City Bug Report: Urban prototyping as participatory process and practice

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ABSTRACT

This paper explores the wider contexts of digital policy, transparency, digitisation and how this changes city administration and the role of the (digital) publics, using City Bug Report as a design case. Employing a mix between design research and action research, the authors exemplify and analyse elements of both the design process, the organisational, the political and technological contexts. They point to the role of researchers and designers in exploring and understanding digital elements of public space as not merely registering structures but also actively engaging in public discourse, providing critique and alternatives as much as solutions. Further research and challenges are discussed.

Author Keywords

Media architecture; Digital Publics; Design explorations;
Urban Interaction Design;

ACM Classification Keywords

H.5.m. Information Interfaces and Presentation (e.g. HCI):
Miscellaneous

INTRODUCTION AND MOTIVATION

Media façades are just one of many ways in which digitisation and novel digital technologies are transforming urban space and how we experience cities. As researchers within the relatively new field of urban interaction design [7], the city and the urban space give us amble opportunity for studying how passers-by interact with media façades and urban screens and how information can be displayed and made interactive. Researchers and practitioners within the field of media architecture and (urban) interaction design have provided rich insights into and methods for how designing and developing media façades and public displays [11, 28, 24], the role of context, content and interaction [15, 26], how media façades can benefit from or be made more engaging and interactive [8, 32, 6], how to evaluate public displays [1] and outlined key challenges when designing media façades[10].

Moreover, Fisher et al.[16] and Fritsch & Dalsgaard[19] argue for moving beyond both interaction, information and utility, and provide interesting topics for further research into the role of media façades and architecture in transforming the public space, spatial models, affective experience and engaging interaction. Thus, the research within the area of media architecture and façades has already made a broad and rich contribution in understanding what happens behind the scene (technology), on the screen (medium/content), in front of the screen (interaction) and potential role in the public urban space (urban experience).

However, when scaling our research interventions to the facade, urban space and the city, the challenges and implications go beyond the spatial context, the technical infrastructure and the directly involved stakeholders. The design and deployment of a media façade become entangled in and conditioned by organisational, political, policy, historical and cultural circumstances, where decisions directly and indirectly affect media architecture, digital technologies and the (digital) urban space are in the hands of actors outside the core project group, e.g. city administration, authorities, urban planners, and is conditioned by both existing policies, historical and local circumstances and relations. Dalsgaard & Halskov[10] touch upon these as challenges related to aligning stakeholders and balancing interests, not only within the primary group of stakeholders (e.g. designers, architects, technology providers and building owners/developers), but also between policy and regulation (e.g. city architectural policy, traffic regulation and urban branding). Similarly, Korsgaard et al.[24] describe how the final decision regarding the conceptual design of a potential media façade in Stockholm was effectively in the hands of the Stockholm city architect. Fatah Gen. Schieck [15] sees the planning system, urban planners and policy makers as gatekeepers in ensuring a sustainable implementation and integration of media screens in the built environment and calls for the (research) community to engage with the planning system and the development of appropriate strategies. We share Fatah Gen. Schiecks position and argue that media architecture and urban interaction design should expand the scope beyond the research themes outline above, and use media architecture as an opportunity to explore the broader political and urban context, thus pushing larger topics related to digital policy, transparency, digitisation and how this changes city administration and the role of emerging (digital) publics.

In the following we present the design case *"City Bug Report"*, a media façade on the city hall tower in Aarhus, Denmark and an online/mobile platform for citizen feedback and reporting issues within the city, regarding any facet of city life. The two constituents (media façade and online/mobile platform) were not technically connected, but share a thematic and semantic link, as the media façade at the city hall tower *outputs* a visualisation of actual open records on civic communication between the city departments and citizens, whereas the web-based cross-platform reporting tool acts as the *input* for said municipal departments around any issue citizens perceive as matters for the city. As such, the media façade and reporting tool is strongly embedded in a political context — it is installed on a iconic landmark on the facade of a building housing both the civil service and city council, with content based on the municipalitys ability to manage and respond to enquiries from citizens and the online feedback and reporting tool offers a public platform for bringing issues to the attention of the municipality and the public. In this particular case, the research agenda is to explore media architecture and tools for citizen engagement and feedback as interfaces between city and citizens, and to understand the role of media architecture as a strategy for prototyping or probing into the digital maturity, policy and notions of transparency at the scale of a city.

The contribution of this paper is first and foremost a thorough account of the media architecture case, findings and reflections, and a discussion of how media architecture can act as a touch point between city stakeholders and means for exploring challenges and implications regarding city policy, transparency and digitalisation. The latter requires some broader contextualisation and reflections, as the process which led to getting 5.500 LEDs mounted on the cultural heritage landmark city hall tower in Aarhus, showing actual information on communications between the municipality and citizens, within a very short timeframe, was rather complex and unsystematic. On a side-note, this, we often find to be the case when engaging in real-world development.

Figure 1. City Bug Report media façade at City Hall Aarhus

The paper is structured as follows: First we present our research approach, followed by a presentation of the design case. This leads to a reflection on and discussion of the case,

findings, challenges and further research in relation to the research agenda and contribution outlined above.

RESEARCH METHODOLOGY

The research methodology is a mix between action research and design research (cf. e.g. [22, 5, 17]), both traditions emphasising change through action. In interaction design research, change often comes both as a novel technology and the socio-technical changes brought about by new artefacts, which, in turn, is a result of a longer collaboration between the involved stakeholders. Both the resulting artefact and the co-design and collaboration in itself are means to investigating the research themes and attempts to suggest alternatives to and engage critically with existing assumptions and current situation. The notion of *urban prototypes* is strongly influenced by what Fallman[14] calls *design-oriented research*, where the artefact and the underlying design process are seen as means to understand and investigate both the present — the existing socio-technical context, issues related to normative values, assumptions, world views and political and organisational tensions — and possible futures, including situating them in complex contexts. The insights gained from design-oriented research could be knowledge for designers e.g. new methodologies, design techniques, implications for design and design exemplars as often emphasised by research through design [4, 33] or insights into the existing socio-technical context, assumptions on the role of technology and society at large, leaning more towards critical approaches, such as provotypes[27] and critical design[13, 3]. Hayes[21] note a similar distinction between design and research in his review and discussion of action research in Human-Computer Interaction. She states clearly that the end product of action research is scholarly knowledge and not a technological artefact as in software development, even though the latter may include participatory or iterative approaches. We understand and articulate urban prototypes in the same way Hutchinson et al. [23] present *technology probes* as a particular kind of probe that combines goals from social science, engineering and design research but with a key difference. While technology probes focus partly on gathering data from the users, urban prototypes are intended for provoking and probing reactions from the stakeholders directly and in-directly involved in the project, as media architecture goes beyond users and enters a larger socio-technical context. Following Hayes, and action research, our research approach embraces that research is value-laden, intervening, represents more than a strict research agenda and has a strong commitment to the particular localised problems at hand. Here Hayes emphasises openness and transparency in the research agenda and both the necessity to formulate and perform the research with the people experiencing the problems.

In the present case, the most tangible and concrete outcome is a particular technological artefact, a media façade and an online tool. These artefacts are used as a means to examine and discuss some of the underlying assumptions around intangible notions of digital transparency, open data and civic communication in a governance context. While much of the technology and the placement of the media façade were given beforehand, we used a two-day workshop with participants

from the municipality, industry, the region and the university to develop a conceptual frame focusing on open data and transparency as both design and research concepts which we wanted to understand and investigate in the context of Aarhus and the municipality. The key design concept — the idea of visualising and working with issues pertinent to the city — emerged from the workshop and was further co-developed with the involved stakeholders. From a research perspective, we see this collaborative approach and the continuous dialogue throughout the process as the prime source of insight on the socio-technical changes brought by the case. Following the project we conducted two longer interviews focusing on the impact of the project on the involved municipality departments and confirming our observations throughout the collaboration. In this paper we will include the responses on a reflective and anecdotal level, due to the low number of interviews and their focus.

CASE: CITY BUG REPORT

The project was born when AHL Lighting Group Limited[1] offered to sponsor 5500 LEDs for the media Media Architecture Biennale 2012 (MAB12) in Aarhus. Together with the municipality we got approval for transforming the iconic city hall tower into a media façade during the biennale running from the 15th to the 17th of November 2012. While the technology and the site were given from the onset we had completely free hands regarding the design of the façade and the content. In 2012 the city of Aarhus launched both a smart city initiative, Smart Aarhus[2] and the open data platform Open Data Aarhus (ODAA)[3], a process the authors were heavily involved in, and we wanted to use the media façade as an opportunity to work with the stakeholders within Smart Aarhus to explore both the potential and challenges in open data and digital transparency.

In September 2012 we invited key stakeholders within Smart Aarhus, local industry, researchers, design students and others to a two-day workshop on open data. The workshop was facilitated by journalist and technology author Ben Hammersley, and the aim was firstly to open up a dialogue on and explore different topics related to open data with the participants, and secondly to develop a focus and series of design concepts for the façade at city hall. The first day was spent exploring which data were interesting for a city and local stakeholders, how and where they could be gathered and what they could be used for which imminent challenges and potential the group could see emerge from the shared exploration and analysis. In the second day, the preliminarily analysis where brought into the context of the media faade on the city hall tower as a design task. The participants developed six design concepts from which the final concept was further developed in terms of how the citizens would use the tool, the role of citizen service and other municipal departments, available data and needed infrastructure. The workshop provided two concrete outcomes for the design case: A conceptual design for the media façade with the working title *City Bug Report*, and

a shared analysis around open data, transparency and civic communication that served as a further inspiration for our research focus.
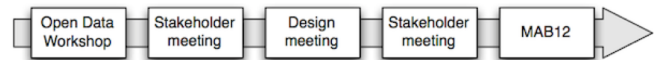

Figure 2. City Bug Report design process

The concept was further developed and refined together with the primary stakeholders: Citizen Service department within the municipality, ODAA, Media Architecture Institute (MAI), a local business intelligence company D60 and us as researchers from Centre for Advanced Visualisation and Interaction (CAVI) and Participatory IT (PIT) at Aarhus University. CAVI and MAI took care of the technical design of the media façade, while CAVI, D60 and ODAA focused on the bug reporting platform, data analysis and content for the façade. Each part of the project was developed throughout a series of design and stakeholder meetings throughout October and November 2012. Citizen Service contributed with the data for the façade and helped co-design the bug reporting platform.

Figure 3. Poster outside the Citizen Service office at City Hall

The initial concept was very simple, we wanted to provide the municipality with a tool that could help map issues within the city with the help of the citizens. Unlike tools such as FixMyStreet[4], we wanted to go beyond simple issues such as potholes and broken pavement and provide the opportunity to report all issues: day-care, health, culture, libraries, slowly moving away from the built environment and into areas and budgets closer to policy-making and more complicated issues. Another aspect in moving beyond a platform for

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[1]http://www.ledahl.net/

[2]http://www.smartaarhus.eu/

[3]http://www.odaa.dk/

[4]http://www.fixmystreet.com/

reporting straightforward problems and then leaving it to the municipality to fix it, preferably as soon as possible, where to make one report visible to other citizens and maybe even other stakeholders within the city and generate a conversation regarding the issue. A part of the concept proposed by the Citizen Service was to use the platform as a way to either pre-qualify an issue, e.g. how many citizens acknowledged and agreed that the issue indeed was a matter of concern? to whom was it a problem and why?, and what were the potential concerns and implications?, or as a place where local stakeholders, e.g. journalists, NGOs, communities, start-ups and companies, could find important issues or potential suggestions for solving a specific issue in a more open manner.

With the title, City Bug Report, we draw inspiration from software development, where a "bug" denotes some form of flaw, error or unintended behaviour in a specific system caused by errors in the source code, bad design or issues related to interoperability across systems and code. In software development bugs present a huge challenge and it is impossible to make a completely bug free system, as many of the issues surface after deployment and when the software is in use. Therefor it has become acceptable that bugs exist, think of the infamous Blue Screen of Death error screen from previous versions of the Windows operating system. One strategy for finding, identifying and solving software bugs, is to let developers, early users in pre-release phases (so-called alpha and beta phases), and even end-users report these errors in different reporting tools and wikis, such as the Linux distribution Ubuntus Launchpad[5] or the more generic Bugzilla[6]. We have adopted the term inspired by the community supported and crowdsourcing approach in software development, the use of digital tools and because we regard the city as a larger system that never reaches a state of fixed it is always "broken" for someone somewhere. Moreover, we wanted to have a link between the tool and the media façade, preferably with live data coming from the reporting tool and the citizens themselves. However, this proved difficult, mainly due to the lack of real data when producing the animation for the facade and the risk that there might not be anything to show for the first few days until the bug reporting tool was more widely used, if at all. We did implement the technical link between the platform and the media façade during the biennale, but we never made use of it as the existing installation was working to our satisfaction and due to the low traffic on the bug reporting platform. Instead we chose to use existing data on civic communication around issues and requests on the façade provided by the Citizen Service department and then connecting what happened at the tower with the bug reporting tool via a poster below the tower and outside the Citizen Service office, see figure 3. The poster is thus a more semantic link, creating a narrative around the media façade and the bug reporting tool, with an open invitation to participate and a link (URL and QR code) to the bug reporting tool.

With the visualisation on the media façade, we wanted to show not only the successful, timely and well-managed communication between the city and citizens, but also highlight

some of the instances where the communication was complicated, either by the nature of the citizen request, the complexity of the internal workflow within the municipality or slow response times from both parties. We envisioned the city hall as a kind of barometer or yardstick for the health and maturity of the digital communication and transparency between the public, citizens and the municipality. If any of the visual representations of the communication raised the top of the tower (i.e. the upper ribbon on the media façade) the communication was slow and requests made by citizens may even be left unanswered, while quicker movements and colour changes between red and blue on the lower ribbons indicated more timely and responsive communication. An ideal scenario from the perspective of the municipality would be thriving activity on the lower levels of the media façade, indicating maturity in terms of digital civic communication and openness towards requests from the public.

Media Façade

The media façade is comprised of 5496 full RGB AHL S25-3 LED pixels distributed onto 13 segments each comprised of either 57*8 LEDs or 48*8 LEDs, with a pixel pitch of 20 centimetres. The pixel LEDs was controlled by four AHL CP950 controllers. Each LED was fastened on a metal wire grid mounted on the outside of the existing railing at the city hall tower.
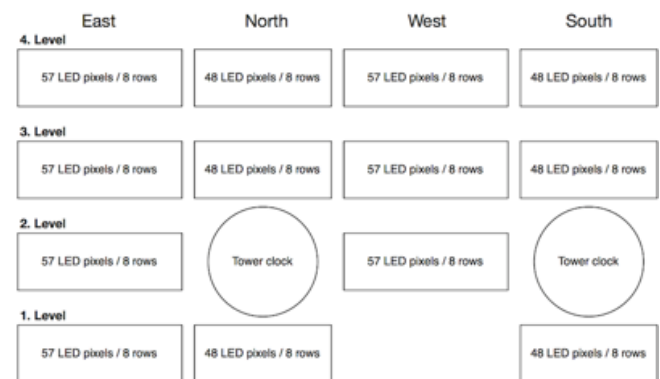

Figure 4. Façade design and LED segments

Figure 4 shows the distribution of the LED segments around the tower, with four vertical segments facing the street (east), three on the park side (west) and three on each side with the clock generating a gab in the media façade.

The content of the façade was a time lapse of specific online communication between the municipality departments and citizens. The municipality of Aarhus has a service called "Postlisten"[7] (literally, the mail-list), where citizens can direct inquires towards the city on specific matters via either email or traditional mail. Once a citizen has made an inquiry, e.g. requesting information, seeking a special permit, generating awareness complaining on specific issues, the municipality is legally obliged to give an answer within two weeks. The answer may come in different ways depending on the inquiry. Sometimes a question is straightforward to answer,

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[5]https://help.ubuntu.com/community/Launchpad

[6]http://www.bugzilla.org/

[7]http://www.aarhus.dk/da/omkommunen/nyheder/Postlister.aspx

Figure 5. Media Façade at City Hall Tower

while others need to circulate throughout different departments and areas within the municipality or requires additional information from the citizen(s) inquiring. A special permit might involve both the technical-, fire- and legal department, and may span several replies from the municipality, while an inquiry on using a school for accommodation at a sports event only requires a single response. Moreover, once something is registered and put on Postlisten, it is open to the public via the municipality website and was frequently used by local news reporters as a source on smaller cases within the municipality.

The time lapsed animation showed four years of communication on Postlisten and was repeated throughout the running time of the installation. The data was parsed and filtered for anything but the case ID, the number of replies and their dates. In the final dataset used for the animation, each case was comprised of the case ID and a number of transactions, with date and direction, i.e. *incoming* if the communication was from the citizen or *outgoing* if the communication was from a city department involved in the case. We chose the colour red to signify incoming request made by a citizen to the city, and the colour blue to signify a response from the city departments to the citizen. The animation was designed so that when a case was born, that is when the first occur-

rence was registered in the data based on the citizen request, a red dot would spawn on the lowest ribbon of the facade. It would then travel horizontal alongside the ribbon and around the tower until a new occurrence happened on the same id. This could be either a second incoming request from a citizen or an outgoing response from the city. If it was a second request from a citizen the dot would retain the red colour, grow a bit in size and jump up to the next ribbon on the tower. It the occurrence was a response from the city, the dot would still move up and grow, but change colour to blue indicating a response from the city. The dot would continue to move up, grow and change colour as long as there where transactions on that particular case ID. If the dot reached the final transaction, it would keep moving around the ribbon for a fixed duration time before disappearing from the façade. A larger white dot would flash every time a new dot was spawned or when a dot disappeared. If the dot reached the upper ribbon it would travel for an extended time and reach the final size regardless of colour. As mentioned in the concept description, the dots should remain at the lower ribbons and stay blue, indicating quick and uncomplicated response from the municipality, and not end up being large red dots at the upper ribbon, indicating slow or lacking response to the citizen request from the municipality.

Bug reporting tool

The bug reporting tool is a simple web-based tool designed for both desktop computers and smartphones. It allowed anyone to explore existing bugs, report new ones and share a specific report via social media (e.g. Twitter and Facebook). When reporting a bug, the user is presented with a tiled interface with different categories mirroring some of the existing responsibilities within the municipality and new ones identified together with Citizen Service department, see figure 6. The categories range from traditional areas within the technical department, e.g. roads, signage, utilities, over family, school, citizen service, health and housing, to culture, libraries, public websites and finally a miscellaneous category to catch anything that does not fit the existing categories (and/or departmental organisation within the municipality). Upon choosing a category, the user is taken to a traditional web-form with three fields, a headline, a description of the problem and a suggestion for improvement. Final page before submitting the report contains fields for contact information, name, email, phone, a checkbox where the user allows further contact regarding the issues and possible solutions and finally a Recaptcha filter. The headline and base description were required fields for reporting a bug, while the contact information was set as required fields and validated as a way of curating the contribution. Once the bug is reported the bug is visible on the list with the given information, see figure 8.

It is also possible to see the total list of reported bugs and go into each one for more information. This is best done via the desktop browser, see figure 7. The purpose here was more to browse the existing bug reports and share these on social media as a way of discussing the issue and further suggest solutions. When designing the visual identity of the design we wanted it to be clearly separated from the design guidelines for the municipality and the municipality website. We used

Figure 6. Smartphone interface for City Bug Report

graphical elements to indicate that this was more a platform for the city and citizens as a whole, and not just a different municipality website.

Figure 7. Browser interface for City Bug Report

Findings

23 bugs were reported in the running period. When filtering away bugs submitted by people clearly testing or playing with the tool, we ended up with 14 legitimate bug reports. After the first few weeks the platform was flooded by spam in spite of the Recaptcha filter. Of the 14 bugs, 12 did put in both a description and a suggestion for a solution. We have not accessed the viability or quality of the solution, it only shows that contributors not only have issues, but are also capable of and willing to suggest an improvement. The 14 reports can very clearly be divided into bugs related to the build environment and traffic, and the reports relating to a particular political case regarding the closing of a specific school in Aarhus. Four of the bugs are pointing out that it is a wrong decision to close the particular school and only one of these provides a suggestion for addressing the problem. The language in

Figure 8. Example bug report

the bugs also varies from concrete and specific descriptions of the matter, e.g. describing the street where the bug is occurring or how the markings the pavement are endangering cyclists, over pointing our more general issues, e.g. the parking or traffic situation in the city is unbearable, to mocking or protesting against specific decisions. The last was most dominant around the more political or general issues (e.g. traffic congestion).

When discussing the concept with the participants from the Citizen Service, and later the communications department within the municipality, three major concerns were raised. The first issue was raised early in the project when the first test version of the bug reporting platform was presented. The Citizen Service department and participants from other municipality departments, that participated through ODAA, were concerned on how to deal with the incoming bug reports. Was the city obliged to fix everything? Who would be responsible within each department? How would the day to day operation be integrated in such a tool? In the subsequent interview, the participant from Citizen Service reflected on this issue in terms of the internal workflow and organisational design of the municipality. The respondent reflected on a more finalised version of the tool and what other elements should be in place for such a tool being well-integrated and valuable for the municipality. Such a tool would both require clear internal and external documentation and communication regarding what would and would not be an issue the which municipality should take care of, as well as requiring an organisational design that allowed more direct communication, coordination and collaboration across, the often very sectorised, departments within the municipality. The second concern raised in the runtime of the platform, where the legal obligations related to reported issues. As it is now, the municipality is obliged to respond to any request within a given timeframe and deal with it with the official workflow and documentation required of a public governmental institution. It was very clear from both the respondents and from the participants in the project, that a more mature version of the city bug report tool would challenge the existing legal framework for case-work and communication between citizens and municipalities in Denmark. The third issues were related to the qual-

ity of the bugs and what level of description that was needed in order for anyone to start addressing an issue. This is also reflected in the incoming bugs and the diversity of descriptions and the level of detail. While the bug reporting platform prompted both reflections upon and discussion of the role of both digital tools, communication and the changing relationship between citizens and municipalities, it also inspired the Citizen Service to work with the concept internally, seek out more information on data visualisation, business intelligence and the emergent topic of big data in relation to their area. According to the respondent, they are both working with the idea of an open hearing portal and showing some of their data on the existing urban screens in the city.

The media façade itself did serve its purpose throughout MAB12. However, the animation and content on the façade was very hard to decipher for outsiders to the project. When explaining it to participants at the Biennale, journalists and other outsiders, it was very clear that the content on the media façade failed to make the civic communication and transactions on Postlisten more accessible, transparent or relevant. On the contrary, it was very hard to explain the project and content to outsiders and the media trying to convey the installation on the city hall tower to the public, confusing and mixing up the actual content. In spite of this, the media façade itself generated a lot of stir inside city hall. One of the respondents explained how the combination of real data from Postlisten and the high visibility was taken very serious at city hall and the participants from Citizen Service noted how they where slowly become more conscious of the potential political implications as the project became more concrete. One respondent expressed in the interview, that they started asking themselves what would happen if the project reached the "frontpage" of the local media. According to the same respondent, the installation generated a nervous atmosphere inside city hall, even though the content of the façade was very hard to decipher. Regardless of the nervousness inside the municipal organisation, the running time of the media façade got extended to the 3rd of December, due to a visit by the Minister of Housing, Urban and Rural Affairs and a board meeting in the Smart Aarhus initiative.

DISCUSSION: CITY BUG REPORT AND IMPORTANT CONCEPTS

In the following we will discuss the project, City Bug Report, and the outcome in relation to three of the topics that have had a strong significance in our own reflections on the project and stand out, in retrospective, as important concepts that points toward further research.

Designing digital publics

In City Bug Report we ended up designing and exploring two different notions of digital public spaces. The media façade was not a public space in itself, it hardly changed that much on the outside in terms of the urban space around city hall being a public space. But the internal perception of a public generated by the installation, in terms of transparency and accountability, created a different digital public space. Just as Bentham's panopticon allowed one to gaze at the many,

the media façade created the sensation of The Public looking over the shoulders of the municipality. In that sense the media façade became perceived as a different digital interface between the citizens, the public, and the municipality. In reality the the façade never gave real sense of transparency from the outside, as the content was simply to abstract, but the facade acted upon the employees at city hall, just as Bentham's panopticon acts upon the individual in Foucault's famous analysis[18]. Showing what happens on the inside of a building or connecting the inside to the outside via media architecture is not an unfamiliar idea, and how this affects not only the urban space outside but also the inner workings of a public institution is a very interesting perspective to explore further.

The platform on the other hand represents a tool that invites the public to participate. The openness in the categorisation and low requirements in the web form allowed citizens to report what they perceived as "bugged" or broken within their city. Not only did the citizens rather quickly provide rich and detailed descriptions of issues within the build environment, they also used the platform as a way to express their discontent with political decision regarding the school system budget. While we are normally sceptic regarding the saying *build it and they will come*, the bug report platform proved that at times issues and concerns can drive participation. Le Dantec & DeSalvo discuss attachment too and the role of issues in forming publics[25]. Here they draw on Dewey's idea of multiple publics forming around specific problems[12] and relate this to the act of infrastructuring[31]. Le Dantec & DeSalvo argue that infrastructuring *"[...] is the work of creating socio-technical resources that intentionally enable adoption and appropriation beyond the initial scope of the design, a process that might include participants not present during the initial design."* Here, the bug reporting platform both becomes a platform for formation of publics through the ability, not only to raise tame issues, but also because it enables the formation of publics around matters of concern, that is more wicked issues[29]. In the sense of infrastructuring discussed by Le Dantec & DeSalvo, the platform enables participation around *future* issues in the city. The interesting element to us, is the balance between designing a platform that allows the richness, broadness and contested nature of urban issue, but also how important the idea of issues is for both participation and the design of a digital public space. The real challenge is how to keep the open and infrastructuring nature in the platform, while also ensuring enough potential for the municipality. If how bugs are described are to open, general, vague or possibly political, it becomes harder for the municipality to act upon these, while a too narrow description, e.g. via a strict template, would ensure the right level from the perspective of the municipality, albeit remove very aspect that may motivate people to participate around specific issues. The latter may simply create a barrier for contributing by either requiring too much specific information (that the citizen may be unable to provide) or simply filter away unwanted issues by creating a template that does not accommodate more open-ended issues and input.

Prototyping what?

We consider the project an exercise in addressing city managers and municipal departments with our installation on the city hall tower. The media façade seem to have a more significant impact on the strategic level and the inside of city hall, than on the citizens and the urban space outside. While we wanted to create something that would get attention on the outside and wanted to increase the transparency from a citizen perspective, our research agenda was to also to explore the digital and strategic maturity of the municipality in Aarhus. We wanted to prototype or test the current organisational perception of transparency and conception of open data and civic communication, through both the media façade and the bug reporting platform. Through both the discussion in the development phase and subsequently in the reflections afterwards, we have clearly made parts of the municipality consider both the potential and challenges in governmental transparency and open data. More precisely, and partly due to us being unaware on the seriousness involved, the Citizen Service department and other participants from within the municipality now seem to have a deeper understanding on the level of the legal, technical and political implications involved in working with the elements involved in the project. Dalsgaard & Halskov[10] describe alignment of stakeholders and transforming social relations as two challenges pertinent to developing media façades. In the context of City Bug Report, we have tried to move beyond alignment and actually tried very actively to push existing perceptions, assumptions and agendas. It is almost given, when you want to expose real data on civic communication within a city, but we wanted to explore some of the implications, changes and unforeseen consequences, in what Dalsgaard & Halskov call transforming social relations, to actively trying to understand the changing relations between the city and its citizens. Here we see City Bug Report both as a prototype, that is a design suggestion for how future technologies could be appropriated by the municipality, a probe into how the municipality and citizens would use such tools and what types of breakdowns they would elicit and finally a provotype existing assumptions and challenge these with alternatives.

But as the scope and scale of urban interaction design and research changes, what are we the prototyping? The technology, usage, adoption, quality, aesthetics or the usability? We initially presented Fatah Gen. Schieck's [15] call to target the planning system, and argue that we could expand this to start prototyping some of the areas where the policy is inadequate, dated or completely lacking. According to raham and Marvin[20] and Aurigi[2], we should not expect the policy or strategic push for more holistic approaches to come from neither urban planners, city managers, industry or sectorised research areas. Aurigi argues that *"Recombinant space can only be dealt with by a recombined discipline."*[2, p.14], that is from the emergent interdisciplinary and transdisciplinary traditions, such as media architecture and urban interaction design[7]. So maybe we should start urbanising technology[30] and use this as an occasion to start prototyping policy, challenges and implications with the aim of providing insights, not only around the media façade, but also for the strategic level within the city. From our experience with City Bug Report, we know that the policy is needed, the stakeholders want to experiment and we most definitely have some insights that can help develop citizen-centric digital cities.

Localist perspective

When reflecting on City Bug Report and how the opportunity to work with potential critical data on civic communication on a media façade placed on a political building, it is difficult to ignore the influence from previous media architecture projects within the vicinity of city hall and our involvement in the local smart city initiative and open data platform. When revisiting previous media façade projects developed in collaboration between city stakeholders and our research institution (CAVI), we see that several projects have been developed close by city hall and in the city centre (see [10] and [8]). In 2007 CAVI created the Aarhus By Light installation on the music hall right opposite of city hall and in 2009 words related to the climate debate were projected on the wall right outside city hall. While there is no direct connection between the cases, the previous projects may have generated both familiarity with media architecture, CAVI and our research, and provided some assurance and trust in our approach and towards the specific project. Moreover, the collaboration between the local stakeholders in exploring the concept of urban data and related challenges, as well as active participation in both the workshop, project meetings and design of the bug reporting platform may also have contributed to success in working with some of the more strategic and risky issues around transparency, public records and digital policy.

This localist perspective is similar to what Carroll and Rosson[9] have showed with their community work and engaging in being *"wild at home"*. Here multiple projects help develop an established local context of trust and mutual development and foster long term patterns of participation across local communities (or in our case community and organisational). They point to higher visibility, shared and even co-developed infrastructure (e.g. resources, services etc. in our case specific data and needed technical systems), forms of participation, the role of geographic place and collaborative methods as key benefits from engaging in multiple projects within the same context over time. This reflects our experiences with City Bug Report and previous projects. If we want to provide input to the generation of appropriate digital strategies for media architecture and the urbanisation of technology in general, we need long term collaboration across city stakeholders and communities, both on a practical level and the strategic level. Here we see the urban prototype as a possible mediator, as it allows us to explore specific aspects of digitisation and collaborate broadly with city stakeholders in articulating the potential and implications.

CONCLUSION

With city bug report we have shown how we have developed a media façade on the city hall tower of Aarhus and a bug reporting platform inviting the citizens of Aarhus to report urban issues from their everyday experiences of the city. By seeing it as an *urban prototype*, we have tried to both provide a very tangible outcome in the form of the media façade

and the online/mobile platform and a way of exploring both practical, technical and strategic issues related to the existing notions of transparency, digitisation and open data within the municipality of Aarhus and the local smart city initiative Smart Aarhus. We found that citizens are willing to both report issues and possible solutions, and that when providing such a platform, citizens will use it to both report everyday issues and more political matters of concern. This in turn challenges how the municipality is organised internally and the existing work-flow around city maintenance, and how cities deal with political issues as matter of concern to the citizens in these emergent digital public technologies. Is it even possible to separate potholes from political matters when inviting the citizens to identify and report what they perceive as broken or "buggy" within the city? We also found that visualising data on complex communications between citizens and municipal departments is difficult and that doing it on a media façade with the presented design does not generate a higher level of transparency directly, nor communicate the potential critical issues to the public. However, it did show that by using real data and making the data highly visible on the facade of city hall generated an internal sense of transparency, that in turn challenged the municipality's sense of accountability. Thus, we argue that by opening up data and putting it in public, without making it intelligible to everyone on the street, it still makes the involved stakeholders reflect on the role of transparency and helps foster a committed discussion on the implications of opening up data and striving for more transparency.

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