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# SITUATIONALIZATION, THE NEW ROAD TO ADAPTIVE DIGITAL-OUT-OF-HOME ADVERTISING

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## ABSTRACT

‘Digital out-of-home advertising’ (DOOHA) leverages digital screens to reach out to consumers at any time and anywhere in public space. While personalization – tailoring advertisements to an individual – has proven successful for advertising, this concept has its limitations. Particularly challenging are privacy concerns and negative perceptions caused by personalized advertisements. We propose situationalization – adapting advertisements based on the current situation – as a promising (additional) option. The suggested PERSIT matrix (PERsonalizationSITUationalization) structures the available adaptation strategies. It helps advertisers and system designers to make educated strategy decisions for adaptive DOOHA system designs.

## KEYWORDS

Digital Out-of-Home Advertising, marketing, situational advertising, personalization, situationalization, adaptation

## 1. INTRODUCTION

‘Digital out-of-home advertising’ (DOOHA) is a rapidly emerging marketing means that promises to leverage digital screens to reach out to consumers at any time and anywhere in physical space. It can be used to display advertisements to consumers who are in transit, waiting, or at commercial locations, such as a retail venue. Hardly any bus or train, airport, stadium or mall area is now without DOOHA. In contrast to other forms of advertising, DOOHA revenues are growing at an accelerating pace, having a projected growth of 19 percent for 2012 (BusinessWire, 2012).

Although advertisement spending has increased, advertising effectiveness has suffered dramatically in recent years. Consumers are overwhelmed by the quantity of advertising messages and it is getting more difficult to attract consumers’ attention (Pieters et al., 2002). As a result, marketing researchers seek new ways to increase the effectiveness of advertisements. Personalization mechanisms are a promising approach to break through the



information clutter in digital media. As digital media allows for the adaptation of content in real-time, advertising messages can be personalized (adapted and tailored to individuals) in real-time (Vesanen, 2007). On the Web, personalized advertising is widely used and praised for its effectiveness compared to traditional advertising (Adams, 2004, Kazienko and Adamski, 2007).

However, despite its benefits, personalization also has its limitations. For instance, consumers frequently feel that personalized advertising intrudes their privacy. As a consequence, they develop negative emotions towards the advertised product and/or company (Malheiros et al., 2012). Also, researchers postulate a trade-off between privacy and personalization (Lee and Ahn, 2011); thus an increase in required privacy (due to regulation or consumer pressure) will limit personalization options. When transferring personalization concepts to DOOHA, its limitations increase. For instance, the perceived privacy intrusion will likely rise, when personalized content is shown in public, where other people can watch it too.

We believe that the outlined pitfalls can only be avoided by taking a different perspective and propose *situationalization* as a viable way to avoid the challenges faced by personalization. We define situationalization as *delivering information that is relevant to an individual or a group of individuals in the present situation based on information about the current situation, which is retrieved, transformed, and/or deduced from information sources*. In contrast to personalization, situationalization eliminates the usage of personal data. Information about a situation is based entirely on physical context, that is non-personal aspects such as location, time, atmospherics and social environment (cf. Bauer and Spiekermann, 2011). In terms of communication psychology, situationalization creates communication that is adequate to the situation (Schulz von Thun et al., 2003). Personalization, on the other hand, is an orthogonal concept, which creates communication that fits a person. Ideally both requirements are met in order to ensure effective communication (Schulz von Thun et al., 2003). Since personalization faces stronger limitations in DOOHA settings, we suggest situationalization as a particular interesting advertising concept for this fast growing advertising vehicle. Still, we stress that personalization has its value for DOOHA settings – though only within a limited application scope.

The remainder of the article proceeds as follows: The next section reviews the conceptual foundations of DOOHA and adaptive advertising. In the third section we suggest the PERSIT matrix as a model of adaptation strategies for DOOHA. The matrix has been systematically developed based on guidance for building a design science theory (Gregor and Jones, 2007, Hevner et al., 2004). Design science research involves the creation and evaluation of information technology (IT) artifacts, constructs, models, methods, and instantiations, which can address IT problems. Our proposed artifact represents a novel model of adaptation strategies for digital advertising, particularly suitable for DOOHA. The fourth section discusses the application of the matrix. The fifth section, finally, discusses our contribution and concludes this paper.

## 2. CONCEPTUAL FOUNDATIONS

This section presents work on digital out-of-home advertising (DOOHA) and adaptive advertising. The critical reflection of the existing literature motivates our proposed situationalization approach and acts as the foundation of the proposed PERSIT matrix.

## 2.1 Digital Out-of-Home Advertising (DOOHA)

A myriad of descriptors have been used to term networks of displays in public space. When such displays are primarily used for advertising, we speak of digital out-of-home advertising (DOOHA). We define DOOHA as *digital screens in public spaces that can be controlled independently via a centralized network and that are mainly used for advertising purposes*.

As mentioned before, DOOHA is perceived as an important and promising marketing vehicle, growing at a high rate and making a significant contribution to the global economy. Yet, research exploring the effects of DOOHA is limited. Only a few academic (e.g., Burke, 2006, 2009, Dennis et al., 2010a, Dennis et al., 2010b) and commercial (e.g., Page, 2007, NEC Display Solutions, 2006) studies investigate the effects that DOOHA has on consumer behaviour. From a scientific viewpoint, research on DOOHA is insufficient by now (Bauer et al., 2011). There are no experiments that compare DOOHA to traditional advertising concerning advertising effects. Many studies argue on a very global, imprecise level. For instance, retailers such as the British supermarket chain Tesco or Spar in Germany report that using DOOHA at the point of sale increased sales by 25-60 percent (NEC Display Solutions, 2006, Page, 2007) without indicating any reasons for the observed sales increase. Moreover, some studies indicate positive effects of DOOHA (e.g., Burke, 2006, 2009, Dennis et al., 2010a, Dennis et al., 2010b), while other scholars report challenges and severe drawbacks such as consumers ignoring screens (Müller et al., 2009b) or getting annoyed by attention grabbing displays (Müller et al., 2009a).

## 2.2 Adaptive Advertising

Advertising on digital media promises improved advertising effectiveness compared to advertising on non-digital media. The anticipated increase in advertising effectiveness should originate from the ability to *adapt* advertising messages, thus being able to deliver more relevant and suitable advertisements (Adams, 2004). Adaptation is conceived as *dynamically changing advertising messages on digital media based on information that is sourced from the targeted consumer or the situation shared by the advertising system and the consumer*. Hence, adaptation of advertisements on digital media promises to break through the information clutter, which is created by an overwhelming quantity of advertisements (Ha and McCann 2008) and challenges to attract consumer's attention (Pieters et al., 2002).

Existing adaptation techniques, which deal with placing the 'right' advertisements, can be best described as person-centric adaptation (better known as 'personalization'), because they target an individual and rely on personal data. Many scholars refer to personalization as the tailoring of products, services or content to consumer needs, goals, knowledge, interests or other characteristics (Zimmermann et al., 2005).

On the Web, personalization methods are already very advanced, making use of a wide range of approaches (e.g., Riemer and Brüggemann, 2007, Adomavicius and Tuzhilin, 2005). Personalization is typically based on user information (Adomavicius and Tuzhilin, 2005) such

as identity, demographics, lifestyle, specified preferences, past purchases, or historical visit patterns (cf. Kim, 2002). It has proven effective in increasing the level of attention (Malheiros et al., 2012) and perceived usefulness of information (Tam and Ho, 2006).

Besides personalization, research in psychology and marketing has long acknowledged the influence that the *current situation* has on the human processing of information (cf. Mehrabian and Russell, 1974). Studies have shown for TV (De Pelsmacker et al., 2002), print (Dahlén, 2005, Moorman et al., 2002), sponsorship (Fleck and Quester, 2007), and product placement (Balasubramanian et al., 2006) that ‘editorial context’ (content that surrounds an advertisement) highly impacts how advertising affects its audience. All these approaches have in common that they anticipate a specific advertising-situation and select the advertisement way before consumers are exposed to it.

Digital media enable the real-time adaptation of ads, supported or automated by information systems. Indeed, information systems that are aware of their context can adapt to it have already been described (Dey and Abowd, 1999). Yet, little research exists on information systems that dynamically adapt advertisements to the situation on DOOHA (e.g., Kazienko and Adamski, 2007, Di Ferdinando et al., 2009, Rosi et al., 2010). This is surprising since several researchers emphasize the importance of situational context in this setting. For instance, Silberer (2010) indicates that the advertising effects largely depend on the display’s environment. Also Telschow and Loose (2008) state that advertisements that are directly related to the current purchasing situation are better remembered. However, if there is adaptation to the situation, it is generally not considered an independent form of adaptation, but is merely considered as a complement of personalization (Zimmermann et al., 2005).

### 3. THE PERSIT MATRIX AND ITS CONSTRUCTS

In this section, we introduce the PERSIT matrix. PERSIT abbreviates the two dimensions of adaptation: ‘PERsonalization and SITuationalization’.

The design of an artefact, such as the PERSIT matrix, is an inherently iterative search process that follows a continuous cycle of generating design alternatives and testing their utility (Hevner et al., 2004). Our approach to generating and testing the PERSIT matrix combines the informed argument method and group reflection phases. Both were performed iteratively throughout the design process. To ensure continuity, we based the PERSIT matrix on the existing conceptualizations of adaptive advertising. We critically analyzed concepts and ideas in analytical group reflection sessions. We then used input from these sessions to generate an improved model. For instance, the importance of distinguishing between 1:1 personalization and 1:n personalization came up in a group reflection with DOOHA experts. Further group reflection after each generate/test cycle helped to converge design alternatives into a coherent design. Each cycle contributed considerably to the advancement of the artifact, leading to the final model as presented in this section.

The PERSIT matrix provides a systematic overview of available adaptation strategies for DOOHA. It proposes a structured approach to apply adaptation strategies to achieve coherence in communication. Communication theory states that communication has two important anchors of reference, the person and the situation (Schulz von Thun et al., 2003). Effective communication strives to be coherent with both.

The PERSIT matrix (Table 1) presents personalization on the vertical axis and situationalization on the horizontal axis. Combining these two constructs leads to six possible adaptation strategies. All of these strategies inherit the advantages and challenges associated with personalization and/or situationalization. Because every strategy implies the use of different information sources, different hard- and software will be required thus leading to DOOHA systems of different technical complexity and cost structure.

Table 1 PERSIT Matrix with Adaptation Strategies

		Situationalization	
		no	yes
Personalization	no	(I) no adaptation	(IV) adaptation to a specific situation
	1:1	(II) adaptation to a specific individual	(V) adaptation to a specific individual and to a specific situation
	1:n	(III) adaptation to a group of individuals	(VI) adaptation to a group of individuals and to a specific situation

### 3.1 Personalization

*“Personalization is the use of technology and consumer information to tailor electronic commerce interactions between a business and each individual consumer. Using information either previously obtained or provided in real-time about the consumer, the exchange between the parties is altered to fit that consumer’s stated needs as well as needs perceived by the business based on the available consumer information.”* (Vesanen, 2007).

Personalization literature only implicitly differentiates between adaptation for a specific individual (1:1 personalization) and a group of individuals (1:n personalization). However, we emphasize that for the design of adaptive DOOHA this distinction is crucial. It makes a difference if communication is tailored to an individual, or if this communication has to address several people at once. When a system personalizes for an individual, it must consider only characteristics of that individual. Whereas, when a system personalizes for a group, it must categorize individuals according to characteristics that the individuals share (Kim, 2002). In a nutshell, both options require different kinds of identification and approaches to analyse characteristics.

The main advantages of personalization are increased advertising effectiveness (e.g. improved memory or improved attitude towards the brand) (Adolphs and Winkelmann, 2010), increased perceived usefulness of information (Tam and Ho, 2006), and increased attention towards the ad (Malheiros et al., 2012). Personalization is also well suited for any situation where just one consumer views an advertisement (1:1). Furthermore, personalization techniques are based on established technologies and have been studied and optimized for years (Adams, 2004, Kazienko and Adamski, 2007).

However, recent research pinpoints the limitations of personalization: Firstly, person-centric adaptation is not possible in all situations, and secondly, its benefits are limited by a

phenomenon referred to as ‘personalization reactance’. The first implication is based on the concept of a personalization-privacy tradeoff (Lee and Ahn, 2011). An increase in required privacy (or decrease in available personal data) reduces personalization options. The second implication – personalization reactance – describes a phenomenon, where consumers feel that personalized advertising intrudes their privacy and start to develop negative emotions towards the advertised product and/or company (Malheiros et al., 2012, Tucker, 2012). We expect that personalization reactance will be particularly high when personalized advertisements are shown on public displays, because sensitive information is potentially disclosed to nearby people.

Additionally, the *advertising situation* of DOOHA differs from the one on the Web. On the Web a single user typically browses a website on his or her PC or mobile phone. In contrast, DOOHA is encountered in public space, where several people can see an advertisement concurrently. Therefore, personalization needs to be able to consider several people at once, for example by personalizing for the closest consumer or by using characteristics that is shared between these people.

## 3.2 Situationalization

Instead of basing adaptation efforts on personal data, situationalization draws on information from the environment that is not related to an individual. It provides a way to harness the various effects described by psychological and marketing research, referring to the relation between an advertisement and its ‘editorial context’ (Moorman et al., 2002) or the environment (Mehrabian and Russell, 1974).

We define situationalization as *delivering information that is relevant to an individual or a group of individuals in the present situation based on information about the current situation, which is retrieved, transformed, and/or deduced from information sources*. An example application of situationalization is advertising ear protection in loud environments. The relevance of the advertisement is enhanced through the situation, regardless of the characteristics (e.g., age, gender, preferences) of the beholders. According to communication psychology, this situationalized advertisement better corresponds with the definition of a communication that is adequate in a particular situation (Schulz von Thun et al., 2003).

The main benefit of situationalization is that it resolves the main challenges encountered by personalization. As no adaption to a person appears, personalization reactance is avoided. Also no personal data is required, counteracting a privacy trade-off (Lee and Ahn, 2011). Situationalization is well suited for a DOOHA environment, as the number and type of beholders do not matter. Research revealed that perceived thematic closeness between advertisements and the TV program enhances recall (De Pelsmacker et al., 2002) and the perception of relevance between an ad and its medium leads to more positive attitudes (Dahlén, 2005).

However, there are conceptual and technical challenges when applying this concept to DOOHA. For instance it is not clear yet how situations (context) can be best conceptualized and which parameters to choose for adapting advertisements (Bauer and Spiekermann, 2011). Existing research mainly focuses on rather ‘obvious’ parameters such as time, place or weather.

Consequently the empirical implications of situationalized advertisements are not clear. Technical challenges include the deployment of required sensor infrastructures, as well as the lack of algorithms being capable to match advertisement content to situations.

### **3.3 Distinguishing Personalization from Situationalization**

As mentioned above, the constructs of personalization and situationalization are orthogonal. According to communication psychology, effective communication fits to the involved person and is adequate for the respective situation (Schulz von Thun et al., 2003). Likewise personalization aims to fit an ad to the person, while situationalization aims to make an ad adequate to the situation. Ideally both dimensions are regarded, however, in case that one option is not available (e.g. privacy concerns) the other option can still be used to optimize communication.

The major differences between personalization and situationalization are the target entity and data used for the adaptation. Personalization targets a defined person (or group of people). In contrast, situationalization does not target an individual but aims to make a message adequate to the entire population in a given situation. Hence personalization relies on person-related data (data that preserves meaning only if being related to a person or group of people), but situationalization relies on situation-related data (data that preserves meaning if being related to a situation, but does not need to be related to a person). These differences are orthogonal, which means that it is possible to optimize ads for a defined person as well as the general population and to use data sources that are related to a situation as well as to an individual.

For instance, imagine advertisements on an online search engine. Traditionally ads are selected based on the keywords entered. This is personalization because the ads are only relevant for the person who is searching (targeted to this individual) and also the search terms are only relevant and meaningful to this person. If these ads would be shown to any other person, they would very likely not being relevant. However, in case the search interface presents searchers with an ad based on the time and location of the searcher (e.g. using the most likely language and greeting form that can be expected for these parameters), this ad would likely be meaningful to any other person being at the same place and time. In this case, we speak of situationalization. Of course both concepts can be combined. For example searching for 'bank' could mean a financial institution or an object to sit down on. Ads could be selected based on personal information (e.g. previous searches, the job, preferences) and/or situational information (e.g. more likely to look for a place to sit during day, at sunshine and when walking in a park).

## **4. APPLICATION OF THE PERSIT MATRIX**

In the following, we demonstrate how the PERSIT matrix benefits practitioners in the development of a DOOHA system. A manufacturer for ear protection decides to advertise its products by using DOOHA. The company wants to use innovative technology and advertising concepts. A task force is created to work out a DOOHA strategy and implementation roadmap. By consulting the PERSIT matrix, the team learns about the six possible adaptation strategies

and decides to use the matrix to structure their decision process. It runs through the matrix and develops usage scenarios for each matrix area (see Table 2).

So far the team has only been aware of personalization, which they already use on the company’s web store. RFID tags, which are embedded in all of the company’s products, could be used to identify past customers. However, the team knows that such practices have been met with serious opposition in the past and are legally at the edge. Furthermore, the team has learned from marketing research that people are more willing to buy ear protection when they are exposed to loud noise (e.g., in clubs or at construction sites). As a result, the team comes up with the idea to customize their ear protection advertisements based on the level of noise that surrounds the screen; different noise levels will trigger the display of ads for different ear protection products. Consequently, an ad could be triggered when the noise level exceeds a certain threshold-level or increases at a certain rate. The resulting PERSIT matrix, including extracts of the usage scenarios, is depicted in Table 2.

A technical feasibility study confirms that all options could be implemented. Technology is available to identify individuals based on the RFID chips embedded in the products; microphones, which are deployed with the screens, can capture noise levels. However, the 1:n personalization strategies (III, VI) must be excluded because of regulatory restrictions in many European countries. Likewise, the legal due diligence leads to the exclusion of the 1:1 personalization strategies (II, V) due to privacy constraints and company policies concerning the usage of customer data. As a result, the team decides to adopt a situationalization-only strategy (IV), as it is more targeted than no adaptation (I).

Table. 2 Applied PERSIT Matrix with Application Scenarios

		Situationalization	
		no	yes
Personalization	no	<p><b>(I) no adaptation</b> e.g. just displaying the ads, without any adaptation. Cheapest and least complex approach, however not targeted enough.</p>	<p><b>(IV) adaptation to a specific situation</b> e.g. using noise level – display the ad when a certain noise level is exceeded</p>
	1:1	<p><b>(II) adaptation to a specific individual</b> e.g. using data from web store combined with mobile phones or RFID tags embedded in products. Identification of past customers (promote new products, cross selling) or presentation of target group specific products (teen, adult, retiree)</p>	<p><b>(V) adaptation to a specific individual in a specific situation</b> e.g. ID of customer and display of product ad depending on the noise level (very low – very high)</p>



		<b>(III) adaptation to a group of individuals</b> e.g. determination of average age and gender of viewers via video camera – display of suitable product category	<b>(VI) adaptation to a group of individuals in a specific situation</b> e.g. determination of average age and gender and display of advertisement depending on this information and the noise level
	<b>1:n</b>		

Summing up, the PERSIT matrix helped the team to (1) consider all possible adaptation strategies, (2) generate new ideas to increase advertisement relevance (based on noise levels), (3) structure their decision process (feasibility and due diligence) and (4) enhance communication between technical and marketing experts.

## 5. CONCLUSION AND DISCUSSION

Real-time adaptation of DOOHA systems is a promising way to enhance the relevance and impact of advertisements. We propose situationalization as a viable alternative and orthogonal concept to personalization. The PERSIT matrix structures the available adaptation strategies for DOOHA alongside the dimensions of situationalization and personalization. This allows considering the various adaptation opportunities systematically to select a feasible adaptation strategy (regarding regulatory, time and cost constraints). As shown in our application example, the PERSIT matrix helps marketing decision makers and system designers to envision, design and articulate implementable and adaptable DOOHA systems, especially making use of the possibilities offered by situationalization. The matrix allows its users to consider personalization and situationalization options at an early stage of the requirement definition process. The matrix also supports the systematic evaluation of approaches, which can result in the exclusion of certain strategies based on economic, social, or regulatory (e.g., privacy) constraints.

A limitation of our work is a missing large-scale evaluation of the PERSIT matrix. Field experiments should be performed, demonstrating which of the six adaptation strategies outperform the others in given advertising settings. In addition, we encourage researchers to apply the PERSIT matrix also to other settings than DOOHA and evaluate whether it may be applicable in those settings as well. Due to missing empirical work on advertising effects on DOOHA, currently the PERSIT matrix cannot provide detailed recommendations on advertising effects or system designs.

However, as the PERSIT matrix provides a level of abstraction that both business people and system designers can understand, it facilitates the communication between these groups. Advertisers can relate to the strategic options that the matrix offers them to create coherent advertising messages. The PERSIT matrix also facilitates their creativity and allows considering other, non-personal, adaptation variables that suit the advertised product or service. Correspondingly, system designers can use the matrix to present technological opportunities, without the need to explain technical details. When combining the identified strategy with the desired adaptation variables such as location, noise or weather (as specified by the advertisers),

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system designers can translate this information into specific technical designs and requirements.

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