Personas and user-centered design: How can personas benefit product design processes?

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This paper investigates personas, an alternative method for representing and communicating customer needs. By using a narrative, picture, and name, a persona provides product designers with a vivid representation of the design target. Numerous benefits of incorporating personas into product design approaches have been suggested, but the present literature fails to identify the most significant and universal advantages of persona use. By incorporating expert opinion through the use of Delphi methodology, this research first examines the benefits of incorporating personas into design processes. After gaining consensus on the perceived importance of the individual benefits, this paper then elaborates on the most significant benefits of persona use and needed future research on the personas method.

Keywords: personas, design processes, design methodology, research methods

The product design practice has made significant strides in facilitating the development of products that satisfy individual needs and are easy to use. Since the popularization of user-centered design (UCD), the usability of web sites, systems, and many products has improved (Vredenburg, Mao, Smith, & Carey, 2002). User-centered design, also commonly referred to as human-centered design and customer-centered design, represents a general philosophy toward design that brings the users or consumers into the design process (Veryzer & Borja de Mozota, 2005; Vredenburg et al., 2002).

However, the widespread acceptance of user-centered principles has not eliminated frustration with the design of modern products. While preaching the importance of practicing user-centered concepts, many organizations fail to consider the consumer needs as the focal point of their design processes (Gulliksen et al., 2003). As a result, many design processes are still not reaching their target, the consumers or users of the product (Dahl, Chattopadhyay, & Gorn, 1999; Pruitt & Adlin, 2006; Schaffer, 2004). The well-documented usability

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issues of web sites, systems, and products provide further anecdotal evidence that today's product design processes still require improvements (e.g., Kalin, 1999; Nielsen & Norman, 2000; den Ouden, 2006; Temkin & Hult, 2005). For example, den Ouden (2006) found that as many as half of product returns are caused by product complexity and customers' inability to use the desired features.

Personas, the central topic of this research, potentially can help address some of the issues with current user-centered approaches. Personas are 'fictitious, specific, concrete representations of target users' (Pruitt & Adlin, 2006: p 11). A persona represents an aggregate of target users who share common behavioral characteristics (i.e., is a hypothetical archetype of real users) (Pruitt & Adlin, 2006). Since their introduction by Cooper (1999), personas have been integrated into the design processes of prominent firms such as Discover Financial Services, SAP, and FedEx (Manning, Temkin, & Belanger, 2003). The anecdotal evidence from practice suggests that persona use can facilitate useful and usable designs (e.g., Cooper, 1999; Cooper & Reimann, 2002; Grudin & Pruitt, 2002; Leggett & Bilda, 2008). For example, personas aided design efforts of the MSN Explorer application at Microsoft (Pruitt & Grudin, 2003) and Sony's personal entertainment system for airplane passengers (Cooper, 1999). Floyd, Jones, and Twidale (2004) provide a thorough review of personas literature and the characteristics of personas.

Even though personas have received some attention in the literature, they lack solid empirical grounding and a rigorous and thorough examination of the personas method is still lacking (Chapman & Milham, 2006). In this study, the Delphi method is used to examine personas and to provide a stronger foundation for future research on personas. Fields such as information systems (e.g., Brancheau & Wetherbe, 1997), education (e.g., Raskin, 1994), medicine (e.g., Fleuren, Wiefferink, & Paulussen, 2004), operations management (e.g., Malhotra, Stelle, & Grover, 1994), and product design (Denton, 1997), have used the Delphi methodology to lay a foundation for and spur new research. The Delphi method is a group process used to seek, aggregate, and gain consensus on the opinions of a group of panelists (Schmidt, 1997).

By seeking opinions from individuals with extensive experiences with personas, this research first identifies and gains consensus on the importance of specific benefits of utilizing personas as part of user-centered design. After the panelists reach consensus, the implications of the most significant benefits are elaborated upon. The findings also provide a starting point for further empirical examination of the effectiveness of personas and the processes through which they influence product designers.

1 *Introducing personas*

Personas are abstractions of groups of real consumers who share common characteristics and needs (Pruitt & Adlin, 2006). A persona is represented through

a fictional individual, who in turn represents a group of real consumers with similar characteristics (Pruitt & Adlin, 2006; Turner & Turner, 2010). Even though a persona is not a real person, a name and a picture are selected to represent the fictional representative. Second, a persona is described in narrative form. This narrative has two goals: (1) to make the persona seem like a real person, and (2) to provide a vivid story concerning the needs of the persona in the context of the product being designed. The narrative of a persona starts with a description of the type of individual that the persona is, likes and dislikes, occupation, and so forth. This part of the narrative brings the persona to life (Cooper, 1999; Grudin & Pruitt, 2002). Then, the persona's specific needs and personal goals in the context of the product being designed are described. This segment of the narrative helps to inform the resulting design decisions (Manning et al., 2003; Pruitt & Adlin, 2006). These are the same needs that one would find in a standard requirements document but are now written in the context of the narrative describing a specific persona.

1.1 *Proposed benefits of personas*

A primary focus of previous accounts of persona use has been on the perceived benefits of incorporating personas into design processes. The proposed benefits of personas, as compared to other approaches of communicating user information, are summarized in Table 1. One of the widely described benefits in literature is improved communication about the target users within the design team and with other stakeholders (Cooper, 1999; Cooper & Reimann, 2002; Grudin & Pruitt, 2002; Ma & LeRouge, 2007). Also, persona use has been commonly linked to an increased focus on the needs of the target users (Cooper, 1999; Grudin & Pruitt, 2002; Long, 2009; Ma & LeRouge, 2007; Pruitt & Adlin, 2006). However, diverging opinions also exist concerning the primary benefits of personas. For example, persona use has been suggested as beneficial to guiding product-related efforts such as marketing campaigns (Cooper & Reimann, 2002), the extrapolation of the information from the persona to diverse situations (Grudin & Pruitt, 2002), enhancing identification with the users (Ma & LeRouge, 2007), and a reduction of changes at the end of the product development process (Cooper, 1999).

As evidenced by Table 1, the present literature on personas fails to reach consensus on the significant and universal benefits of incorporating personas into design processes. The wide variety of claims provides a convoluted picture of personas and make personas seem like a universal fix to issues within the product design process and related efforts. Additionally, the cited accounts of persona use have reported specific benefits based on first-hand experiences with personas or the interpretation of the experiences of others. In this study, we seek to substantiate those claims by using a panel of experts. The Delphi method is predicated on the rationale that 'two heads are better than one' (Dalkey, 1972: p. 15). While the perspectives might not generalize to all contexts, the collective opinion of a Delphi panel is more representative than of

Table 1 Benefits of persona use suggested in literature

Source	*Specified benefits*
Cooper (1999)	- Increase focus on the users and their goals - Facilitate effective communication about users - Reduce necessary changes at the end of the development process
Cooper and Reimann (2002)	- Build consensus and commitment to design - Help to measure a design's effectiveness - Define the product's feature set - Facilitate effective communication within the project team - Help other related efforts such as marketing plans
Grudin and Pruitt (2002)	- Facilitate a focus on users and work contexts - Allow for extrapolation from partial knowledge of users to diverse contexts - Make assumptions about users explicit - Facilitate effective communication about the users - Increase focus on a specific audience
Long (2009)	- Strengthen focus on the users during the development process - Lead to more user-friendly designs - Make the user needs more explicit - Guide decision making
Ma and LeRouge (2007)	- Facilitate effective communication about the users - Enhance identification with the target users - Increase focus on user needs
Pruitt and Adlin (2006)	- Make assumptions about users explicit - Narrow the users being designed for - Lead to better design decisions - Increase engagement among the design team - Build empathy for the users

a single individual (Linstone & Turoff, 1975). As a result, an application of the methodology with a panel of persona experts allows us to make more conclusive statements concerning how personas most benefit design processes.

Further, the consolidated and validated list of benefits provides a stronger foundation for more focused follow-up research. As been claimed by others (e.g., Cooper and Reimann, 2002; Floyd et al., 2004), personas have been reported to 'work' – they help bring about superior design outcomes. However, a key question remains: 'If personas are effective, then *how* do they work?' Groups of identified benefits can help build an understanding of the mechanisms through which personas influence individual designers and product design teams.

2 *Delphi methodology*

The Delphi methodology is a group process that was originally developed by the RAND Corporation in the late 1950s (Linstone & Turoff, 1975; Okoli & Pawlowski, 2004). The Delphi process is characterized by anonymity, iteration, feedback, and the aggregation of group responses (Rowe & Wright, 1999). In multiple rounds or stages, the panelists submit their responses without the knowledge of the identity of the other individuals. This anonymity helps to overcome a serious issue with other group processes that seek consensus – the influence of dominant individuals (Dalkey, 1972).

The method has been used in over 460 studies in a variety of fields (Gupta & Clarke, 1996). The methodology has been primarily applied in two specific areas: (1) forecasting and issue identification/prioritization, and (2) conceptual framework development (Okoli & Pawlowski, 2004). The method is particularly useful when applied to research topics that lack a strong empirical foundation and that could benefit from the opinion of experts (Okoli & Pawlowski, 2004).

There are many variations in the application of the Delphi method. In this research, a variation called the ranking-type Delphi study was selected. The ranking-type approach was chosen because it attempts to overcome the limitations of previous applications of the Delphi methodology such as a lack of an appropriate measure of consensus (Okoli & Pawlowski, 2004; Schmidt, 1997).

The framework developed by Schmidt (1997) and later refined by Okoli and Pawlowski (2004) provides a rigorous, step-wise variation of the Delphi process. In the first phase of the ranking-type approach, brainstorming, a consolidated and validated list of items is gathered from the panelists. In the second phase, narrowing-down, the list of items is reduced to a manageable size. In the third phase, ranking, the list of items is ranked iteratively until consensus is reached.

One of the goals of this study is to develop a list of persona benefits and to order the list with regard to importance. An appropriate source for this information is a product design expert with extensive experiences with personas in the field. However, an expert working at a specific organization is unlikely to possess experiences in the variety situations where personas can be employed. A wider scope of individuals is needed. The Delphi process provides us the facility for capturing and reaching consensus on the opinions of a group of experts.

2.1 Expert selection and panel composition

As suggested by Okoli and Pawlowski (2004), this research used the procedure proposed by Delbecq, Van de Ven, and Gustafson (1975) for the selection of the most qualified experts. Through the creation of the Knowledge Resource Nomination Worksheet (KRNW), this procedure first attempts to identify the broadest classes of possible experts. In this study, the three classes were (1) organizations or associations such as the Usability Professional Association, (2) companies such as Cooper Interactive and Microsoft, and (3) relevant literature such as the Proceedings of the Participatory Design Conference. The KRNW then was populated with names of 38 possible experts. Next, each of the individuals was contacted and directed to the study's website for information about the study and the Delphi methodology. The contacted persons also were asked to nominate any additional individuals who have used personas extensively. Finally, the individuals were directed to an online registration form, where demographic information and specific qualifications were collected. This information was the basis for panel selection.

Table 2 summarizes the qualifications of the 19 experts that were selected as panelists. Due to the strong qualifications of each of the experts, one more panelist than the recommended panel size of 10–18 suggested in Delphi literature was included (Okoli & Pawlowski, 2004). In case that attrition normally encountered with the Delphi approach occurred (Witkin & Altschuld, 1995), the larger panel size also provided an additional buffer.

A majority of the selected experts worked at small companies with less than 50 employees, and they possessed senior roles at their organization such as president and principal. The median number of years that the panelists worked with personas was at least five years. This qualification was particularly significant because personas have only been in use for about seven years at the time of this study. Also, a majority of the panelists had not only used personas, but also created personas for eight or more projects.

Table 2 Qualification of the selected experts

	Years of experience				
	<1 year	*1–2 years*	*3–4 years*	*≥5 years*	
# of years worked with personas	0	0	4	15	
	Persona qualification ranges				
	None	*1 to 2*	*3 to 4*	*5 to 7*	*8+*
# of design projects used personas	0	0	1	2	16
# of design projects for which created personas	0	0	2	4	13
# of articles, case studies, books, and papers written on personas	5	6	3	3	2
# of tutorials, seminars, and classes taught about personas	2	4	3	2	8
# of presentations given about personas	0	1	2	1	15
	Company size				
	1–49	*50–999*	*1000–4999*	*5000+*	
# of experts working for a company with a specific number of employees	12	2	2	3	
	Position/Role				
	President/CTO	*Director/VP*	*Principal*	*Strategist*	*Designer/ Sr. designer*
# of experts with a specific position/role	2	6	8	1	2

The remaining criteria show that a significant number of panelists had experiences teaching, giving presentations, and writing about personas. Based on these qualifications, the selected individuals were clearly persona experts.

2.2 Data collection and analysis method

Data were collected electronically from the selected panelists using a customized online application. Paper-based Delphi studies traditionally have suffered from long turnaround times. By conducting the study online, the data collection time was decreased to eight weeks.

Phase 1 of the study consisted of two questionnaires. In the first questionnaire, the panelists were asked to name and define at least six benefits of personas. The researchers then consolidated the submissions. In the second questionnaire, the panelists were asked to validate the consolidated list. According to Schmidt (1997: p. 769), without this second questionnaire 'there is no basis to claim that a valid, consolidated list has been produced.' The panelists were asked to comment on the individual items, to validate that duplicate items did not exist, and to suggest any additional benefits of personas.

Phase 2 of the ranking-type approach narrows down the consolidated list of items to a manageable size. The target size for a list should be no more than 20 to 23 items (Okoli & Pawlowski, 2004). After the first phase of this study, the consolidated list consisted of 22 items, which was within the bounds of a manageable number of items. Therefore, the study continued directly to the third phase for ranking.

Phase 3 iterated through multiple rounds of questionnaires in which the panelists were asked to rank and re-rank the benefits according to their importance. The item that was judged to be the most significant was ranked first, the item that was judged as second most important was ranked second, and so on. In the first round, the panelists were asked to uniquely rank each benefit and provide a short justification for their rankings. In the following rounds, the panelists also were provided with (1) their previous rankings, (2) the mean rankings of the group, (3) a summary of the justifications provided by others for their rankings, and (4) an indication of the level of consensus among the experts.

As suggested by Schmidt (1997), the consensus among the rankings was measured using Kendall's W. A value of zero indicates no consensus, whereas a Kendall's W value of one indicates perfect consensus. The third phase continued until one of the following conditions was met: (1) strong consensus was achieved as indicated by a Kendall's W of at least 0.70, (2) the mean rankings

did not significantly change between two questionnaires, or (3) the feasibility of another round became an issue (Schmidt, 1997).

3 Results

During the first phase of the study, the panelists generated a consolidated and validated list of persona benefits. As described above, the individual benefits were gathered from each of the panelists during the first round. The researchers consolidated the list of benefits, and this list was verified with the participants who could suggest changes in wording, deletion of items, and addition to the final list. Table 3 presents the names and the definitions of the final 22 benefits of persona use.

As previously explained, this study proceeded directly to the third phase for ranking. In the first round of this phase, the panelists were only asked to rank the relative importance of each of the 22 items (i.e., each benefit received a ranking from 1 to 22). In subsequent rounds, the participants also received the rankings of the group, a summary of the justifications for the importance of individual items, and an indication of the overall level of consensus. The additional information concerning the group's responses is intended to drive the panel toward consensus on the relative rankings of the items.

The first round of the third phase resulted in a Kendall's W of 0.42 signifying weak consensus (Schmidt, 1997). As expected, this result showed that persona experts initially had diverging views of how personas are most beneficial. The second round increased Kendall's W value from a weak consensus to a moderate consensus level of 0.52. In the third round, Kendall's W value only increased to 0.56, again signifying moderate consensus. At this point, it was decided not to continue the Delphi study because the panelists only made minor adjustments to their rankings (the 2nd stopping rule). A moderate level of consensus already was reached, which warranted a fair degree of confidence in the final rankings (Schmidt, 1997). Other Delphi studies also have stopped when moderate consensus has been achieved (e.g., Brancheau & Wetherbe, 1997). Achieving moderate consensus was encouraging due to the diverging ways that personas are used in practice, and the strong opinions expressed by the experts in this study when justifying their rankings. Additionally, the panelists started expressing frustration with the length of the ranking phase, and many were not willing to continue with another ranking round (3rd stopping rule). The results of the three rounds of the ranking phase are summarized in Table 4.

4 Discussion

The results of our Delphi study have several significant implications. First, we attempted to address the basic question of 'what do the experts think about personas'. Our work attempts to go beyond the anecdotal beliefs and provide some substantiation for the benefits of personas. The listing of the individual benefits also provides a checklist of ways that personas

Table 3 The names and definitions of the identified benefits of personas

#	*Benefit name*	*Benefit description*
1	Audience focus	Focus product development on users/customers and their goals (rather than the specific limitations or opportunities presented by technology)
2	Product requirements prioritization	Prioritize product requirements and help to determine if the right problems are being solved
3	Audience prioritization	Prioritize audiences and bring about a focus on the most important audience(s)
4	Challenge assumptions	Bring to the surface and challenge long-standing (and often incorrect) organizational assumptions about the users/customers
5	Prevention of self-referential design	Help individuals realize how the users/customers are different from themselves
6	Decision guide	Are the basis for product design decisions by providing a clear picture of customer needs, and the context/environment for these needs
7	Agreement catalyst	Aid in achieving agreement on product definition decisions by clarifying the user/customer goals to varied stakeholders and interests
8	Engagement and unification	Engage, unify, and educate individuals who are not close to the users or the user research (such as potential investors, product marketers, or engineers) by creating a clear picture of the product or service
9	Empathy creation	Create an understanding of and emotional identification with the users/customers
10	Innovative thinking	Stimulate innovative thinking that produces new and better solutions that meet the user goals
11	Team collaboration	Foster collaboration among team members from different disciplines through a clear understanding of the customers/users
12	Communication aid	Through the shared knowledge of an archetype, assist in communicating within and across teams and stakeholders
13	Problem scope definition	Help with defining the scope of a problem that needs to be solved
14	Evaluation guide	Guide the evaluation of product definition decisions
15	Organization of research data	Assist in organizing and utilizing research findings about users/customers by structuring research data in a more vivid form than raw data
16	Articulate stakeholders' vision	Help to articulate the product vision and target market strategies of executives and other stakeholders
17	Improved usability	Aid in designing more usable products because the goals and the needs of the users/customers are understood
18	Product offerings	Can be used by a business to determine what types of products/services to offer and highlight new business opportunities
19	Product evaluation	Can be used to evaluate existing products and their strengths and weaknesses
20	Intuitiveness	Can be used by specialists and non-specialists because individuals intuitively understand stories and how characters work
21	Product marketing	Through the use of marketing materials, can be used to tell a compelling story that helps to convince potential customers that their needs and goals are understood
22	Reuse of research data	Allow for reuse of user research data for products in the same domain with similar 'types' of users/customers

Table 4 Mean rankings of the 22 benefits (low score indicates a higher rank)

#	*Benefit name*	*Round 1*	*Round 2*	*Round 3*
1	Audience focus	3.3	2.5	2.3
2	Product requirements prioritization	6.5	4.8	4.1
3	Audience prioritization	6.5	6.1	5.8
4	Challenge assumptions	8.2	7.1	6.5
5	Prevention of self-referential design	9.5	7.7	6.7
6	Decision guide	7.7	7.7	8.4
7	Agreement catalyst	9.0	8.7	8.8
8	Engagement and unification	9.6	9.1	9.5
9	Empathy creation	9.7	9.6	10.4
10	Innovative thinking	9.2	9.5	10.5
11	Team collaboration	10.6	11.3	10.6
12	Communication aid	11.2	11.0	11.4
13	Problem scope definition	11.5	12.6	12.8
14	Evaluation guide	14.2	14.1	13.4
15	Organization of research data	13.5	13.6	13.9
16	Articulate stakeholders' vision	15.2	14.8	14.1
17	Improved usability	13.5	14.9	14.6
18	Product offerings	13.2	14.1	14.8
19	Product evaluation	16.2	16.6	16.4
20	Intuitiveness	16.1	17.2	17.7
21	Product marketing	19.5	19.8	19.7
22	Reuse of research data	20.2	20.3	20.7

can help individual designers and improve organizational design processes. Various opinions have been provided in previous accounts, but our study talked directly with the experts. Many of our panelists have been using and discussing personas since their development by Cooper (1999). In the next section, we elaborate on the five benefits of personas that were ranked as most critical by the experts. Next, we illustrate how this research could provide a foundation for future empirical work. Groups of the most highly ranked benefits can help researchers identify significant variables and derive propositions that are examined in follow-up studies. We hope that more focused follow-up research that uses the results of this Delphi study as a foundation can uncover the mechanisms through which personas influence individual design choices and lead to a more rigorous understanding of the personas method.

4.1 Implications for product design practice

According to the experts, the five benefits with the lowest mean rankings, audience focus through prevention of self-referential design, point to the areas of design processes that would most significantly benefit from persona use. A strong consensus also was achieved among the rankings of these five items.

The most significant benefit of personas is their ability to focus product design teams on the actual goals of the target customers. Instead of talking about general 'consumers', personas bring the target consumers to life and help to

integrate their needs and goals as a central driver of design processes. Through the increased audience focus, personas help to overcome the disconnect between the designers and the consumers, which has been cited as a common problem with UCD processes (Grudin & Pruitt, 2002; Gulliksen et al., 2003). According to the panelists, this benefit is vital because it allows for a 'focus on who the users are and to formulate design hypotheses accordingly' and facilitates a 'clear focus on who the product/service is designed for, who it is not, and what the goals are.'

Similarly, two other important benefits, prevention of self-referential design and challenge assumptions, point to the personas' ability to establish a truly consumer-centered design attitude. One participant explained, 'Personas bring to the surface and challenge long-standing (and often incorrect) organizational assumptions about the users/customers'. In addition, as evidenced by the two critical prioritization benefits, personas not only instill a stronger consumer focus but also aid with targeting the most significant consumer segments. One of the participants explained, 'A persona helps project teams answer two fundamental questions: who are we solving for and who are we not solving for?' Personas help to narrow the target audience; instead of designing for everyone, designers can design for the persona(s). Personas focus product designers on the one (or a few) consumer audiences, which helps to limit the resulting product feature sets. Products that satisfy 100% of the needs of a few personas will have a great chance of success than products that serve 10% of the needs of the all encompassing 'everyone'.

4.2 Implications for future research

In addition to the implications for practice, the items judged most significant by the panelists can aid with the identification of variables and the generation of propositions for future research (Okoli & Pawlowski, 2004). In the following section, a specific future direction is proposed, which highlights how the results of the Delphi study can provide a starting point for follow-up studies. However, it should be noted that the suggested future direction is not intended to be the sole interpretation of the results. Additional links and alternative interpretations are certainly possible based on our results. Other researchers are encouraged to use these Delphi study results as a basis for their own proposition development.

4.2.1 Example research direction

Psychology and marketing literature has focused extensively on the influence of choices on individual behavior. Recent research has found that increased choice leads to decreased individual satisfaction when selecting from an assortment of choices (e.g., Iyengar & Lepper, 2000). For example, when consumers in a grocery store were presented with either 24 flavors or 6 flavors of jam, they initially opted for the larger variety, but then were less motivated

to buy the product that they selected from the larger assortment (Iyengar & Lepper, 2000). Similarly, research found that consumers forced to make a choice from a wider assortment of products are less confident in their eventual choice (Chernev, 2003a; Chernev, 2003b). The popular notion that 'the more choices, the better' has been challenged by recent research results – individuals are experiencing an effect of 'overchoice' (Gourville & Soman, 2005).

Designers could experience the same phenomenon of overchoice when attempting to choose among design options available for a particular product. In many design scenarios, the target consumer audience tends to be all encompassing – designers are commonly asked to design for 'everyone' (Pruitt & Adlin, 2006). Without a clear vision of the users and the specific features that these users desire, designers are able to generate endless design alternatives. Research has shown that individuals are hindered in making effective judgments when they need to consider even a dozen options. One of the reasons is that the conscious consideration of each of the option leads to the focus on a limited number of options without taking into account other relevant information (Dijksterhuis & Nordgren, 2006). Perhaps, this is one of the factors contributing to the unnecessary complexity, poor usability, and consumer frustration with many modern product designs. Designers are not able to focus on a specific design target, and as a result the available design options seem endless. Design for 'everyone' could lead to design for "no one."

Two of the identified benefits of personas, audience prioritization and product requirements prioritization, point to the personas' ability to limit the design choices available to designers and to allow for calculated design decisions. By limiting for whom the product is designed for and what features are vital, personas limit the design alternatives that are available to the designers. For example, when a designer is asked to design a new product (e.g., a new DVD player) for older users and is provided with an elderly persona (e.g., 'George'), then the designer will be able to generate a more limited set of design alternatives than when s/he is simply told to 'design a DVD player for elderly individuals'. Most likely, a specific component (e.g., the 'play' button) can still be designed several different ways to allow George to accomplish his goals, but now each of the alternatives is inferred from the persona narrative. This limited choice set could lead to simplicity and reduce complexity, a benefit for all users.

5 *Conclusions*

Based on the results of this study, the many benefits of incorporating personas into user-centered design processes are evident. Through the ranked list of benefits, this study also provides a foundation for future research examinations of persona use. Further, we hope that this study builds further awareness and an increased research focus on the personas method. Personas' potential

to significantly improve the design of products should not be ignored by researchers. Personas have the potential to help us achieve the adage fundamental to user-centered design: 'Know thy user, for she is not you'.

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