

A Critique of Personas as representations of “the other” in Cross-Cultural Technology Design

Daniel G. Cabrero
University of West-London
London,
United Kingdom
daniel@personas.technology

Heike Winschiers-Theophilus
Namibia University of Science
and Technology (NUST)
Windhoek, Namibia
hwinschiers@nust.na

José Abdelnour-Nocera
IT University / M-ITI
Copenhagen, Denmark / Madei-
ra, Portugal
josa@iut.dk

ABSTRACT

A literature review on cross-cultural personas reveals both, a trend in projects lacking accomplishment and personas reinforcing previous biases. We first suggest why failures or incompleteness may have ensued, while then we entice a thoughtful alteration of the design process by creating and validating personas together with those that they embody. Personas created in people’s own terms support the design of technologies by truly satisfying users’ needs and drives. Examining the experiences of those working “out there”, and our practises, we conclude persona is a vital designerly artefact to empowering people in representing themselves. A persona-based study on User-Created Persona in Namibia contrasts the current persona status-quo via an ongoing co-design effort with urban and rural non-designers. However we argue persona as a design device must ease its implicit colonial tendency to and impulses in depicting “the other”. Instead we endorse serenity, mindfulness and local enabling in design at large and in the African context in particular.

Author Keywords

Personas; User-Created Personas; User-Centred Design; UX; Co-Design; User Involvement; Cross-Cultural Design.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

Persona is a well-known method in Human-Computer Interaction (HCI) despite its fuzzy definition and utilisation. As a concept and tool persona got introduced in technology design as a “fictitious user” [9]. Framed within the philosophy of User-Centred Design (UCD) persona is a communicational evocation of a set of users with shared aims on technological needs and requests, and it is mostly built by designers based on users’ real data. However a lack of con-

ceptual empiricism [22], in particular in cross-cultural locales [20], and a lack of accord on what personas entail [24] keep designers divided amid the apathetic and the adept to using it in design decision-making [30].

Persona as a Tool was framed in the Global North anchored in its etymology and semiotics, thus it carries values of its context of original use. As such there are two emerging and opposing views in using persona elsewhere: deployed *as is* [2, 10, 15, 18, 19, 22, 23], and adapting it to derive further situated offerings [3, 4, 8, 16, 20, 31].

We argue a lack of cross-cultural validity, local relevancy, and designerly liability make personas prone to false or oversimplified representations in depicting local populaces. Taylor [28] reminds us that “we bring certain ways of ordering to the world when we cast ourselves “in here” looking “out there””. Designing technologies from such a perspective carries the risk of stereotypical enactments or designing “for deficits” on the basis of overstated perceived differences. Thus Taylor [ibid] suggests situating design and HCI in those collectively enacted logics and dialogues emerging “right here, right now”. Thus it becomes obvious that personas as objects of design for interaction with technology should come from the context of design and use. Thus we postulate that co-created and user-created personas deliver situated mimetic artefacts loyal to, and understood by locals, and at the same time useful in conveying user needs, wants and goals to the designers of technology.

This paper explores the origin, meaning, and connotations of personas and problematizes the later application in HCI, in a cross-cultural context specifically. This leads us to re-think the conceptualisation and associated methods to create personas as cross-cultural design tools, which we exemplify with empirical data from Namibia. We conclude that user created personas as a self-representation, rather than a representation of “the other”, conveys values and practices necessary to guide design in cross-cultural HCI.

MAKING SENSE OF PERSONAS

Etymologically persona emanates from ancient Greece, the pillar of western thought and philosophy. There it played the role of *acting masks* transforming bearers into other personages, mainly in dramatic plays, as a way of defining the human character around its strengths and its flaws [11]. Persona *etymologically designates a mask through which*

*the sound of the voice of an actor is heard, and therefore highlights, like the Aristotelian concept of *êthos*, the performative aspect of character rather than its authentic, distinctive constellation* [ibid, p, 6].

In the 19th Century Marx took on persona as *character mask* [17] skilful in hiding the weaknesses and fallaciousness of capitalistic systems by showing an altered face of people and organisations. This persona conforms (1) to a role whereby people adopt and personify a given function, and (2) to social forms required to serving certain ‘obligations’. Adopting such *personae* people assent to applied, assumed rules implied in exercising a role in becoming well-adjusted adults serving detached interests of abstract authorities. Consequently they may have little or nothing to do with personal needs or micro-cultural, national or other welfares.

In Freudian and Post-Freudian psychology the mask is a metaphor for the outer self that conceals reality within [17].

At heart, persona is a mask disguising authenticity within.

THE SEMIOTICS OF PERSONA

The common semiotic understanding of persona in HCI is that of a ‘fictitious’ representative (i.e. regarding signifiers and signified) of a collection of people for whom some technology is intended. When looking at synonyms of fictitious, however, untrue, fallacious, false or pretended, among others, hold equal worth. Antonyms are in the range of real, palpable and factual. The meaningfulness and applicability of wording is now utterly up to the reader.

One can though argue that design processes using pretended proxies can, and do readily lead designers to assume [9, 12] grounded on fancies rather than data from ‘the real world’. In artistic works like novels, films or theatre, fancies and dreams are sensible to bring illusion to intellect and senses. Yet embodying real people is a task to be seriously held. Otherwise outcomes from misrepresenting depictions can be detrimental designs at best, if not ruinous cultural flops.

Persona as currently is reveals connotations and denotations acquired and advanced in, from and to serve dominant sites. Such is the use of ID-size pictures, which make cross-cultural identifications of people become doubtfully alike [20]; the provision of a name is irrelevant in certain places [3]; or the inclusion of *written* narratives, a typical feature in western sites, is not always suitable in other sites [3, 24].

PERSONAS IN HCI

When Cooper conceived the term “persona” in HCI [9], it was never stated if the artefact was to tacitly hide or openly reveal legit harmonies amid the depicted societal groups. One could argue the name, photo and written narrative typically comprising persona may merely be props to make laypeople turn into accessories of a hiding mask that shields designers under their control –or lack of– in design.

Personas in UCD are constructed by designers with the aim to illustrate user needs, wants, goals and hopes to design satisfactory technology. As such UCD tends to involve us-

ers in iterative data-gathering processes (i.e. user-research, prototyping, testing), though not throughout entire design process, nor in conceiving and developing the tools of trade, which often leads designers to subconsciously disregard user-data in decision-making [12] or to openly utilise assumptions [9].

Literature guides ten intends persona ought to embody [3]:

1. create a grounded understanding of the targeted users
2. provide early design needs and desires from the users
3. introduce / support design thinking during the process
4. encourage a shared vision of users’ needs for efficiency
5. provide focus on users’ goals, needs, wants and traits
6. convey dimensions of ecosystems where people function
7. complementary enhance methods like PD or scenario
8. steadily facilitate communication among all stakeholders
9. seduce designers to empathizing with the end users
10. enable the social & political nature of design to emerge

Such benefits contrast with added challenges such as:

11. paucity of overall empirical persona research & reports
12. empirical paucity specially in sites across cultures
13. organic use of grounded user-data in the UCD process
14. lack of agreed definition of persona in literature
15. detailed throughout user participation past study phases

These challenges underpin the ongoing reluctance and debate regarding the need for persona methodological scientific validation [13], which overall endangers the core deeds assigned to it.

Grudin holds as *a serious error to think that “the designer” is responsible for design*, and argues toward an organic involvement of users and other stakeholders as co-designers to empower ‘the design’ while sharing accountabilities [14].

As illustrated in the following section, the approach to persona in cross-cultural HCI can and ultimately affects the construal of *the other*, overtly or covertly, as either defined by own mental models and self or others’ interests, compassionately looked at, novelised-like or as patronising. Why may this be as such? We attempt to discern it below.

CROSS-CULTURAL UCD PERSONAS

This section presents cross-cultural projects worldwide that deployed UCD personas as the focus tool in their research.

Cross-Cultural Pictorial Persona Probes

Across 9 countries Nielsen [20] probes the take on an open written account, and the ensuing photo-depiction of an online marketing manager persona. The premise is that personas are *supposed to create a shared perception of the users that is not built on preconceived ideas*. Most photos chosen come as business people as assumed in the Global

North. This illustrates that enough informational gaps in the persona make readers to infer on others based on own experiences, beliefs, or surroundings in simplistic labelling ways [ibid]. This is how “the other” is usually described – stereotypical social depictions shared across cultures and societies that provide a synthesised reason of why ‘others’ act as they do [21]. This leads to misreading and distortion.

Personas in Brazil

In Brazil designers used personas for more than 10 years. Designers ascribe cultural background as key [2] and state that in sites with highly diverse populaces some are barred from electronic markets due to lack of systems adapting to human interaction difficulties such as literacy [18]. Results though point to imitational depictions of ‘the other’ via western persona renderings but in names (i.e. Paulo José). This misses unique nuances on Brazilian varied publics.

Personas in Kyrgyzstan

An ICT4D project [24] to design a mobile directory service in Kyrgyzstan created personas from sets of primary (i.e. 12 interviews) and secondary data (i.e. 1000 people survey). Personas though got conditioned by factors like survey data not being initially intended for such purpose; the influence of top management in ‘liking’ personas, and the imposed use of marketing segmentations. Ultimately researchers stated that some inconsistencies arose by having executed a set of quantitative data processes to try creating personas, and by inflating age differences to stress group variances.

Personas in India

In the same manuscript above [24] personas are built for a water service in Pradesh, India. As users are *socially connected either by kinship bonds or by friendship* researchers depicted entire families versus individuals; thus they performed a tinker with personas as literature mostly centres on describing single western technology users. However researchers argue this leaves little or no room for further readings where users are genuinely asked [25]. Instead foreign partakers conceive their own readings and versions of actual people with real issues of their own [24].

Also in India Dearden and Rizvi [10] positioned storytelling in an ICT4D project to elicit life-stories to create personas. However researchers claimed such personas unreliable to supporting the design of the software and stated constrains by benefactors in determining the goals and plans to follow.

In turn Sarat St. Peter [27] recently paid an analysis to the personas in [10], and advised methods to solve problems in this specific type of project. Taking an angle based on User Experience (UX) this study though does not plan involving users in the persona creation, but scaffolds from the existing material, thus the foreign research’s logic in [10] is applied. The study builds on an Indian agricultural father-persona sceptical of, and who finds technology a time-waster, and whose main aim is increasing the crop every year to sell it. This oversimplified account leaves many gaps and carries serious misinterpretations that may endanger a grounded

understanding of the people technologies are aimed for. First it does not contemplate that users may be *socially connected either by kinship bonds or by friendship* [24] but focuses on describing a single western-like technology user. Further no UX specifics are given as per what and how selling may be meaningful for him and his family, what aspects of life are priority, if and how tradition is vital, etc.

Also in India Vestergaard et al. [29] create personas to design a water management system. A researcher first performs an ethnography on locals’ daily life and practices; then co-creates a script and a movie with the locals, and finally validates the film via a screening in the locality. While the project implicates users in making and acting the characters, no insights are given on the effect on the users of being filmed first and then seeing oneself on the screen. Ultimately designers in Denmark provide the technology relying on personas *supposed to create a shared perception of the users that is not built on preconceived ideas* [21].

Personas in Malaysia

In Kuala Lumpur Hisham explores persona with elder via focus group sessions aiming to introduce computers [15]. The classic persona’s blueprint name, photo, written narrative is used upfront. This work states persona usefulness in eliciting culturally situated nuances, though such efficacy gets just stated with no further detail given.

Personas in the African Context

In South Africa Meissner and Blake explored issues in the schooling system to prepare low-income students for the post-secondary education job-search [19]. They stated understanding local culture and attitudes as a must to aid design processes via a persona dialog amid foreign designers and a local NGO. Results showed hidden drives rare in persona depictions such as *dysfunctional families, substance abuse, teenage pregnancy and even regular sexual abuse* [ibid]. Lacking, though, an organic immersion of end-users in creating such personas (hypothetical users were used) threatens the core openness of design processes.

In Mozambique designers [1] deployed a project via *point of view personas* (i.e. what personas see as an alternative to how the persona is perceived) aimed to inform various partakers on local views of community multimedia centres. Data analysis focused on gender, age and education as variables, though no on a social, contextual study. As stated earlier [24] *researchers have to take into account that the use of data not intended to create personas may lead to some “missing links” in the narrative* [1, p. 14]. This also got warned by [20] regarding misrepresentations when there are enough informational gaps in the persona recount.

Back in South Africa Pretorius and Sangham [23] identified demographics, profiles and needs like languages’ diversity or user needs to applying for governmental aid or to find information on tenders, and so create personas representing rural users that attend *Cape Access e-centres* (i.e. e-Government initiatives). Despite semblances in aim and

drive, neither [1] nor [19] above are cited as African literature on personas, while the study is solely backed by western literature, *based on participants' needs and demographic patterns* [19]. Analysing the information on the personas created, they all seem handy, *ok* people with no major live issues. However neither a language follow-up (leaving English as the prevailing language despite not being handled by users but by staff members at the centres), nor governmental aid or tenders got mentioned again.

Personas in Vietnam

In a persona project aiming for frugal redesign and novelty in prosthetics for financially poor Vietnamese amputees, *local intelligences* are identified as organic elements to revise and adopt [16]. Personas here depict dimensions of the ecosystem via which researchers advocate for a cultural situatedness and awareness to answer *new questions on the personas role and into collaboration for articulating implicit, local, embedded and grassroots expertise with more formalized information and methods* [ibid, p. 1].

USER-CREATED PERSONAS (UCP)

So far the personas discussed are created via inferences and conclusions by other people than the end-users themselves. This holds the danger of creating oversimplified depictions, while losing a vital degree of non-transferred aspects, perhaps, because users have not been asked participation and an opinion in creating personas. User-Created Personas (UCP) counteract the influence of the other in the way user representations are imagined and portrayed.

User-Created Personas in Malaysia

Researchers [31] working with Long Lamai youth in the Malaysian jungle scaffold from the grassroots expertise of the elder and adapt personas to Participatory Design principles by enabling young participants to engaging via SMS-composing without *losing face*. Youth's thinking, creativity and consciousness come in personas created by eliciting their communicational needs and styles, to then proceed with suitable affordances to co-designing an SMS App based on the Penan's Oroo' signs' language.

User-Created Personas in Namibia

In urban and pastoral Namibia we probed various methods aimed at persona co-creations with ovaHerero [3], ovaHimba [4], Ovambo [7] and Khoisan [5] ethnic groups.

First we used westerly-conceived methods with ovaHerero. These neither aligned aims nor gave any valid results [6]. For example proposing personas upfront puzzled locals and made them to craft clichéd one-trait self-depictions [5]; the usual written facet of persona portrayals did not function in ovaHerero milieus, as orality typically prevails versus writing [3]. We shifted angles via locally adapted methods like narratives and storytelling. This enabled communities to convey self-depictions [5] carrying persona benefits [3].

Using storytelling and narratives with Ovambo groups [7] we found UCP enabled relational references from present times to situations of the past and to future consequentiality.

Since Namibian groups closely relate to the Ubuntu philosophy, families also counted as key in the individual persona design in Ovambo settings [ibid].

Locating aims based on actual technologies with ovaHimba, we found constructs of Usability and goals of UX emerged rather naturally, and that the latter take more conversational space and prominence with ovaHimba [4].

Co-designing with urban youth Khoisan two faces appear in their personas: the one when being on their own with researchers –based on aims and goals, and the one when being among other ethnic groups –stigmatised [5].

Crucial factors to get such results were serenity, mindfulness and time, while UCP researchers also took the occasion to have local researchers guiding. As a result local empowerment has so-far been achieved, as well as local designers' acceptance and enablement for their co-design agendas are being supported, and, at least, partially enhanced through this persona-research proposal.

CONCLUSIONS AND TAKE AWAYS

The task of depicting people is a puzzling undertaking [26]. This paper has presented cases where UCD personas were deployed cross-culturally to carry out humanly depictions.

The etymology and semiotics of persona as a fictitious portrayal of people has shown problematic in the HCI discourse, specifically in cross-cultural sites. Over-simplistic cultural assumptions and representational forms make UCD persona dubious in depicting “the other”. These personas emerge as *acting masks* devised from western thought and revealing aspects developed and attained in, from, and to serve technology-dominant sites.

Personas co-created with laypeople, though, attempt to aid users in creating self-depictions for technological designs. Participatory styles to such ideations from the outset scaffold from an initial literature review where understanding settings, defies and advances previously attained show vital to generate empathy, engagement and the success of ‘the others’ in depicting themselves via self-created personas.

Hence we promote UCP to shift the “us/you” focus to the representation of the “me/us”. This angle overtly addresses other ways of seeing and doing where personas can endure tackling current defies to fulfil design futures “out there”. We acknowledge to have evaded the designer bias, yet we are wary of the readings of the users' self-depictions. Our experiences in Namibia, though, illustrate that users self-representations become meaningful to alien designers in and via a constant dialogical interpretation process [5].

Further work is needed to consolidate and formalise the argument on UCP, though we argue UCP serves crucial objectives in cross cultural communication –in establishing practices and values needed for sensitive technology design. Ultimately we recommend using comprehension, serenity, mindfulness, persistence and local empowerment in technology design at large and African settings specifically.

REFERENCES

1. Lucia Aguirre, Sara Vannini, Isabella Rega, and Lorenzo Cantoni. 2013. Fictional Characters, real data: Personas depicting staff and users of CMCs. In: *Proceedings of the International Conference on Social Implications of Computers in Developing Countries (ICTD '13)*, 917-933.
2. Plinio Thomaz Aquino Junior, and Lucia Vilela Leite Filgueiras. 2005. User Modeling with Personas. In: *Proceedings of the Latin American conference on Human-computer interaction (CLIHC '05)*, 277-282. <http://doi.acm.org/10.1145/1111360.1111388>
3. Daniel G. Cabrero. 2015. User-Created Persona: Namibian rural Otjiherero speakers. In: *Proceedings of the International Conference on the Design of Communication (SIGDOC '15)*, 28. <http://doi.acm.org/10.1145/2775441.2775484>
4. Daniel G. Cabrero, Gereon Koch Kapuire, Heike Winschiers-Theophilus, Colin Stanley, and Jose Abdelnour-Nocera. 2016. A UX and Usability expression of Pastoral OvaHimba: Personas in the Making and Doing. In: *Proceedings of the International Conference in HCI and UX on Indonesia (CHIuXiD '16)*, 89-92.
5. Daniel G. Cabrero, Heike Winschiers-Theophilus, Jose Abdelnour-Nocera, and Gereon Koch Kapuire. 2016. A Hermeneutic Inquiry into User-Created Personas in different Namibian locales. In: *Proceedings of the Participatory Design Conference (PDC '16)*, 101-110. <http://doi.acm.org/10.1145/2940299.2940310>
6. Daniel G. Cabrero, Heike Winschiers-Theophilus, Gereon Koch Kapuire, Colin Stanley, Kasper Rodil, and Jose Abdelnour-Nocera. 2015. Reflecting User-Created Persona in Indigenous Namibia: what NOT to do when working in Foreign Land. In: *Proceedings of the International Conference on Communities and Technologies (C&T '15)*, 53-62.
7. Daniel G. Cabrero, Heike Winschiers-Theophilus, Hedvig Mendonca. 2016. User-Created Personas – A Micro-cultural Lens into Informal Settlement's Youth Life. In *Human Work Interaction Design. Work Analysis and Interaction Design Methods for Pervasive and Smart Workplaces*, Jose Abdelnour-Nocera, Barbara Rita Barricelli, Armanda Lopes, Pedro Campos, and Torkil Clemmensen (eds.), Springer, Berlin, 57-70. http://dx.doi.org/10.1007%2F978-3-319-27048-7_4
8. Apala Lahiri Chavan, and Girish V. Prabhu. 2011. *Innovative Solutions: What Designers Need to Know for Today's Emerging Markets*. CRC Press.
9. Alan Cooper. 1998. *The Inmates are running the Asylum*. Sams Publishing.
10. Andy Dearden and Syed Mohammed Haider Rizvi. 2009. A Deeply Embedded Sociotechnical Strategy for Designing ICT for Development. *International Journal of Sociotechnology and Knowledge Development (IJSKD)*, 1,4, 52-70. <http://dx.doi.org/10.4018/jskd.2009062605>
11. Koen De Temmerman. 2014. *Crafting Characters: Heroes and Heroines in the Ancient Greek Novel*. Oxford University Press.
12. Erin Friess. 2012. Personas and decision making in the design process: an ethnographic case study. In: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '12)*, 1209-1218. <http://doi.acm.org/10.1145/2207676.2208572>
13. Guiseppe Getto and Kirk St. Amant. 2014. Designing globally, working locally: using personas to develop online communication products for international users. *Communication Design Quarterly Review*, 3,1 (November 2014), 24-46. <http://doi.acm.org/10.1145/2721882.2721886>
14. Jonathan Grudin. 2003. The West Wing: Fiction can serve Politics. *Scandinavian J. Inf. Systems*. 15, 1 (January, 2003), 73-77.
15. Syarifffanor Hisham. 2009. Experimenting with the use of persona in a focus group discussion with older adults in Malaysia. In: *Proceedings of the Australian Computer-Human Interaction Special Interest Group (OZCHI '09)*, 333-336. <http://doi.acm.org/10.1145/1738826.1738889>
16. Chloé Lecomte, Eric Blanco, PAscale Trompette, and Céline Cholez. 2013. Towards a Better Frugal Design using Persona - issues and insights from an ethnography on prosthetics in Vietnam. In: *Proceedings of the 1st Interdisciplinary Innovation Conference Cooperating for Innovation*, 1-19.
17. John Mack and Dorota Czarkowska Starzecka. 1994. *Masks: the Art of Expression*. British Museum Press.
18. Andrey A. Masiero, Mayara G. Leite, Lucia Vilela Leite Filgueiras, and Plinio Thomaz Aquino Junior. 2011. Multidirectional knowledge extraction process for creating behavioral personas. In: *Proceedings of the 10th Brazilian Symposium on Human Factors in Computing Systems and the 5th Latin American Conference on Human-Computer Interaction (IHC+CLIHC '11)*, 91-99.
19. Fritz Meissner, and Edwin Blake. 2011. Understanding culturally distant end-users through intermediary-derived personas. In: *Proceedings of the South African Institute of Computer Scientists and Information Technologists Conference on Knowledge, Innovation and Leadership in a Diverse, Multidisciplinary Environment (SAICSIT '11)*, 314-317. <http://doi.acm.org/10.1145/2072221.2072266>
20. Lene Nielsen. 2009. Personas in Cross-Cultural Projects. In: *Proceedings of the International Conference on Human Work Interaction Design (HWID '09)*, 76-82. http://dx.doi.org/10.1007%2F978-3-642-11762-6_7

21. Lene Nielsen. 2013. *Personas: User-Centre Design*. Springer.
22. Lene Nielsen, and Kira Storgaard Hansen. 2014. Persona is Applicable - A Study on the Use of Personas in Denmark. In: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '14)*, 1665-1674.
<http://doi.acm.org/10.1145/2556288.2557080>
23. Marco Pretorius, and Irani Sangham. 2014. Moving the Focus to the User: Personas for Rural Area Users of Digital Services. In: *Proceedings of the International Business Conference 2015*.
24. Cynthia Putnam, Beth Kolko, and Siri Wood. 2012. Communicating about users in ICTD: leveraging HCI personas. In: *Proceedings of the International Conference on Information and Communication Technologies and Development*. (ICTD '12), 338-349.
<http://doi.acm.org/10.1145/2160673.2160714>
25. Cynthia Putnam, Emma Rose, Erica J. Johnson, and Beth Kolko. 2009. Adapting User-Centered Design Methods to Design for Diverse Populations. *Journal of Information Technologies and International Development*, 5, 4 (Winter 2009), 51-73.
26. Edward W. Said. 1994. *Culture and Imperialism*. Vintage Books.
27. Hilary A. Sarat St. Peter. 2015. Communicating User Experience: “Wicked” Problems, Patchwork Personas, and the ICTD Project Lifecycle. *International Journal of Sociotechnology and Knowledge Development (IJSKD)*, 7,2, 14-26.
<http://dx.doi.org/10.4018/IJSKD.2015040102>
28. Alex S. Tabor. 2011. Out There, In: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '11)*, 685-694.
<http://doi.acm.org/10.1145.1978942.1979042>
29. Lise Vestergaard, Bettina Hauge, Claus Thorp Hansen. 2016. Almost like being there: the power of personas when designing for foreign cultures. *CoDesign*. 1-18.
<http://dx.doi.org/10.1080/15710882.2015.1127385>
30. Irith Williams, Margot Brereton, Jared Donovan, Karalyn McDonald, Tanya Millard, Alex Tam, Julian H. Elliott. 2014. A Collaborative Rapid Persona-Building Workshop: Creating Design Personas with Health Researchers. *International Journal of Sociotechnology and Knowledge Development (IJSKD)*. 6, 2, 17-35. <http://dx.doi.org/10.4018/ijskd.2014040102>
31. Tariq Zaman, and Heike Winschiers-Theophilus. 2015. Penan’s Oroo’ Short Message Signs (PO-SMS): Co-design of a Digital Jungle Sign Language Application. In: *Proceedings of the 15th IFIP TC 13 International Conference (INTERACT'15)*, 489-504.
http://dx.doi.org/10.1007%2F978-3-319-22668-2_38