace both in marketing (as set out in Section One) and political campaigns.¹⁴⁹ This demand, too, has been recognised by companies offering campaigning tools. Facebook enables candidates to deliberately target people who post a lot about politics, and, (according to business magazine FastCompany), defines 'political influencers' as people who click on political ads, like lots of politics-themed pages, and share content from political groups.¹⁵⁰

As set out in Section One, AI is set to 'transform how brands work with influencers.'¹⁵¹ It is likely that political campaigns will look to harness the power of AI to improve their engagement with these valuable individuals and subsequently their reach to potential voters.

Trend 2: Cross device targeting

Cross device targeting is a key area in ad-tech, where companies are developing increasingly sophisticated ways - both probabilistic and deterministic - to gain a 'user centric' view of a person, and target them across devices.

The use of this technology in campaigning is already underway. Martin Moore's research on the role of digital marketing in political campaigns finds that 'cross-device targeting is now a standard procedure for political initiatives and other campaigns.' Moore and Tambini confirm that while 'profiling and segmentation has always taken place [in political campaigns], rapid innovation makes individual level targeting much more efficient and sophisticated.'¹⁵² The Democratic National Committee, for example, worked with 'data services firm Experian and political data company TargetSmart Communications to turn its voter file into data that can be used to aim video ads, addressable TV spots and mobile and desktop display ads at specific voters.'¹⁵³

This will increasingly allow campaigns to target individuals at specific times, on specific devices, when they may be more receptive to a

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message.¹⁵⁴ Leading cross-device marketing company Drawbridge offered a suite of election services in 2016 that provided campaigns a number of ways to impact voters, including through 'Voter-Centric Cross Device Storytelling', 'Political Influencer Identification', and via 'Real-Time Voter Attribution Measurement'.¹⁵⁵

The direction of travel is towards customer segments of one. Companies and marketers are increasingly seeking to target consumers on an individual and personalised basis, across their devices, based on widely available data about them from multiple sources; a trend which Michael Schneider calls a 'move to a people rather than places approach'.¹⁵⁶ One marketing agency, Stirista, offers tailored services to political marketers to identify people who are potential supporters and voters. On their website, they explain the new status quo of 'the massive amount of offline and online data on voters and donors available today. Even newer is the technology to turn millions of records into laser-sharp, multi-dimensional, personal profiles, so you can reach each individual with a message that will move the needle.' Stirista claims it has matched 155 million registered voters to their 'email addresses, online cookies, and social handles', in addition to their '400 segmentation filters' which 'combine demographic, geographical, cultural and interest-based data to create the precise profiles you need.' They also claim their 'vast vault of contact information contains donation history for the past two decades, with names and causes'.¹⁵⁷

Another development in this field is the application of geo-location data to target people individually through social media platforms. This could allow parties to identify, for example, people who were present at a demonstration or an event. One company, El Toro, claims to be able to create lists of devices present at an event, then 'map those devices back to the device's home physical address, where IP targeting can then be implemented'. This allows campaigns to reach voters at home, getting a message to those who could not be contacted through door-to-door canvassing.¹⁵⁸ As noted above, this approach is likely to become more effective through considerable improvements underway in geo-location based targeting.

Cross-device tracking is part of a larger trend: the increasing prevalence of household IoT devices, from voice assistants and fitness trackers to smart washing machines, is creating novel ways to tap into a 'captive audience' (for example, people judged likely to be trying to complete a

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household task that requires a certain product). While we are not aware of examples of political parties using IoT advertising, it is plausible that political campaigners, competing to engage potential voters in new and innovative ways, will start to look at the possible use of such techniques.

Trend 3: Growth in use of 'psychographic' or similar techniques

There is a long history of personality tests being used for political purposes. After the Second World War, for example, concerned psychologists in the US developed the 'F-scale' in an effort to determine who might be susceptible to fascism.¹⁵⁹ This psychographic analysis is now grounded in big data, and many advertising firms offer the ability to target consumers (or voters) based on the 'emotion' displayed in their social media presence. Experian Marketing Services for political campaigns offers data that weaves together 'demographic, psychographic and attitudinal attributes' to target voters digitally. The company claims that its data enables campaigns to examine a target's 'heart and mind' via attributes related to their 'political persona' as well as 'attitudes, expectations, behaviours, lifestyles, purchase habits and media preferences'.¹⁶⁰

Political parties continue to use persuasive communication tactics to encourage the electorate to vote for a specific candidate. This has included some limited use of specific personality test techniques, such as the OCEAN test - although there is no robust evidence on how well this approach works. However, the growth of newly available data sets, integrated into psychographic modelling, could result in new insights into personality types and emotional states, based on correlations derived from deep learning systems that are hard for a human analyst to predict, but which can be used to inform political advertising.

If and when these techniques begin to yield improvements in commercial settings, it is highly probable that parties and campaign groups will continue to integrate them into their strategies, though it should be noted here that, again, there is no guarantee that something that works in a commercial context translates easily into political campaigning. Although studies have found some evidence of effectiveness for psychographic targeting in purchasing choices, there is at present very little evidence – at least, that we are aware of – as to its effectiveness in influencing political choices. One unpublished PhD study

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has found 'mixed evidence' on the ability of personality traits to predict who is most likely to vote, and raises the question of whether personality traits can predict who is most likely to be persuaded by advertisements.

A voter's mood is just one way in which technology could reveal individual's intimate details to political campaigners. As described above, companies such as L2 already offer detailed data on a voter's views on divisive issues like immigration and gun control - meaning parties can build up a checklist of precisely what political concerns an individual is likely to have. Methods developed by researchers for taking measures of a user's 'satisfaction with life' from online sources could be used, for example, to identify dissatisfied citizens who might be more open to messages relating to policy changes.¹⁶¹ By combining social media posts with heating bills with health data from a fitness tracker, for example, it might be possible to pick out each users' likely political frustrations or aspirations, then use that to inform the content of adverts.

Campaigning also presents a potential use case for facial recognition technology, though there is no indication that this sort of technology is currently being deployed in political campaigns. However, if such technology becomes unremarkable through integration into the high street, then it is feasible that parties might adopt similar techniques – analysing facial expressions of people watching television adverts or political debates, and seeking to tweak their messages accordingly.

Trend 4: Use of AI to target, measure and improve campaigns

Given the trends outlined in the first section of this paper, it is possible that AI will prove better than human strategists at working out exactly who should be targeted, when, and with what content, in order to maximise persuasive potential. Such a system would be capable of pulling together vast amounts of data from across different sources, and identifying relationships likely to remain invisible to human analysts. It is not inconceivable that AI driven platforms might be semi-autonomously carrying out political campaigns in the near future.¹⁶²

In addition to enabling better targeting, these technologies could be used to monitor and improve the performance of political campaigns. In the commercial sector, A/B testing of adverts, which helps producers understand what messaging results in higher clickthrough rates and more

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conversions (i.e. message A or message B) is commonplace. This method is used iteratively, constantly seeking to improve and target message more effectively throughout a marketing campaign. Improvements in audience segmentation and cross device targeting mean that specific messages can be tested with specific audiences. The problem of finding messages that are effective and resonate with potential voters has been common to political campaigns for a long time, but previously used to involve static and comprehensive 'focus group' testing of a narrow range of messages, each vetted and signed off by senior politicians.¹⁶³

The use of social media and commercial advertising techniques has brought to this endeavour a step change in pace and scale. Moore and Tambini describe a 'dynamic' process where 'messages are selected on the basis of their resonance rather than ideological or political selection.' Tools such as Facebook's Dynamic Creative, using a set of predefined design features of an advert, can already construct thousands of variations of an advert, present them to users, then find the optimal combinations based on engagement metrics. This is the type of feature that Brad Parscale, Trump's digital campaign manager, spoke about in a CBS 60 Minutes interview where he claims that his team tested 50,000 to 60,000 ad variations a day.¹⁶⁴

Trend 5: Use of artificial intelligence to automatically generate content

One of the most important developments in AI in recent years is the ability to generate content automatically, which raises the possibility of campaigns using programmatically created messaging, developed specifically to convince target audiences. In perhaps the most obvious use case, Natural Language Generation tools could be used alongside algorithmic targeting in order to automatically generate content for unique users based on insight about their interests and concerns. In this case, instead of finding an optimal combination of design features through measuring engagement in the field, a system could use trending topics, personal data, and an understanding of the interaction between these to generate bespoke and nuanced advertising content. Such campaigns could combine the interactive element of chatbots with personal data to serve adverts that incorporate a back-and-forth interaction, potentially referencing previous interactions or stated concerns with new generated pieces of content. Taken to its logical conclusion, this could lead to a stream of unique, personalised messages targeted at each voter constantly updated based on A/B testing.

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This technology can already been applied in the in the use of commercial chatbots, occasionally acting as pseudo-shopping assistants, or surreptitiously pretending to be humans on social media. As conversational technology improves, particularly in verbal machine-to-human communication, talking with a chatbot will feel more natural, and become more personalised. This familiarity could help chatbots find a niche in political communications, employed by campaigns as a 24/7 helpline for policy questions or as a dynamic cheatsheet to help provide quick and informative answers during canvassing. A current example of this can be found in the nonpartisan chatbot HelloVote, which was used in the 2016 US presidential election. It assisted eligible voters to register to vote, checked whether they had registered, and helped them gain the ID required in their state. Users could communicate through text and the HelloVote system either directly filled out online voter registration forms or sent pre-filled forms to the users to submit.¹⁶⁵

Not all of this use is likely to be positive. AI generated content has been used for misdirection and disinformation, and social media bot accounts (both private and state-supported) have been used to flood online spaces with masses of false information with the intention to shut down conversations.¹⁶⁶ Similarly, recently invented technologies that generate content are likely to be used to mislead and confuse. Technology which generates photo-realistic images, imitates real voices and hallucinates faces has clear potential to promote misinformation, providing false 'proof' that politicians have said or done something scandalous.¹⁶⁷

Trend 6: Using personal data to predict election results

Political parties conduct polling during election campaigns – to gauge overall results, assess reception to policies or leaders, and even identify key issues voters are worried about. In recent years campaigns have started to use social media in an attempt to discover what people are concerned about, and thereby to predict poll results. A recent study by Rossini *et al* found a strong relationship between a candidate's performance in public opinion polls and the types of messages shared on their social platforms. Their findings conclude that candidates who polled higher were more active on Facebook and Twitter and were more likely to use these channels to attack opponents or advocate for themselves.¹⁶⁸

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One 2017 study explored the link between political liking behaviour and actual voting intention, and found that liking politicians' public Facebook posts can be used as an accurate measure for predicting voter intention. Interestingly, this research concludes that even a single selective Facebook like can reveal as much about political voter intention as hundreds of heterogeneous likes.¹⁶⁹ Another recent study looked at tweets from the 2016 United States presidential election, and sought to find a correlation between tweet sentiment and the election results. After comparing Twitter data to the results of the Electoral College, they found that sentiments expressed online corresponded with 66.7 per cent of the actual outcome of the vote.¹⁷⁰

As described in Section 1, approaches such as multimodal analysis are increasing the accuracy of sentiment analysis technology. We anticipate increasing use of social media sentiment analysis to both gauge reception to candidate's speeches or events; and as a way to predict the results of elections themselves - although given the variable accuracy levels, this will not replace traditional polling in the foreseeable future.

Trend 7: Delivery via new platforms

Digital video, wearable tech, and VR are all increasingly important forms of delivering content to users. This is especially true for video, which, viewed on phones and other devices, is considered a highly effective way of delivering emotional content on behalf of brands and marketing campaigns. YouTube has therefore become an important platform for political ads, with the company claiming that today, voters make their political decisions not in 'living rooms' in front of a television but in what it calls 'micro-moments' as people watch mobile video.¹⁷¹

The growth of video creates new threats. Late 2017 saw the rise of 'deepfakes,' the application of face-swapping algorithms (among other applications) which allow campaigners to 'put words into' their opponents' mouths. A recent report on AI and security threats warned that 'AI systems may simplify the production of high-quality fake video footage of, for example, politicians saying appalling (fake) things.'¹⁷² This could mean that 'in the future AI-enabled high quality forgeries may challenge the "seeing is believing" aspect of video and audio evidence.'¹⁷³ This might not be of immediate concern relating to

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personal information – unless of course it involves the use of personal information of whoever was faked.

Just as companies are starting to use virtual and augmented reality platforms to sell products and services, there is also a rise in VR campaigns aimed at opening political debate. In a recent project by director Alejandro Iñárritu, VR was used to recreate the experience of Mexican immigrants crossing into the United States.¹⁷⁴ The project is not alone in its intent to drive social issues forward using these technologies.¹⁷⁵

The increase in ownership of IoT devices - in particular wearables - is recognised as a new growth area for marketing, especially when combined with location data. As this technology is in its early days in the commercial sector, there have not yet been any applications to political campaigns - at least as far as we are aware. It is, however, an area that could be utilised in the future.

In addition to advertising on social media, more traditional platforms - in particular television - are being used in new ways by political campaigns. The increase in the collection and use of television data (including set-top data and smart TV device data) is facilitating better targeted television advertising.¹⁷⁶ Political campaigns are at the forefront of this technology, using 'second-to-second viewing data', amplified with 'demographic and cross-platform data from a multitude of sources', acquired via information brokers, to deliver more precise adverts.¹⁷⁷ NCC Media, the US cable TV ad platform owned by Comcast, Cox, and Spectrum, provides campaigns with the ability to target potential voters via the integration of its set-top box viewing information with voter data from Experian and others.¹⁷⁸

Due to its enduring importance, targeted TV advertising merits a little more explanation here. There are two types of television adverts: addressable (where specific individuals are targeted, meaning that two people watching the same station at the same time might each see different ads) and predictive adverts (everyone in a given market sees the same ads, but ads shown during particular shows are singled out by political groups based on the high probability that key voters watch

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those programs). According to commentators addressable political advertising is more commonly used by political campaigns; with the catch that it's also more costly. As a result, political campaigns are increasingly merging together various data sources to understand which programs certain voter segments are most likely to watch.¹⁷⁹ In a vivid illustration of this, Forbes reported recently that services like Deep Root Analytics helped the Trump campaign identify police procedural 'NCIS' as popular with anti-Obamacare voters, while 'The Walking Dead' was preferred by those who favour stricter immigration laws.¹⁸⁰

Ken Strasma, CEO of HaystaqDNA, an analytics firm that has worked on campaigns for Barack Obama and Bernie Sanders, is quoted as saying that they haven't yet been able to leverage social media data to improve TV targeting: 'Unfortunately, as it stands now, the number of people whose identities we could match and who also had addressable TV was too small to make it practical.'¹⁸¹ However, recent patents describe significant advances in cross device targeting. For example, Intel IQ's patent describes the ability to target a television advert based on a user profile collated from multiple online devices, only one of which needs to be associated with the set-top box (the device that connects a television and a signal source). The current limitations of targeted political advertising therefore seem unlikely to persist.

KEY CHALLENGES

Below, we set out what we consider to be the main challenges relating to political campaigning as a result of new technologies. As the explicit focus of this paper is on privacy risks or challenges, we have not discussed the many benefits to campaigns and elections that these trends might also create. We have also limited ourselves to legal methods that legitimate and lawful political parties might adopt – and not those from malicious actors.

Privacy

There are several privacy risks resulting from the latest developments in data exploitation and targeting. Some of these will arise from new consumer technologies. A recent report by the Royal Academy of Engineering, for example, warned that IoT devices posed a particular new risk to privacy, as a person's location could be more easily identified through analysis of data collected through IoT devices.¹⁸² The majority of these risks relate to consumer privacy in general, rather than political campaigns specifically. Nevertheless, if political campaign data use follows the same route as marketing and advertising there will be a greater drive toward both cross-device targeting and individualisation - i.e., the aiming of political messaging at unique individuals. As a result, campaigns will be incentivised to hold or obtain more personal data on individuals, and to collect as much diverse data as possible, in order to maximise the effectiveness of their messaging.

User consent and knowledge

The more complicated and automated the process of data use and targeting becomes, the more difficult it will become for users to ask for a clear explanation about how their data is used, and to know whether they can ask for it back. As big data and algorithmic technologies are often highly complex, and AI led processes are typically difficult to scrutinise and explain, the principle of 'informed consent' will become increasingly difficult to apply even to 'everyday' forms of data processing. As a result, it will be hard for people, as well as parties, regulators and campaign groups, to understand how collected data is being used. This will especially be the case with cross-device targeting, since it might not always be clear to the user who is actually responsible for the targeting.

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Inappropriate profiling & messaging

There is potential for automatically generated content to become an important part of political campaigning in the coming years. One possible scenario involves Natural Language Generation being employed to automatically create tailored content for each voter, based on data held about them or acquired by parties. This would amount to the automation of political campaign content. These methods might include a constant and intensive process of iterative A/B testing and production, outputting content at a scale and pace beyond the capacity of any human editor. This could result in inappropriate, inaccurate, or prejudicial adverts appearing. While this form of advertising is will not necessarily be illegal (although in some cases may be), its existence could also undermine public confidence in the ability of regulators to ensure political campaigns are run fairly and increase public distrust of political parties.

Accountability

One of the major trends over the next 2-5 years will be the widening availability of currently state-of-the-art artificial intelligence, automated Natural Language Generation, and user targeting. It is our view that algorithmic marketing techniques will soon become available to all political parties, enabling them to routinely run thousands, perhaps millions of algorithmically tuned messages. This scale is might overwhelm regulators, who could find it difficult to effectively monitor political adverts that are shown. Regulators are advised to consider how high volumes of messages might be stored and shared, potentially with the wider public, in such a way that they can be reliably checked. Unless this can be achieved, there is a risk of growing concern relating to the transparency and political accountability of campaigns.

Emotional manipulation

The technique of using psychographics, or broader emotional targeting, is likely to improve with the creation of very large and cross-referenced datasets. It is probable that, in an effort to increase the inferential power of targeting algorithms, personality survey data will be linked with ever larger and more varied data sets from IoT devices, location histories and social media. This will help campaigns build up correlations between personality types / moods / psychological states and patterns of behaviour. In advertising, this will lead to new methods for targeting

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consumers at the time and place that they're most receptive, using content that reflects their personality.

As much of this will necessarily be automated, handing control to an AI based system could potentially sometimes result in political parties targeting people who are extremely depressed, anxious or suffering from particular psychological difficulties with adverts designed to appeal to them. As well as being ethically questionable, this could cause reputational damage to the party running the campaign if discovered - though the fragmentation of individual targeting is likely to mean many cases go unnoticed. In general, we believe there is a danger that political messaging will become more emotional in tone, appealing more often to anger, frustration or prejudice, in an attempt to mobilise voters and maximise engagement with content. This is likely to have other, longer term effects on the health of democracy.

Competition

According to various analysts, there is evidence that a small number of companies – notably Facebook and Google – are becoming increasingly dominant in terms of online advertising.¹⁸³ The continued improvement of their services to target people – including custom and lookalike audiences, along with the ability to reach into people's homes through advertising by personal assistants – is likely to mean these companies become increasingly important for online ad spend during elections. As the academics Moore and Tambini set out in their recent paper on the subject, 'the continuing dominance and monopoly positions, particularly by opaque foreign companies, are likely to be particularly corrosive of trust, fairness, and legitimacy.'¹⁸⁴

Creation of new forms of personal data

Likely improvements in generating inferred data – where probabilistic inferences are made about a user based on an analysis of available data points – will create new categories of data. For example, on current trends it might be possible to very accurately determine an individual's sexual preference, political persuasion, voting history etc, based on a sophisticated analysis of metadata arising from their device use, browsing habits and so on. If this process can be made sufficiently accurate, it would allow for the inference of what is arguably personal data, generated by a private company without the knowledge of the individual concerned. Of particular interest for political campaigns will

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be 'persuadability' to certain political messages – whether about the economy, immigration, the environment or so on - which could help to determine a person's political persuasions. In these circumstances, it is hard to see how the user would know this data exists, or exercise their rights to have it removed, corrected, or processed in any other way.

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ABOUT THE AUTHORS

Jamie Bartlett
Director, CASM

Jamie is one of the UK's leading thinkers on the politics and social influence of the internet, with a particular interest in the dark net, cryptocurrencies, surveillance technology, machine learning and big data. He is Director of the Centre for the Analysis of Social Media, a collaboration between Demos and the University of Sussex. His books include *The Dark Net* and most recently *The People Vs Tech: How The Internet is Killing Democracy (And How We Save It)*.

Josh Smith
Researcher, CASM

Josh is a software developer and researcher, with a particular interest in the application of natural language processing to social research. He has worked on a wide range of technologies, from hardware to web design, most recently holding a position at IBM as a Python developer and systems administrator.

Rose Acton
Researcher, Demos

Rose is a researcher and entrepreneur, with a particular interest in the role of technology and how it can be used to solve social problems. She is a co-founder of Adia Health, a tech start-up on a mission to revolutionise women's reproductive health. She is a recent graduate of the social innovation programme Zinc VC, and has previously held roles at the Money and Mental Health Policy Institute and the Financial Conduct Authority.