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Combining Ideation and Journaling to Explore to New Possibilities for Visualization on Mobile Devices

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Abstract

While mobile visualization is not a new concept, there is not yet much dialogue about what specifically might make this mobile visualization unique. To help trigger innovative ideas and to begin an exploration of what might be possible in mobile visualization, we propose an exploratory ideation process. This work describes our ideation, in-situ, journaling approach for exploring possibilities for visualizations on mobile devices. We present four concepts for mobile visualization and discuss the pitfalls and benefits of in-situ journaling and ideation.

Author Keywords

Information visualization, mobile visualization, methodology, mobile HCI.

ACM Classification Keywords

H.5.2. Information interfaces and presentation (e.g., HCI): User Interfaces

Introduction

While an abundance of visualizations exists on our mobile devices, they largely appear as small versions of the visualizations built for our desktop displays (e.g., [10, 12]). Just as there are hundreds of new apps designed specifically for mobile devices, we wonder if



Figure 1: Ideation in progress. A person walking in an urban environment takes a moment to contemplate her mobile device and ideate about possible visualizations.

there are untapped opportunities for visualization and interaction techniques for mobile that have yet to emerge. We devised and used a design process to help us think of possible visualizations that are specifically for mobile devices.

Beyond the call for considering alternative input and output modalities [8], such as the limited display size in comparison to desktop visualization, we consider the process of designing for mobile devices to comprise a mix of designing for context (e.g., [1]), supporting tasks occurring in a mobile context, and designing for personal use (e.g., [4, 11]).

Mobile information visualization could still be considered in its infancy. We as designers are still attempting to determine how to translate existing design norms into this more compact non-WIMP display. With the current focus on translating desktop visualizations to small displays, we are losing opportunities to innovate and create truly new visualizations in an unexplored medium.

Many current visualizations for mobile devices and tablets are simply smaller scale versions of existing visualizations or glance-able visualization of personal data as tracked by other wearables (e.g., the Apple Health eco system). There is room here to create visualizations for mobile devices that leverage their existing input and output modalities, such as sensors like accelerometers and gyroscopes in smartphones and smartwatches. Using these sensors, mobile devices have access to data unavailable to desktop computers and can incorporate these additional data into applications unique to interactions with mobile devices.

In our research community, we need to treat mobile devices as their own independent object or medium worth of study and design. Not the least since the devices become more ubiquitous and situated in daily life. This development increases the importance of developing and designing specifically for them. To this end, we propose and reflect on a situated design ideation approach for visualization techniques for mobile devices (see Figure 1).

Our enforced ideation process consisted of taking a moment and looking at one's mobile device and imagining useful interactive visualizations. We were in part inspired by existing design ideation methodologies and enforced sketching techniques, such as the 10+10 [3]. However, rather than enforcing a specific number of sketches, we enforce a set duration between creating any journal entry or sketch. This process is similar to behavior sampling methods [6], in which a participant records their situation at predefined intervals. In addition, our process is comparable to Situated and Participative Enactment of Scenarios (SPES). Here, participants are given a mock-up of a future mobile device to carry in different environments and are asked to imagine product features and scenarios in which they would use their device [5]. Both our technique and SPES incorporate situated ideation for mobile devices, with different targets and props for the ideation process.

Design Ideation for Mobile Visualization

We decided to explore this possibility by combining three techniques: enforced repetitive ideation, in-situ everyday life realism, and thoughtful journaling [1].



Figure 2: A possible sample of productivity circles, where the many small circles speak of many cell phone interruptions, while the larger circle indicates a longer time of no interruptions.

The enforced ideation process consisted of taking a moment and looking at one's mobile device and thinking "what can I imagine – that is visual and interactive and on my mobile device that would be useful or interesting for me at this moment in time". We realize that some previous experience will trigger most, if not all, of the ideas that emerge. However, through repetitive use of such an ideation strategy some new combinations, variations or novel ideas might appear, as happens with repeated designs [2]. Just as in all brain-storming methods, it is important to be welcoming of all incoming ideas, because the emerging ideas themselves along with the repetitive nature of the ideation action can lead to new unexpected ideas.

Our approach to achieving in-situ everyday realism was to simply insert the ideation process into an unchanged, normal single day [9]. By doing so, we imagined we would strike a balance between realistic problems from everyday life, something that is of real use, and novel possibilities based on our own prior knowledge of visualization and interaction techniques.

The thoughtful journaling approach was to make use of self-reporting, always making notes as close as possible to the ideation moment [1].

Our Ideation Process

As an initial step, the first author used this process in her normal day using ideation moments every 15 minutes. This process broke down since the gap between the ideation moments barely allowed for normal life to resume. Then a pair of authors tried this process together while taking a short walk in a ground floor hallway. This seemed slightly more feasible. Next,

the first author undertook this process during a day spent in an urban environment. She used this journaling method throughout an entire day to collect any emerging visualization concepts that were related to diverse tasks and locations that they encountered throughout the day.

Every thirty minutes, using the Notes app on her phone, the first author chronicled her current location and her activities while providing up to three visualization concepts that she would find useful on her mobile device in her situation. She wrote a one sentence summary of each idea, detailed enough to be distinctive when returning to the ideas later.

Sample Results

Here we briefly describe a few ideas that emerged from our ideation process.

Productivity Circles: Create circle-based productivity visualization that is filled with circles sized by the time-gaps between mobile device usage. To encourage more time spent without distractions, a mobile might provide a playful circle-based interruption visualization. The display would show circles sized by the time gaps between phone usages. More interruptions cause more and smaller circles to appear on the screen. The person could then use this to motivate themselves to create fewer larger circles—more time in between phone usage (see Figure 2).

My Friend's Picking Me Up: While waiting for a possible ride, we imagined that our mobile device could be more actively used. We already use information about location for buses that should be arriving soon and pickup location for ridesharing services: why not



Figure 3: The result of having used *light my way* is a comfortable walk home on a well-lit street.

between friends? One could send a prescribed message such as “where are you?” to a friend who had previously agreed to share location information. Then, in turn receive a map displaying both your and their current location. The single message triggered location share could reduce repeated polling, while still providing the desired information.

Light my way: When traveling in an unknown city or location, we thought it would be comforting and helpful to know not just the quickest path from one location to another, but the safest. For example, when walking at night in a less familiar place, knowing not just the roads but also the amount location of street lamps could be reassuring (see Figure 3). While maps and route guidance are common on mobile devices, they rarely account for more qualitative aspects of the route. In our example, the shortest route might be less desirable than the most lit. This idea can easily extend to other types of data such as snow plowing, crime rates, etc.

Styled breadcrumbs: When moving to various locations on a trip through a city, a person could create a personalized travel record of their movements. If they could customize (colour, shape, texture) breadcrumbs left on a map to show different trips taken, they could then use it to retrace their steps virtually or plan future trips based on their past experiences as visualized. While this has similarities to many tracking responses, there might be scope in personalization possibilities.

Reflection

While using our ideation process throughout a day, we observed several drawbacks.

- On any given weekday, a person may be stationary for most of the day, thus providing few opportunities for developing distinct task-related concepts.
- Since we, as researchers, are mostly using computers rather than mobile devices, we were not in the mindset of mobile-exclusive visualizations. We solved this by changing position to various locations and performing the ideation task outside of work hours. We encourage others to use this journaling process as they move around to different locations to be able to trigger more situated visualizations in different environments.
- Additionally, as a journaling process, a designer’s ideas and concepts are personally related to them and might not have much relevance to people in other situations and environments. Likewise, they might not ideate solutions to problems they are not experiencing.
- Depending on the duration between ideation moments, one might miss situations that could provide valuable ideas. We chose to perform the ideation moments at fixed intervals to reduce effort from the ideator. By using a timer, the ideator was sure to remember to ideate, thus reducing the impact on their day. However, with our current approach, we could be missing interesting ideation opportunities between the fixed intervals.

Fortunately, as a simple journaling exercise, nearly anybody can replicate this design process, allowing them to generate ideas from their individual situations.

Considerations about the Design Process

We have described an exploratory ideation process specifically for thinking about possible visualizations for

mobile devices. We think that this and similar processes might help us find visualizations that are intrinsic for mobiles. However, we experienced several challenges in using the ideation process.

The importance of location: It was our experience that location was central to the ability to think differently about mobile use. Traveling from location to location is time consuming but seems particularly rewarding for triggering ideas.

Importance of immersion: Beyond simply moving to a location, staying in the same location for a while seemed to trigger more ideas about that location. Immersing oneself in the same task for a while could likewise trigger a new understanding of visualization. This aspect creates particular challenges, since by taking a step back to think about visualization, we stopped being immersed in the task.

Importance of note medium: The situation and design notes were recorded using text on an iPhone to reduce interference with daily activities. An added benefit of using the device being designed for at that moment was to be acutely aware of the size and position of the phone throughout a day. This may have affected the quality of the notes, however, as typing on a phone offers less flexibility than hand-written notes or sketches.

Feeling of awkwardness: While visiting new locations and staying in a given location was useful in generating ideas, staying in some locations felt awkward. Likewise, pausing during an ideation phase could feel awkward. Some places in particular felt uncomfortable for stopping to take journal notes.

Realism: By taking notes and ideating throughout a regular day, we were able to collect ideas with high relevance for the situations that we were in. On the other hand, this also resulted in ideas that are specific to our needs, which might not generalize broadly. We think that exploring how we might expand our process outside of our group of designers could be fruitful and see this as relevant and important future work. It is important that with this expansion we maintain the realism provided by full immersion into new environments. Just as in SPES [6], by being situated in our normal environment, we could design for the world as we saw it in that moment, rather than depending on a second-hand account from another individual or the memories of the impression of a situation.

Ideas for Discussion

- Current mobile visualizations are still commonly smaller versions of larger desktop visualizations. How do we discover the new of potential mobile-only interactions and visualizations?
- The phone as an object can be used in many ways as input and output devices now that they are increasingly a part of people's lives – how do we leverage this for visualization? The research on mobile visualization seems to be disconnected from to the marketplace. Many apps use visualization to show e.g. fitness data. Yet, few papers discuss this area. How do we incorporate existing mobile visualization applications into research?
- Mobile devices' unique sensors provide new opportunities for designing interactions. How might we include novel sensor technology in our ideation process?

We have suggested a new journaling design technique for mobile visualization ideation through a process of repeated situated journaling. At set intervals, a designer records their current situation and some visualization concepts that they would find useful in that moment. Using this technique, we created four design concepts for new mobile visualizations. By proposing this new technique and showing its results, we hope to promote the development of a larger variety of information visualizations for use on mobile screens and in mobile environments.

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References

1. Niall Bolger, Angelina Davis, and Eshkol Rafaeli. 2003. Diary methods: Capturing life as it is lived. *Annual review of psychology* 54.1 (2003): 579-616.
2. Steven P. Dow, Julie Fortuna, Dan Schwartz, Beth Altringer, Daniel L. Schwartz, and Scott R. Klemmer. 2011. *Prototyping Dynamics: Sharing Multiple Designs Improves Exploration, Group Rapport, and Results*. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '11)*. ACM. 2807-2816.
3. Saul Greenberg, Sheelagh Carpendale, Nicolai Marquardt, and Bill Buxton. 2011. *Sketching user experiences: The workbook*. Elsevier.
4. Dandan Huang, Melanie Tory, Bon Adriel Aseniero, Lyn Bartram, Scott Bateman, Sheelagh Carpendale, Anthony Tang, and Robert Woodbury. 2015.

- Personal Visualization and Personal Visual Analytics. *IEEE TVCG* 21, 3: 420–433.
5. Giulio Iacucci, Kari Kuutti, and Mervi Ranta. 2000. On the move with a magic thing: role playing in concept design of mobile services and devices. In *Proceedings of the 3rd conference on Designing interactive systems: processes, practices, methods, and techniques (DIS '00)*, Daniel Boyarski and Wendy A. Kellogg (Eds.). ACM, New York, NY, USA, 193–202.
DOI=<http://dx.doi.org/10.1145/347642.347715>
 6. IDEO. 2003. IDEO method cards. IDEO, San Francisco, CA.
 7. Søren Knudsen, Jeppe Gerner Pedersen, Thor Herdal, and Jakob Eg Larsen. 2016. Using Concrete and Realistic Data in Evaluating Initial Visualization Designs. In *Proceedings of the Sixth Workshop on Beyond Time and Errors on Novel Evaluation Methods for Visualization (BELIV '16)*. ACM. 27–35.
 8. Bongshin Lee, Petra Isenberg, Nathalie Henry Riche, and Sheelagh Carpendale. 2012. Beyond mouse and keyboard: Expanding design considerations for information visualization interactions. *IEEE TVCG* 18, 12: 2689–2698.
 9. Joseph E. McGrath. 1995. Methodology Matters: Doing Research in the Social and Behavioural Sciences. In: *Readings in Human-Computer Interaction: Toward the Year 2000*, Morgan Kaufmann, San Francisco
 10. Megan Monroe. 2016. Classic Techniques in New Domains: An Alternative Recipe. *EuroVis 2016 - Short Papers*, The Eurographics Association.
 11. Jeni Paay, Jesper Kjeldskov, Mikael B. Skov, Nirojan Srikandarajah, and Umachanger Brinthaparan. 2015. QuittyLink: Using Smartphones for Personal Counseling to Help People Quit Smoking. *Proc. MobileHCI*, ACM Press, 98–104.
 12. Ramik Sadana and John Stasko. 2016. Designing Multiple Coordinated Visualizations for Tablets. *Computer Graphics Forum* 35, 3 (2016), 261–270.