Challenges and opportunities for public broadcasters to facilitate citizens to engage with public data and encourage civic participation in the smart city

1. Introduction

Smart cities are instrumented with a variety of sensors (e.g. for transport, air quality, parking) to quantitatively assess and understand civic challenges through data. Access to such public data facilitates civic participation processes (DiSalvo, Jenkins and Lodato, 2016). The ability to acquire and process information can thus be considered as a first step towards voicing their opinion and engage in civic debate (Gordon, Baldwin-Philippi and Balestra, 2013). However, sensor data are usually not sufficient to fully understand, address and solve these challenges, because the human perspective is largely missing: sensor data does not include the context of data measurement or show how citizens experience their city. Indeed, recent calls have been made to put the human back in the data interaction loop, i.e. the 'human-data-interaction' approach (Mortier, 2014). Indeed, the sense-making process of data is not only facilitated by technology, but rather developed through human appropriation and application (Elsden, Mellor, Olivier, Wheldon, Kirk and Comber, 2016). In other words, the context of the visual representation – who sees it, on what terms and with what intentions – becomes as important as the visual and interactive design (Elsden, Mellor, Olivier, Wheldon, Kirk and Comber, 2016).

Currently, most existing examples of visually represented data are embedded in other media formats, such as newspapers, documentaries or online channels, which establish a context for decoding the representation by integration in news articles with or without the support of additional (moving) images. When data visualization and other media are connected through a story, even in a simple form, it is referred to as narrative visualization (Segel and Heer, 2007). This type of data visualization is particularly popular with media makers as the data backs their story with data while it still appeals to a wide audience to engage with data. Here, the context for interpretations is a news or informational item on television or online.

Another approach is formed by situating narrative visualization in public environments, such as the city, where humans move around to live, work, visit, which creates an opportunity to reach a wide audience of non-experts with data that is gathered in the actual (physical) context of measurement (Vande Moere and Hill, 2012; Taylor, Lindley, Regan, Sweeney, Vlachokyriakos, Grainger and Lingel, 2015). Here, the data refer to the surrounding physical environment (Willett, Jansen and Dragicevic, 2017), which adds complexity to the context as viewers may interpret the perceived owner of the immediate environment as data author or narrator (Claes and Vande Moere, 2017).

The (smart) city environment offers journalists (or public broadcasters in general) rich ingredients for storytelling, enabling them to enrich their stories with public data in an engaging way. Moreover, the smart city environment in itself offers novel storytelling opportunities to connect data, stories to the physical environment (see research challenge 2.2). On the other hand, we also recognize the opportunities of the smart city for public broadcasters to engage their public in a social way, stimulating conversation and discussion on the stories presented in-place (see research challenge 2.1), thereby opening opportunities to co-create stories based on data (see research challenge 2.3). These three assumptions are framed as research challenges in the following.

2. Research challenges and future work

2.1 Stimulating active citizenship
Stimulating informed and active citizenship is one of the seven strategic goals of the Flemish public broadcasting company, i.e. VRT. The most successful example of this goal is De Warmste Week[1]. This yearly one-week radio marathon is organised the week before Christmas and broadcasted on Studio Brussels, which is one of VRT's radio stations. This large-scaled fund-raising action collects money for different good causes by challenging listeners to organize their own fund-raising action, such as baking and selling waffles, organizing a soccer match or party, come to the physical location where the marathon is organized and donate the money live on radio. Last edition, more than 1000 good causes participated, and collected more than 10 million euro in total. Furthermore, examples exist of local actions that have turned into small communities of people who feel strongly about a particular good cause.
Within the area of the last edition of De Warmste Week, we experimented with public displays that are augmented with beacons to track the location data of passing fundraisers (who had a specific application installed). The display then presented a welcoming message and a thank you word for their exact collected amount. Through initial insights that were captured through semi-structured interviews on the field (N= 12), we learned that fundraisers noticed the personal message and felt welcomed by. This experiment will further be developed to include more storytelling about their action, such as pictures and video-snippets, which will be implemented in the following edition.

This experiment, which connects qualitative data, public displays on a physical location and storytelling in the context of social community strengthening, is a first exploration of the possibilities of the smart city for broadcasters.

2.2 Contextual storytelling
When a citizen inspects a narrative visualization in a public environment, the semantic context is extended with environmental clues (Offenhuber and Seitinger, 2014). For instance, a street sign refers to a specific location. When attaching a visualization to this street sign, it also implies to be representing that location (Claes and Vande Moere, 2013). Besides location, also tacit aspects of the context provide a form of information (Dourish, 2004). This street sign, for instance, can also refer to the identity of that specific location. The street might be known by passers-by to be dangerous for leaving your car unattended, which might influence the interpretation process caused by the data representation.
For broadcasters, these rather architectural storytelling elements are largely unexplored. Some overlap might be drawn with 3D storyworlds, i.e. building a narrative in virtual reality, which is studied in the context of game research (e.g. Shoenau-Fog, 2015). Another connection can be made with augmented reality, in which the digital layer of 3D models enforces the physical environment. As such, the research challenge lies in this connection of

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[1] https://dewarmsteweek.stubru.be/

digital data, video and audio with physical clues.

2.3 Co-creation
The ability to co-create stories with listeners is a need raised by both media consumer and professional media maker (Claes, Bauwens and Matton, 2018). Currently at VRT, viewers of Iedereen Beroemd (a daily light-weighted information show) are encouraged to send in their own videos concerning a particular trending topic through an application (i.e. #dedag[2]). An editor connects these stories and the final edit is broadcasted every Tuesday and Friday. This item is perceived as successful as hundreds of media consumers send in content.

In a smart city context, we envision citizens that create their own visual stories, departing from public data. These stories can serve as materials for professionals. However, we are aware of misuse and fake news. Here, we aim to investigate how we can simplify the fact-checking process for professionals, or how sensor data can facilitate this process.

In the summer of 2018, we will organize a summer school [3]in the smart city of Bristol. Here, a multi-disciplinary group of computer scientists, designers and journalists will create a news item, reporting it live based on the existing smart city infrastructure. The result will be shown on public displays in the town centre, in order to trigger conversation with locals. We see this summer school as a first step towards understanding 1) how we, as public broadcasters, can co-create media with citizens and 2) how we can learn from media consumption behaviour in public space, such as on public displays. We aim to repeat this trajectory in different cities of Belgium. Second, we target to investigate how real-time data can facilitate professional storytellers for constructing for in-place, smart city storytelling with the aim of strengthening citizenship.

3. Conclusion
In this position paper, we introduced the role a public broadcaster in connecting citizens, as a wide audience, with data in order to encourage civic participation. We presented three research challenges we aim to investigate in future work, i.e. continuing to stimulate and support active citizenship through technology, the role of context in storytelling and co-creation of stories with citizens.

4. Biographies
Sandy Claes is a design researcher at the innovation department of the Flemish public broadcast company VRT. She holds a PhD in engineering science (2017) from the KU Leuven university in Belgium. In her research work, she focuses on the overlap between media, technology and public space. Her research work has been published at international, peer reviewed conferences concerning the human factor of interactive technologies, such as CHI and DIS. Sandy has a background as a master in audio-visual arts (2005). Her audio-visual work has been awarded on several international film festivals (such as I Castelli Animati in

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[2] https://communicatie.een.be/iedereen-zijn-dag-in-iedereen-beroemd-kijkers-maken-met-hun-smartphone-nieuwe-rubriek-dedag
[3] https://www.ict-flame.eu/event/1st-flame-summer-school/

Rome, The international short film festival of Leuven), and exhibited at several international venues (such as LABoral, Madrid and Museum M, Leuven). With this mixed background of science, engineering and arts, Sandy approaches research projects from a multi disciplinary viewpoint.

Marc Godon recently joined the Innovation Center of VRT. Here he explores new roles for the public broadcaster in relationship to future Smart Cities. He received the degree of Master in the Industrial Sciences in 1983 in Antwerp (BE) and finalized a degree in Monumental Arts at the Royal Academy of Fine Arts Antwerp (BE) in 2013. He has thirty years of experience in telecommunication system development, innovation, and research. His research work, at Nokia Bell Labs Antwerp Belgium, focused on future media and communication tools for the creative networked society (application and interaction research, IOT, user participation, etc.). He likes to combine his multidisciplinary skills of being artist, engineer, and creativity coach to enhance the creative process. He co-authored an extensive set of papers and patents. He is a big fan of DIY culture and online learning programs. The overall moto in his work is: "share your creativity".

5. References

Claes, S., Bauwens, R. & Matton, M. (2018) Augmenting the Radio Experience by Enhancing Interactions between Radio Editors and Listeners. In Proceedings of TVX'18. Accepted for publication.

Claes, S. and Vande Moere, A. (2013). Street infographics: raising awareness of local issues through a situated urban visualization. In *Proceedings of the 2nd ACM International Symposium on Pervasive Displays*, ACM**: 133-138.

Claes, S. and A. Vande Moere (2017). The Impact of a Narrative Design Strategy for Information Visualization on a Public Display. In *Proceedings of the 2017 ACM Conference on Designing Interactive Systems.* Edinburgh, ACM.

DiSalvo, C., et al. (2016). Designing Speculative Civics. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems.* Santa Clara, California, USA, ACM**: 4979-4990.

Dourish, P. (2004). "What we talk about when we talk about context." *Personal Ubiquitous Computing* **8**(1): 19-30.10.1007/s00779-003-0253-8

Elsden, C., et al. (2016). ResViz: Politics and Design Issues in Visualizing Academic Metrics. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems,* ACM.5015-5027.

Gordon, E., et al. (2013). Why we engage: How theories of human behavior contribute to our understanding of civic engagement in a digital era. In *Berckman Center Research Foundation* 21.

Heer, J., et al. (2007). Voyagers and voyeurs: supporting asynchronous collaborative information visualization. P*roceedings of the SIGCHI conference on Human factors in*

computing systems, ACM.1029-1038.10.1145/1435417.1435439

Mortier, R., Haddadi, H., Henderson, T., McAuley, D., & Crowcroft, J. (2014). Human-data interaction: the human face of the data-driven society.

Offenhuber, D. and S. Seitinger (2014). Over the rainbow: information design for low-resolution urban displays. *Proceedings of the 2nd Media Architecture Biennale Conference: World Cities.* Aarhus, Denmark, ACM**:** 40-47.

Schoenau-Fog, H. (2015, November). Adaptive Storyworlds. In *International Conference on Interactive Digital Storytelling* (pp. 58-65). Springer, Cham.

Vande Moere, A. and D. Hill (2012). Designing for the Situated and Public Visualization of Urban Data. *Journal of Urban Technology* **19**(2): 25-46.10.1080/10630732.2012.698065

Vlachokyriakos, V., et al. (2014). PosterVote: expanding the action repertoire for local political activism. *Proceedings of the 2014 conference on Designing interactive systems.* Vancouver, BC, Canada, ACM**:** 795-804.

Willett, W., et al. (2017). Embedded Data Representations. *IEEE transactions on visualization and computer graphic*s **23**(1): 461-470.10.1109/TVCG.2016.2598608