3.3 The Internet of Things as Disruptive Innovation for the Advertising Ecosystem

Abstract: The connection of physical and virtual objects via the Internet, the Internet of Things (IoT), is one of the most up-and-coming technologies in the digital age. First signs show that the IoT will have a tremendous impact on the whole advertising ecosystem formed by media, agencies, advertisers, and the consumer. Analysing early implementations of the IoT in the health and fitness sector and their impact on the advertising ecosystem, the article shows fundamental alterations in the information-disinformation relation between the involved players and subsequently the impact on their business models. It should also give a guideline for consumers to exploit the new opportunities of the IoT to communicate with brands and products and to become aware of associated threads.

1 Introduction

In recent years the digital age has led to disruptive innovations in several sectors. Examples are media, telecommunication, and commerce. These innovations generate new markets and change existing ones radically. As a consequence, they have a high social impact as the mass production of automobiles had in the past. They start with weak signals, which are often ignored by established market leaders, end with a strongly changed market structure and have a much broader impact than expected in their early years. These disruptive innovations are mostly initiated and driven by new technologies like the invention of the steam engine, machines for mass production, or the Internet. For some years the Internet of Things (IoT), the connection of physical and virtual objects via the Internet, seems to be one of the most up-and-coming technologies with the potential to initiate such disruptive innovation in various sectors. In this article we will analyse how the IoT will transform the whole advertising ecosystem by bringing new players into the market as well as requiring fundamental changes in the business models of established market leaders. A special focus will be on the impact of the information-disinformation relationship on the advertising ecosystem.
Generally such disruptive innovations begin with the first implementations of the new technology in a well-defined market sector addressing early adopters. The following article will show this phase with the help of Nike+ as an example of using the IoT to achieve the aims of advertising such as brand awareness and customer retention. Due to high adoption rates, technologies which drive a certain disruptive innovation will later become widespread in a whole sector. To illustrate this, the impact of implementations of the IoT in the health and fitness sector will be analysed. Exploring the relationship between the IoT and top-of-mind awareness, as one of the main elements of business models in the advertising ecosystem, helps to better understand this impact which leads subsequently to alterations in the information-disinformation relationship between the players involved, further driving the impact on established business models.

This article should present some ideas and guidelines that explore the new business opportunities of the IoT as well as how it will alter the business models of established players in the advertising ecosystem such as media, creative and media agencies, and advertisers. It should also help raise the awareness of consumers in understanding the new opportunities as well as the associated threads of the IoT.

2 Learning from Nike+ as an Early Example of Using the Internet of Things

2.1 The Beginning of the Internet of Things (IoT) in Advertising

For more than thirty years Nike has been a leading player in global marketing. The brand stands for leading edge athletic footwear and sportswear. During the 1980’s the main focus of Nike’s advertising campaigns was on iconic world-class athletes like Michael Jordan. The next step was the ‘Just Do It’ campaign, a first move towards the engagement of target groups, challenging consumers to use Nike products to achieve their own athletic goals. Thus, Nike became a leader in engaging consumers long before the rise of social media. In close cooperation with New York City based agency RG/A Nike opened in 2006 a new chapter in digital marketing: Nike+.

Nike+ defines how a brand can build a self-sustaining platform for customers to track their training progress by inserting a chip in their shoes that connects, in the early days to their iPod music player, and today to smartphone apps, smartwatches, and fitness wristbands. Nike+ runners have logged more than 100 million miles within the first three years, enough for more than 400 round trips to the moon. But Nike+ had already enabled the consumer at that time to
not only log their training progress but to also share and compare it with millions of other Nike+ athletes. Thus, the main innovations were implemented: the IoT by connecting the shoes with the iPod and social media and by offering an open platform to share own data with other athletes. RG/A’s platform and related campaigns were pronounced as the ‘campaign of the decade’ and won the Titanium Lion in Cannes 2009 (Morrissey 2009).

2.2 The Main Disruptive Innovations Linked to Nike+1

But what disruptive innovations (Anthony et al. 2008), from the point of view of the advertising industry, are linked to Nike+? Firstly, technology is no longer seen as just a means to implement the creative director’s ‘big idea’ but also as the source of fresh creativity. The traditional process of briefing by the client, creative work, and implementing the creative idea by using different media is radically altered. New technologies like the IoT and platforms for sharing personal content are seen as new opportunities to fulfil client’s goals in a totally new way. As a consequence, and also in agencies, creativity is no longer a monopoly of the creative department but also stems from the techies and the marketing people – something that has been common in other industries for decades.

Secondly, the move from thinking in campaigns to thinking in platforms is a further disruptive innovation linked to Nike+. An advertising campaign is a series of advertisement messages that communicate a central theme and message by using different channels such as print, TV, or online across a specific time frame, often ranging from six to eight weeks. Thus, most campaigns are short-lived and try to penetrate the theme and message in a one-way communication format. On the other hand, platforms are built for years or decades and are improved incrementally. They are used for different campaigns and enable two-way communication between the consumer and brands as well as among consumers. To build competitive advantages by using digital media, not only is the use of an existing platform necessary but also to own the technological competencies to develop innovative platforms as the backbone for campaigns and the engagement of the consumer. Otherwise competitors can do the same things and no sustainable competitive advantage is generated. Thus, the differentiation is not only generated by new ideas but also by new technical artefacts.

1 The following analysis is based on author’s work in the last decades as founder of several enterprises in the field of marketing technologies, consultant to international brands in changing their customer communication, and as judge in leading international competitions and awards for innovative marketing solutions. See also: Kotler, Armstrong 2016; Wind, Hays 2016.
As a consequence of the second disruptive innovation, a third is linked to the example of Nike+: the opportunity and need to bridge storytelling and systematic design. Storytelling aims to evoke strong emotions, a traditional core competence of advertising agencies. On the other hand, building platforms requires systematic design capabilities from the field of engineering. Normally, there is a big gap between these two worlds that require staff with different competencies, mentalities, and working styles. To bring together both in joint project teams and not falling back to the old model of briefing-creative idea-implementation, is probably the main challenge for agencies in the world of the IoT.

The fourth disruptive innovation connected with Nike+ as an example of using the IoT in advertising is the movement from generating emotional context by different advertising measures to the use of already existing highly emotional situations of the consumer. Traditional advertising tries to generate emotions by creative advertising in a low involvement context like reading a newspaper or watching TV. As shown by Nike+ the exploitation of the IoT takes advantage of highly emotional context like practicing sport to fulfill personal goals. The advertising tactic is no longer to interrupt the consumer by doing something he likes to do, like reading an article or watching a movie, but to support what he really likes to do: logging and sharing his fitness data during a run.

The first conclusion from analysing the advertising ecosystem regarding the impact of digital media in general and the IoT in particular is that we can observe a strong ongoing transformation process in the whole industry as is already witnessed in other industries such as media and banking. Digital innovations are changing more and more from an instrument to increase efficiency to the main enabler of new business models. Due to the strongly increased demand for technological competencies and high affinity to technology driven business models as well as for new ways of thinking there is an open window for the market entry of new players. We will discuss this using the example of the health and fitness sector in the next chapter.

3 The Role of the IoT as a Disruptive Innovation: the Example of the Health and Fitness Sector

3.1 The IoT’s Characteristics for Disruptive Innovation

Generating new markets and radically changing existing ones are the main characteristics of disruptive innovations. As a consequence, they have a high social impact. Examples of this are mass production in the automotive industry or the
strong spread of smartphones. The driving force of disruptive innovations are usually players that don’t yet exist, because current market leaders allocate their resources on hitherto successful business models based on traditional ways of thinking. Instead of the former market leader, new players enter the market with a fresh way of thinking, new business models, and without the burden of past success in an old market environment (Christensen 1997). As a consequence, market leaders for horse-drawn carriages didn’t achieve a relevant role in the automotive sector and the transformation of the media sector with its dual-market of public audience and advertising was led by new players like Google. The IoT already has some of the characteristics of disruptive innovation and is currently spreading its impact to reach one of the most important criterions of a disruptive innovation: the strong social impact. The IoT can be defined as a network of physical objects like devices, vehicles, and buildings among others, embedded with sensors, software, and network connectivity that enables those objects to collect, store and exchange data. Due to the embedded electronics, those objects can also be controlled remotely across existing infrastructure like the Internet (International Telecommunication Union (ITU) 2013). International Data Corporation (IDC) estimates a growth of the worldwide Internet of Things market from $655.8 billion in 2014 to $1.7 trillion in 2020 with a compound annual growth rate (CAGR) of 16.9% (MacGillivray, Turner 2015).

A strong social impact of the IoT can be expected, and is already witnessed, in the sector of health and fitness. The new opportunities of technology together with people’s altered attitude towards health and fitness leads to a global trend often called ‘quantified self’ or ‘self measurement’ (Choe et al. 2014). The basic idea is that electronic devices such as wristbands, smartwatches, smartphones, headsets, or chest belts are equipped with sensors that log bodily functions together with body movement to store, analyse, and share these data. The main data measured are heart rate, heart rate variability, brainwaves, power on bike pedals and body movement. From these measurements a lot of data is estimated, such as energy consumption, VO2 max (maximal oxygen uptake), Total Stress Score, or degree of regeneration. Thus, the quantified self can be seen as a further development of the early Nike+ as described above, while the current version of Nike+ incorporates a number of quantified self functionalities.

If we look at the main characteristics of this global trend of the quantified self we can find many of the attributes of disruptive innovation. Firstly, a new market for self-measurement devices, data analysing, and sharing platforms is established. In Q4 2015, the shipments of smartwatches, introduced a couple of years ago, was already higher than for the world-famous Swiss watch manufacturer established by Abraham-Louis Breguet in 1775 (Mawston 2/18/2016). The year-over-year comparison shows for the smartwatch segment an increase
of 316% and for shipments of Swiss watches a decrease of 5%. Of course, the per-item value of one watch is still much higher in the Swiss segment. Showing the time is just one of many functions of a smartwatch, so as a consequence it’s not in the same market as traditional watches but is instead building a new one. Secondly, none of the traditional strong players made this innovation but it was new companies from a different sector. The market leader in the sector for smartwatches is not a traditional watch brand, but is Apple with a market share of 65% at the beginning of 2016 (Mawston 2/18/2016). The leading platform to analyse and share fitness data was also not built by a traditional brand, but by Runtastic, an Austrian based start-up, acquired by Adidas for 220 million Euros in 2015. Thirdly, the quantified self already has a strong social impact. One example is the movement from the more passive ‘beauty and wellness’ trend back in the 1980’s towards the emphasis on the active ‘fitness’ engagement. Another is the rise of more self-responsibility for one’s health than compared to the past, where delegating decisions to doctors and beliefs in standards set by traditional authorities such as the WHO dominated.

3.2 Digital Native’s Delphi D-Move Shows First Indicators for a High Social Impact of the IoT

A high social impact is one of the main characteristics of a disruptive innovation but to observe this requires long-term empirical studies which deliver insights only ex-post with limited usefulness for proactive innovation management. Thus, in this paper the first results from an Expert Delphi Study should be presented to identify early signs of the social impact of the IoT. The Digital Native’s Delphi ‘D-Move’: (for a detailed description see: Petrovic, Lembeck 2016) is run on a bi-annual basis. As the participants are recruited every two years from the same population long-term changes in experts’ opinion and their behaviour can also be analysed.

The basic assumption of D-Move is that digital natives are early adopters of digital innovations having grown up in the world of the digital and are closer to it than their parents’ generation who are digital immigrants. At the same time, due to their adoption behaviour, they form the innovation environment for companies and individuals bringing those digital innovations to the market. Those characteristics of the adoption process of the innovation’s early versions influence its further development and form the social environment for other disruptive innovations. The relationship between digital innovation and adopter’s behaviour is not linear but more interdependent and circular. Thus, digital natives are at the same time the objects and subjects of digital innovations (for
a basic elaboration of that dual role of the user see: von Hippel 1986; Rogers 2003).

Therefore the main aim of D-Move is to understand digital natives’ current behaviour as an indicator for future large-scale transformation processes with a high social impact. The implementation of D-Move offers four main characteristics: bring in examples of real world experiences into the Delphi process to explain one’s own point of view to others, facilitation of interaction with peers, usage of familiar means of communication, and giving digital natives the role of experts in the Delphi process. To exploit these four features, a modified Delphi method is implemented with face-to-face as well as asynchronous dispersed forms of communication. The use of the D-Move Field Experience Software further supports the goals via functions like the capturing and posting of videos, pictures and textual description from smartphones directly to domain specific video blogs in a structural form. Figure 1 shows the main elements of D-Move’s processes and functionalities.

Bringing in examples of real-world experiences as the first characteristic is achieved by using the Field Experience Module of the D-Move Delphi environment to explain and support the individual’s position with annotated videos, pictures, and textual description. This material is collected in an information repository, mostly in the form of a collaborative video blog. The interaction with peers as the second characteristic is supported by interaction with other participants in the Delphi group, for example by discussing the research questions, building
the Delphi thesis jointly, trying to get more consensual answers, and preparing the final report. The third characteristic, use of familiar forms of communication, is fulfilled by using online questionnaires to answer the Delphi thesis, shared digital spaces to communicate and share documents within and between the groups, and the described digital capturing functionalities. Also the interaction with the review board, which gives methodological advice, is supported by digital communication. To obtain the fourth characteristic, digital natives take the role of experts; they are engaged in the development and refinement of the Delphi thesis in addition to giving their opinions. They can bring in their real-world expertise as digital natives to improve the quality of D-Move’s outcome.

The aim of D-Move 2016 was to understand whether digital natives are any different to their parents with regards to healthy living and improving fitness supported by the IoT and quantified self or if this trend is similar across all generations. Twenty-five digital natives as experts for D-Move 2016 were recruited from a master’s and a bachelor’s class in information systems. The whole process as shown in figure 1 took four months. In the first step basic assumptions were discussed by the experts dealing with their own behaviour regarding this trend by using more open questions. Afterwards, results were aggregated to eight assumptions in a second step in the form of closed questions.

The two Delphi responses marked in red in Figure 2 show the most homogeneous results. They cover the topics of sharing fitness information (central
tendency 5 and variance 0.889) and the usage of quantified-self-apps (central tendency 5 and variance 0.598). The digital natives think that they use app-based fitness programs more than older generations and share the results much more than their parents.

But at the same time, digital natives think that the trend of health and fitness has an emergent role in all generations. Particularly when it comes to awareness and personal responsibility for their own health, participants think that this is not a question of generations but much more of social stratum and education. In summary, the results show that health and fitness is a strong trend, not only within digital natives but across all generations. But the authorities setting the standards are quite different between digital natives and their parent’s generation. Digital natives orientate themselves more towards their peers using social media and increasingly IoT technologies, whereas their parent’s generation is more strongly oriented towards standards set by traditional authorities like the World Health Organization.

These results from D-Move 2016 show the first signs that there is already an on-going social impact of the IoT in such an important field as health and fitness – a main characteristic of a disruptive innovation. Due to this we can expect further development of the IoT in the field of health and fitness and as a consequence broader adoption in this domain due to the interdependent and reinforcing relationship of technological innovation and social adoption as discussed above. As shown in that example sector, there should be a sustainable impact of the IoT on basic assumptions in the business models of the advertising ecosystem. The following section discusses these impacts of the IoT with a special focus on top-of-mind awareness, as one of the most important elements in the advertising sector’s business models.

4 The Impact of the IoT on Top-of-Mind Awareness

Top-of-mind awareness (TOMA) plays a central role for the different business models in the advertising ecosystem. A brand or product is characterized by a high TOMA if it comes first in consumers’ minds, when thinking of a particular industry. High TOMA is shown when the brand or product is on the top of consumers’ relevant set during a multistage buying decision and the probability is high of preferring that brand or product compared to alternatives within the relevant set (Karlan et al. 2016). Each player in the traditional advertising ecosystem has a specific role to support a brand or product by building a strong TOMA. The creative agency develops messages to strengthen the brand image and promote sales, the media agency uses different media such as the Internet,
radio, newspapers, television, magazines, and social media to communicate those messages and the media companies provide access to the target groups. As the business models of these players are strongly related to TOMA, any alteration in building and using TOMA would immediately impact them (Petrovic et al. 2015).

4.1 Impact One of the IoT: The Time Frame to Build, Influence, and Use the Relevant Set is Shortened or Eliminated

A basic assumption of TOMA is that there is a time gap between recognizing needs and having the opportunity to make the actual buying decision. Without this time gap keeping a certain brand for the following buying decision is not necessary as it is done immediately. An example is the gap between seeing an advertisement or noticing a need e.g. by looking in the fridge and the actual buying process at a grocery store. If a wife sees an interesting ad in a newspaper, she has to note down that she plans to consume that product and ask her husband to buy it. He has to remember where he put the note before he next goes shopping, and then, after mastering all these barriers, he will be in the shop making his final buying decision. TOMA is necessary to bridge the gap from noticing the need to making the buying decision. The wider the gap the stronger the impact of the ad on TOMA needs to be to fulfil the intended top level position in the consumer’s relevant set. Thus, any alteration of that time spread will have impact on the role of TOMA and consequently on the business models of the whole advertising ecosystem.

Impact one of the IoT leads to a shortening or elimination of the time spread between noticing a certain need and making the buying decision. With ‘Amazon Fresh’, Amazon offers access to 500,000 grocery products and is from that perspective already the largest grocery store in the world. To bridge the physical and the virtual world, Amazon offers its clients the IoT device ‘Amazon Dash’. It allows scanning of the barcode of any grocery item and putting it automatically into the shopping basket of Amazon’s eShop. The Amazon Dash Button is a similar an IoT device. It is Wi-Fi connected and reorders your favourite item with the press of a button (Amazon 2016). Thus, the buying decision can be made immediately upon noticing a certain demand, e.g. after eating the last of the oatmeal in the kitchen. There is no longer a time span between noticing the need and putting the oatmeal into the shopping basket in the physical grocery store couple of days later. Due to that elimination of the time span there is no longer any space to build, influence, and use the relevant set by means of the traditional advertising ecosystem.
Similar developments can currently be witnessed in the health and fitness sector. The fitness tracker on the wrist recognizes alterations in heart frequency, the number of daily steps, walking distance covered, calories burned, or floors climbed. Linked with a nutrition app, recommendations for the daily training schedule together with alterations in nutrition and lifestyle are given. As a consequence, the time span to build, influence, and use the relevant set is shortened or again eliminated. Further examples are an embedded direct link to a personal coach instead of advertising for a certain fitness centre, the automatic generation of a shopping list for a recommended nutrition strategy instead of remembering certain brands in one’s relevant set or finally, the automatic replenishment of nutrition supplements instead of having to make additional buying decisions.

This first impact of the IoT is used for the same goal that has been pursued in the traditional advertising system for a long time: to increase customer retention. But the means are totally different. The traditional way is to raise the amount of advertising to boost top-of-mind and to increase switching costs by means such as long-time contracts or loyalty programs. On the other hand, the IoT melds the point of forming a certain want with making the actual buying decision.

4.2 Impact Two of the IoT: Not Only Humans but also the IoT’s Machine Algorithm have to be Influenced

A second basic assumption of the advertising ecosystem is that the relevant set of people should be influenced, leading directly to the intended brand awareness and buying decisions or acting indirectly by impacting on human influencers.
The IoT also affects that assumption. More and more, the starting point for any research for a certain buying decision is a generic search with a search engine. 71% of B2B purchasers begin their research with a generic search and more than half of the decision process is finished by the time a certain brand is contacted directly e.g. via its website (Snyder, Hilal 2015). To be highly ranked in the organic search results of search engines, especially by the market leader Google, is at least as relevant as being highly ranked in the person’s relevant set. To improve the ranking in Google’s relevant set is the main aim of the new market for search engine optimization (SEO) with a lot of specialized agencies. SEO is quite different from search engine marketing (SEM), the use of different marketing methods based on search engines like Google AdWords. As details about Google’s search algorithm are secret and often changed by Google, there is a kind of ‘SEO race’ between specialized agencies to obtain the best rankings within the organic search results for certain brands and products. Another strong impact on a person’s TOMA bypassing the traditional advertising system comes from recommendation engines. Based on algorithms such as collaborative filtering and profiling, the consumer gets recommendations for other products linked to his behaviour in the past and the interests of other consumers with similar profiles. The third area of strong influence by algorithms on people is user reviews. The algorithm collects, stores, categorizes, and filters people’s reviews and decides whether to offer them to consumers. Thus, user reviews are a kind of human-to-human influence but strongly intermediated and influenced by a machine algorithm. These three areas strongly cross link humans via machine algorithm. Specialised service providers like SEO agencies try to improve client’s top-of-mind position in a machine algorithm like Google with the main aim of influencing a client’s customers. That shows how important the move from traditional advertising to search engine optimization, recommendation engines, and the handling of user reviews is for a sustainable impact on a person’s TOMA.

Again, the health and fitness sector shows the impact of the IoT on the traditional advertising sector regarding the rivalry in influencing the relevant set. Whereas Nike+ is born with the main aim of increasing customer retention for an established big brand and heavy advertiser, Strava (2016) is coming directly from the IoT field, with no advertising history and no physical goods to sell. Thus, the following section shows this example to have, along with Nike+, both aspects of the IoT’s impact on the advertising sector: the traditional advertiser using more and more IoT technology and the IoT service provider becoming more and more an influencer of the advertising ecosystem. Strava is a leading social network for logging, analysing, and sharing running and bicycle data. It has more than 1.5 million active users. Its main innovation is to automatically
recognize certain parts of a route also logged by others (so called ‘segments’) and to compare their own performance data with those of others in the same segment. Strava acts as a platform to connect IoT devices with each other, as well as directly to runners and cyclists. Increasingly, Strava is also the main information point for this booming segment in tourism. As a consequence, it has become a competitor to traditional advertising methods for travel destinations such as brochures, online ads, tourism agencies, or recommendations given by the host. Each runner or rider can choose their travel destination and the route for a ride or run based on different criteria like weather conditions, elevation gain, road condition, or expected riding or running time. Additionally, Strava puts the user into a highly emotional environment without the traditional means of advertising such as movies, pictures, or advertising copy.

4.3 Impact Three of the IoT: A Machine Makes the Buying Decision

If the person no longer makes the buying decision but the IoT enabled device, raising TOMA does not concern the relevant set of a human being but that of a machine. From this perspective, unlike the other impacts, the IoT doesn’t influence the TOMA of a person, because this TOMA is no longer relevant. Instead, new forms for fitting into the relevant set of machines need to be developed, which are quite different from traditional advertising.

In the B2B sector, many grocery retailers have already implemented software that replenishes stock automatically (Myers et al. 2000). These solutions have been rolled out for many years and are implemented on a large scale. The main aim is to increase the availability of listed products on the shelf and to reduce procurement costs. Similar solutions for the B2C sector are still in an experimental phase. One example is LG’s smart fridge. It recognizes stored grocery by NFC chips or barcodes, makes proposals for recipes based on them, identifies a food’s expiration date, and makes replenishment decisions. The high potential of those IoT solutions reveals the estimate that more than 80% of all bought grocery is purchased just for replenishment. Another example with huge possible social impact – the main characteristic of a disruptive innovation – are self-driving cars like Google’s driverless car or Tesla’s electric cars, the latter already in regular use on public streets. Today, a lot of decisions by the car driver are made based on his relevant set. Examples are the selection of a certain route dependent on actual road conditions and the driver’s personal

2 Internal estimations of leading grocery chains.
preferences, stops at a certain gas station to fill up on gas and to buy groceries, visits to preferred restaurants, or the willingness to drive to a certain store to buy a special offer advertised in a flyer. The IoT devices make all those decisions in a driverless car autonomously. Thus, as in the case of automatic replenishment, the main aim should be to fit into the relevant set of those IoT enabled devices. As a consequence, product development may become the most important aspect of market communication, as more and more communication tasks are transferred from the marketing department to certain functions of IoT devices.

Those three impacts of the IoT on the advertising system shown above can lead to sustainable change in the advertising sector, mainly based on changes in basic assumptions and elements of current business models of its player. The following chapter will analyse which changes in business models can be expected or are already witnessed due to impact of the IoT on the information-disinformation relation of the players in the advertising ecosystem.

5 The Impact of the IoT on the Information-Disinformation Relation in the Advertising Ecosystem

The following section shows changes in the information-disinformation relationship between the main players in the advertising ecosystem caused by the IoT. For this purpose, we understand disinformation as intentionally false or inaccurate information that is spread deliberately. Under this term we summarize traditional propaganda techniques to obtain certain emotional reactions as well as disinformation used to manipulate the audience at the rational level by either discrediting conflicting information or supporting false conclusions. Disinformation is often generated by mixing some truth and observation with false conclusions and lies. Another technique is to hide facts when channels of information cannot be completely closed or to make them useless by filling them with disinformation (Stahl 2006).

Figure 3 illustrates the main information-disinformation flows in the advertising ecosystem together with changes due to the implementation of IoT devices. It shows that the impact of the IoT is much broader and stronger, as well as much more complex, than privacy concerns on the consumer side that have been emphasized in scientific and popular publications and discussions in the last few years (for this discussion see: Groopman 2015).
5.1 The Consumer-Media Relationship

The main information flow from traditional media to the consumer includes fact-based *information and entertainment*, sometimes inseparably mixed. The information flow in the other direction, from the consumer to the media, is twofold. Firstly, usage of the media and attention to its content determines media data such as reach or characteristics of the audiences and is the basis for the value of the media on the advertising market. The second information flow includes consumer’s personal preferences and behaviour, an information flow which strongly gained importance during the last years.

The use of media by IoT enabled devices, like smartwatches, tablets, or interactive TV, enables a much *more accurate measurement* of what content is used for what purposes at what time and at what location. As these devices are often very personal appliances, the mapping between its usage and a certain person can also be made. As a consequence, the media company has much

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**Figure 4:** The impact of the IoT on the information-disinformation relationship in the advertising ecosystem
more accurate information about real consumer behaviour than in the traditional advertisement world, with copy tests as a part of marketing research. At the same time, the advertisers as clients of the media can use those data without any manipulation in real time. This direct connection eliminates inherent failures of traditional measurement methods like certain kinds of bias linked to copy tests as well as giving the opportunity to manipulate data about consumer behaviour by holding back certain data or manipulating data to increase the value of the media in the advertising market. Thus, on the one hand IoT devices can deliver more accurate data than traditional audience research due to direct measurement of real audience behaviour instead of conducting surveys. On the other hand, this direct measurement also has embedded limitations, mostly due to the use of IP addresses as an identifier, such as the difference between visits, unique visitors, and unique clients. But these limitations are well known and transparent and a lot of effort is invested to overcome them by elaborate methods of user research based on the observation of their recorded footprints in the digital world. Of course, there is an immanent trade-off between user research and privacy issues.

This enhanced information about consumer preferences and behaviour allows the media a much more personalized offer of information and entertainment content. It can be delivered via awareness of consumer’s current location, the time of day, the device used, and personal preferences. This is possible with sophisticated customer insight techniques together with the option to divide digital data in small packages and reconfigure and distribute them as a function of consumer needs. Thus the greatly increased availability of information about the consumer gives media and advertisers a much better orientation on real customer needs and can also be used in conflict with consumer’s privacy concerns (for a discussion of the security and privacy issues linked to the IoT see: Federal Trade Commission 2015) (see chapter 3.2 on the legal and ethical aspects of collecting and using information about consumers).

### 5.2 The Consumer-Advertiser Relationship

The information flow from the consumer to the advertiser is mainly based on the consumer’s attitude, behaviour, and preferences in the form of brand awareness and buying of a certain product or service in relation to certain measures by the advertiser. Those measures include offering the consumer information on the benefits and competitive advantages of the product or service and creating emotional environments for the advertiser’s branding aims. The main source for disinformation for the customer is to build brand and product images that are far removed from the real product properties.
Using IoT enabled devices the advertiser can recognize highly emotional situations of the consumer without any time delay. Examples are fitness trackers carried by the user 24 hours a day. Collecting data like GPS-based location, heart rate, or more advanced brain activities, the advertiser can recognize and use activities of the consumer with highly emotional engagement in real time and can use them for his aims instead of creating new ones in the traditional way through art work, advertising copy, and stories. An example in the field of health and fitness are different performance awards granted immediately after a bike ride linked to the advertiser’s brand. Of course, due to the high proximity of any activity by the advertiser to the privacy of the consumer, much more orientation on real customer wants and needs is necessary before doing e.g. outdoor advertising. Context awareness can also be used to communicate the benefits of a product or service. For example, the smartwatch can propose a certain nutrition supplement linked to the morning run when the consumer enters a grocery store. Due to the increase in the advertiser’s information about the consumer’s actual context, he can strongly reduce the amount of inappropriate messages in regards to content as well as location and time where it is offered. On the other hand, while information from the advertiser may have more impact on consumer’s attitudes and actions, disinformation can also influence the consumer more directly and immediately – at least for a certain period in the relationship between the consumer and advertiser until the consumer recognizes it.

There is also a strong impact of IoT enabled devices on the information-disinformation balance in the information flow from the consumer to the advertiser. Firstly, the consumer’s willingness to unfold and share personal preferences is much higher when this is closely linked to an instant benefit in using the product rather than just filling out a questionnaire or giving an interview. Secondly, measurement of consumer’s real reaction to advertising measures regarding brand awareness and buying behaviour by tracking functionalities embedded in IoT enabled devices, allows for skipping any intended or unintended disinformation from traditional media or agencies.

5.3 The Media-Advertiser Relationship

The main function of media in this relationship is to offer advertisers access to their target audience. Access means to enable an information flow between the advertiser and the consumer to draw consumer’s attention and to generate information about his behaviour and preferences. From an ethical point of view not so desirable but nevertheless something necessary to establish is the relationship between coverage of the media about a certain advertiser and the
advertising buying behaviour of that advertiser. Consequently, the information flow between the media and the consumer is influenced by the behaviour of the advertiser. In the other direction, advertisers deliver information about their products and services in the form of ads and emotional content for branding aims, both of which are potentially valuable content for the media.

One of the most disruptive innovations in the world of digital is the ability of brands to own and control their own media or at least to have direct real-time access to media used by the consumer. If we look at the example of Nike+ given above, we see that the digital platform developed by Nike is huge with high reach, clearly directed at Nike’s target group and with very low wastage. The costs for designing, developing and using this platform are at least partly at the expense of advertising in the traditional media. As it is operated by the brand themselves, no disinformation about reach, target group, consumer behaviour and other performance information between media and the brand is possible, resulting in more accurate performance. On the other hand, if the brand owns the media, a relationship between content offered and the interests of the brand does not surprise the consumer. But there are some exceptions. A well-documented example is the car recommendation portal for an automotive company, which also proposes competitors’ cars if they best fulfil a certain consumer need. The aim is to build as high of a degree of consumer trust as traditional media try to do (Urban, Hauser 2004). The information flow from the advertiser to the media is no longer limited to content in the form of artwork or advertising copy but also includes features of the product and service to ad value on the media’s platform. An example is a feature to measure one’s own daily calorie consumption embedded in the content of the media with an application offered by the advertiser from the health and fitness sector.

5.4 The Media-Agency Relationship

The information flow from agencies to the media is twofold. Firstly, creative agencies develop advertising media and have to specify technical production data e.g. for printing. In the digital world, these data are much more complex due to a range of different devices and software used to consume the media. An example is an interactive banner ad where specifications for supported browsers, responsive design characteristics, or supported scripts for interactive features have to be agreed upon between the agency and the media. Secondly, media agencies have to specify format, placement and frequency, or in case of TV spots, the time of day to best reach their target group. In the reverse direction, from media to agency, there are important information flows before, during, and after the execution of a campaign. Before execution, the media inform the agency
about *media data* like circulation, reach, or characteristics of the audience. These data are relevant for the booking decision according to the media plan. During execution, data like *actual circulation, posted bills, or page impression* for a certain banner ad are communicated. After execution, data on campaign performance and user behaviour are very important for the agency.

The IoT alters the information between the media and the agency. Due to the high technical complexity of the IoT devices and their close integration with media platforms the information flow is *bidirectional* and more like an *agreement* between the media and the agency to obtain maximal performance rather than standards given by the media. The information on format, placement, or frequency can be changed by the agency during execution in real time instead of being tied to a contract before execution in the traditional advertising world. The consequence is an increasing risk of disinformation in the case of problems in execution such as the high loading time of banner ads or late or incorrect changes in format or placement. The impact of the IoT on information flow from the media to the agency is twofold. As a consequence, data from digital platforms, such as all media data and actual data of execution, performance, and consumer behaviour are measured and stored in *server repositories*, which can also be used directly by the agency in real time. Thus, the risk of disinformation due to the bias of participants in copy tests or of the media to obtain more value on the advertising market is reduced. The opportunity to obtain more accurate information on media data, actual execution, performance, and consumer behaviour is further strengthened in the case of *access to the consumer’s IoT devices* directly by the agency. If all server requests of the IoT device, for example storing a run on a smartwatch, is rerouted first to the agency and then forwarded on to the media’s platform, the agency can double check the information transferred by the media.

### 5.5 The Agency-Advertiser Relationship

The information flow from the advertiser to the agency mainly covers the *briefing*. This includes the creative brief based on brand values and corporate design as well as performance aims like brand image or an increase in sales. The information flow from agencies to advertisers is linked to *creative work* to obtain advertisers goals and to develop and implement an appropriate media plan. Another information flow from the agency to the advertiser that has strengthened in importance in the last few years is twofold. Firstly, information about the *performance* of the campaign closely related to business aims and secondly, *consumer data* on behaviour and preferences.
The information flow from the advertiser to the agency is altered in the IoT world. Due to the increasing complexity of advertised products and services as well as to the plurality of advertising media and other channels to reach the consumer, traditional campaign planning and execution can be rarely done by following the traditional process of brief/creative work/re-briefing.execution. Instead, agile project management with close cooperation between advertiser and agency, beginning with the development of a rough briefing and including all working steps is necessary. Thus, there is an ongoing information flow modifying the briefing during the whole campaign cycle, which requires a lot of changes in thinking and doing on behalf of all participants.

In the world of the IoT the creative agency’s work plays a less important role in the field of advertising copy and art design than in the area of functionalities of the IoT application. This requires deep knowledge about technical characteristics and standards of the IoT platform that acts as the media and offers access to the target audience. The owner and/or operator of the IoT platform has better information about the framework conditions for designing IoT applications than the creative agency and can offer its services directly to the advertiser. Often the platform is even operated directly by the brand and the agency’s work is limited or totally eliminated. Also the information flow starting from the media agencies is undermined by digital media in general and IoT platforms in particular. Due to the high market concentration of digital media, certain players like Google cannot be bypassed by media agencies. As a consequence, if a campaign uses media much less than in the traditional world, media planning and performance measurement can be done directly by the media or the advertiser themselves. This tendency is further enforced by the increasing ability of IoT devices to do the ‘advertising’ with their own embedded functionalities like viral dissemination of messages within their own peers. The capability to capture consumer data directly by advertiser-controlled devices and platforms makes data generated by the media and edited by agencies in the past increasingly just to a small part of the available consumer data. Thus advertisers will perform the business analytics work in-house more often or together with external specialists. This means that the media agency’s work is limited or carried out by others and any opportunities for disinformation are also eliminated due to the direct linkage between the media and the advertiser.

6 Conclusion and Further Research Work

The Internet of Things (IoT) has many of the characteristics of a disruptive innovation. It generates new markets and changes existing ones radically and, most
importantly; it has the same high social impact like mass production in the automotive industry or the spread of smartphones. In the past, new players entered the market with a fresh way of thinking and new business models and they became the driving force, as they utilized the disruptive innovation much better than the former market leader. Currently, we can already witness the consequences of the IoT in the field of health and fitness with the strong social impact of IoT devices such as smartphones, fitness trackers, or heart rate monitors. The impact of the IoT on the advertising ecosystem could be much more far-reaching and sustainable than currently discussed with a strong focus on consumer’s privacy in particular (see chapter 3.2 on the legal and ethical aspects of collecting and using information about consumers). Due to massive changes in the information-disinformation balance, traditional media, agencies, and brands have to change their business models and – much more challenging – their competencies and mind-sets.

The IoT’s impact is most obvious in established mechanisms to build \textit{top-of-mind awareness} (TOMA) and the relevant set as the basis for buying decisions. In particular, the current business models of traditional media and agencies are built around measures to increase TOMA for brands. Thus, a change of their linked mechanism hits these notably hard. IoT devices like the Amazon Dash Button enable the consumer to place an order immediately after recognizing the demand – shortening or eliminating the time span required to build and use TOMA. The human TOMA and the linked buying decision are increasingly influenced by the machine algorithms used in search engines. To compete in the ‘SEO race’, brands and their partners have to not only influence humans but also machines. If a machine makes decisions autonomously, like refrigerators with built-in self-replenishment functions or self-driving cars, the challenge is to optimize a machine’s TOMA.

Due to changes in the information-disinformation balance between consumer, traditional media, agencies, and brands, further impact of the IoT on the advertising ecosystem can be expected or is already witnessed. The operator of the IoT platform carries over former value propositions from traditional media like reach in the target group with low wastage. At the same time he offers services like performance measurement directly to the advertiser. An example is the use of Google Analytics to analyse the impact of campaigns directly by the brand/advertiser in real time. The consequence is a much stronger direct linkage between the IoT platform and the brand/advertiser, increasingly \textit{skipping creative and media agencies as well as traditional media}. Both not only suffer from a shifting advertising budget towards digital platforms but also from the fact that brands as former advertising clients will increasingly build and operate their own platforms which carry out the value propositions of traditional media,
among others, and can obtain more reach and less wastage than traditional media. In addition, the linkage between brands and consumers, enabled by IoT devices, is encouraged. This is not only obtained by strong digital platforms operated by the brand but also by communication features as part of the product/service as shown by Strava’s or Garmin’s IoT platforms. Thus, product development, especially specifying features, formerly a role of the traditional advertising system, could become the most important aspect of customer communication in the future.

One important further research aim is to foster empirical work on the topics presented in this paper. That could not only be done by using surveys as in the past but to a greater extent through observations utilizing the fact that consumers leave their footprints in the digital world automatically. Using this data, taking into consideration legal regulations of course, can provide many more insights into real consumer behaviour and demands. Identifying lead users or early adopters using means like social network analysis or Delphi studies with digital natives as experts will bring new insights into this very dynamic research field.

**Publication Bibliography**


