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By signing this document, each group member confirms that everyone has participated equally in the making of the project and that everyone is thus collectively responsible for the content of the report.



Quali-Quantitative Evaluation:

An experiment in heterogeneous engineering

Masters thesis in Techno-Anthropology, Aalborg University Copenhagen, by Alexander Luis Manuel Siegfried & Alfred Lund Felumb

Abstract

This project is based on an opportunity to bridge an increased desire for architectural user evaluation in an industry context that currently does not allow it, and the somewhat precarious employment situation a techno-anthropologist might find themselves in. Based on this, this thesis is an attempt at experimenting with quali-quantitative analysis as a means to add a level of scalability to qualitative architectural evaluation. As such, an experiment has been conducted which seeks to fulfil said aim on the Lyngby campus of The Technical University of Denmark with the employment of a mobile app directed at students. As a least-likely case, to test out the boundaries of delegating data collection to students and dedicated digital tools—with the least in-situ involvement of a researcher. This way, the experiment contains the double aim of both producing insights about campus, but more importantly shedding light on the challenges encountered along the way. The result of which has been many challenges, but little data. Despite this, doing quali-quantitative analysis in a 'complementarity'-sense, has proved to still be a viable option.

As such, our project demonstrates a core challenge of data projects: aligning network affordances with the matters of concerns of all parties involved. Where our efforts of translation fell short, we encountered challenges with the following: our perceived legitimacy, owing to our role as students; the trade-off, of offering recruitment incentives external to the goal of the evaluation itself; and by involuntarily relating ourselves to the existing data practices of apps on smartphones. From this, we recommend a focus on achieving transparency, when using dedicated digital tools for architectural evaluation—aiming at concrete matters of concern of the participants you wish to engage with and putting special effort into communicating the outcomes of the evaluation. Based on this, as well as a wider discussion, we argue that the role of the researcher in data projects is much more than just attending to their own research interest: It is a matter of *translating* between tools, methods, participants and conflicting data conceptions—a marathon of interdisciplinarity.

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Introduction

Quali-Quantitative Dreams

From a Techno-Anthropologists perspective, working with qualitative research seems to be an increasingly challenged endeavor. Just from an employability perspective, the closing of our study programme—as well as the rest of Social Science and Humanities at Aalborg University, Copenhagen-seem to fit well with the 'adapt or die' narrative that has been following Anthropology for the last 50 years (Sunderland & Denny, 2007, pp.25-36). To compete with the quantitative sciences, we have to be faster, cheaper and capable of creating 'evidence'. Slight strawmanning aside, the pressure to compete with statisticians, programmers or even Big Data, can seem very real for a graduate. Not to say we disavow the qualities of ethnography (or other qualitative research for that matter)—in fact it plays quite a large role in this project. Rather we see this dilemma as a good occasion to experiment with new methods for qualitative research. Luckily for us, we are far from the first to follow this line of thought-although the rationale behind the development of Digital Methods and Controversy Mapping, is much more imperative than simply 'employability' (Venturini & Munk, 2021 p.1-20; Marres, 2015; Birkbak & Munk, 2017; Munk, 2019; Rogers, 2017). The argument from Controversy Mapping being, among other things, that we need digital tools to study an increasingly digital society (Venturini & Munk, 2021, p. 8. Nonetheless, the "old, sociologists dream" of "single level analysis", serves as an conceptual entry point to what we want to argue here (Latour et al., 2012; Munk, 2019). The 'have your cake and eat it too' notion, that the digital frontier makes it possible to approach both the scale of the quantitative and the depth of the qualitative, encapsulates the dream we see in Digital Methods, Visual Network Analysis or any of the other digital tools or methods that enable this project. However, while the tools for quali-quantitative research keep evolving, the road has lately taken another turn. Cautionary tales like the Cambridge Analytica scandal and similar privacy issues (Birkbak et al,. 2015; Perriam et al., 2020), have made the analysis of social network data (with few exceptions like Wikipedia (Weltevrede & Borra, 2016; Moats, 2019) the sole providence of multinational tech corporations. While this is plenty worrisome in of itself, it puts the digital researcher in a 'baby out with the bathwater' situation. Although there are ways out of this problem, a big inspiration for this project being the Participatory Data Design method of the Techno-Anthropological Laboratory (Jensen et al., 2021), our association with the latter has introduced us to a new branch of data driven research: the Urban **Belonging Project.**

The Urban Belonging Project

The Urban Belonging Project is an interdisciplinary¹ research project, that bridges city planning with visual-, digital- and participatory methods and tools, in order to map "the lived experiences of under-represented communities in Copenhagen" (The Urban Belonging Project, n.d.-a). Partnering with local community organizations, the project invited different marginalized identities to participate in documenting their 'belonging' to Copenhagen, through photo diaries and participatory mapmaking (The Urban Belonging Project, n.d.-a). Though the Urban Belonging project produced many stories and maps about social sustainability in Copenhagenwhat we are interested in here, is the toolkit developed to accomplish this comprehensive task. The centerpoint of this toolkit, and arguably the linchpin of the project, is the eponymously named Urban Belonging App. The app enabled participants in the project to easily map out their walks around Copenhagen, and for the researchers to pose participants "Photo Tasks", prompting them to take pictures of places they encountered along their walks, as well as annotate them (Madsen et al., in review, p. 8). The app importantly also allows for the creation of relational data, for the purpose of network analysis, by giving participants the opportunity to react to the photos taken by other users (Madsen et al., in review, pp. 15-16). From our perspective, we saw in the app (and the toolkit) a platform for conducting distributed qualiquantitative research—and more importantly; a way to retake agency over the data.

The Challenge of Evaluation in Architecture

Taking a step back from the methods, the other half of the equation that makes the Urban Belonging toolkit so interesting to us, comes from another professional context. One that nonetheless seems to mirror the challenges with modern ethnography (and by extension Techno-Anthropology). Through the grapevine of friends and family, we got news of a similar problem within architecture, namely the increasing wish to revisit and evaluate existing

¹Project partners in the Urban Belonging Project are: The Techno-Anthropological Laboratory; Gehl Architects; Service Design Lab, Aalborg University; the Visual Methodologies Collectives; and the Public Data Lab (The Urban Belonging Project, n.d.)

buildings; within the constraints already imposed on the construction industry. To qualify this proposition, we interviewed² two experienced architects with a strong relation to our case:

Charlotte Felumb: Architect with 27 years of experience, currently Market- and Development Lead at ERIK Architects. Has worked extensively with teaching institutions, including the Copenhagen Business School and the Technical University of Denmark (Full transcription in Appendix B).

Lars Steffensen: Architect with 30 years of experience, Partner and Design Lead at KONTEKST; professor at Technische Universität in Berlin for the past 5 years. Has worked with "everything from detail work to city planning"; including the Technical University of Denmark (Full transcription in Appendix C).

Based on these interviews, it seems the thing architects usually want to evaluate on, is simply whether the use of a building fits the vision behind the construction, or if a new, unmet need has arisen (Felumb, Appendix B, 04:37). The specifics are usually relating to the function of the building, but the aim is often either to support a rebuilding or renewal (of said building), or to develop the knowledge base for future projects (Felumb, Appendix B, 08:46, 21:20). As Steffensen puts it: "We learn a lot from our mistakes, but it's also quite costly—architecture is after all a bad medium for experimentation!" (English translation by project group, Steffensen, Appendix C, 14:27). While an unambiguous definition of architectural evaluation is unlikely to be agreed upon, there is an important distinction to make; for this project and in general. The type of evaluation most often conducted, and most methodologically supported, is what might be called "Operation-" or "technical evaluation". With technical evaluation, the aim is usually to quantify certain aspects of a building, from the soundness of the material construction, to how adequately space is managed; and assess if they fulfill the current needs (Felumb, Appendix B, 06:05, 07:38; Steffensen, Appendix C, 03:37). However, in this case, we are interested in a second, 'softer' kind of evaluation. The less supported and not as often done, what we might tentatively call "user-" or "qualitative evaluation". Here the object of evaluation is the lived experience of users inhabiting a building, and if said experience actually corresponds to the goals or intentions with which the building was constructed (Felumb, Appendix B, 14:07,

²All interviews have been conducted as semi structured according to the guidelines Steinar Kvale (2007). Interview guides can be found in Appendix A

15:26). However, while architects might dream of having a better insight into how buildings work in practice, it is often outside their skillset (or timeframe) to do the evaluations themselves. Some tools exist (usually either questionnaires or focus groups), however a more in-depth look at the effect of a building, often requires bringing in outside specialists; like anthropologists, psychologists, or sociologists (Felumb, Appendix B, 10:43, 12:38, 16:11; Steffensen, Appendix C, 10:10). While we would be the first to argue that it sounds like a good idea to bring some ethnography into the mix, the reason why it is so seldomly done is somewhat inherent to the process of generating qualitative knowledge—it is usually both time-consuming and costly to employ anthropologists or other specialists (Felumb, Appendix B, 16:11). Unfortunately, the current way of dividing budgets between "Construction" [Anlægsbudget] and "Operation" [Driftsbudget], means there is often little money left for other things, once the building is completed (Felumb, Appendix B, 26:51). On top of that, the architects themselves have probably long since moved on to other projects (Felumb, Appendix B, 26:51). All in all, it produces an interesting dilemma, where most people can agree it would probably be a good idea to 'evaluate' more, but few have the time, funds or tools necessary to do it. While resolving this dilemma might seem like a bit of a 'golden goose', we see an interesting opportunity for expanding the methodological toolkit with the methods and tools of quali-quantitative research. Although many things can be done to make ethnography (to take an example of qualitative research) fit within the shorter time frames of business (Sunderland & Denny, 2007, pp. 33-36)—moving from the scale of one room or building to the scale of a city, would always present a problem (Steffensen, Appendix C, 12:51). Even if someone was willing to cover the expenses.

Putting two and two together, we saw an opportunity in repurposing the Urban Belonging Toolkit for qualitative architectural evaluation. One that would allow us to test if the users could be enrolled in the task of evaluating, and if the role of the researcher in the field (that we would normally take) could be in part delegated to the Urban Belonging App. Fortunately for us, we had access to what seemed like the ideal place to test this composition out: The Technical University of Denmark.

The Technical University of Denmark

This point finally brings us to the case of this project. Through our previously mentioned associations with the field, we got in touch with ERIK Architects, one of the Clients Advisers [Bygherrerådgiver] at the Technical University of Denmark (DTU). At DTU, they had previously undertaken an ambitious renewal project, with one of the primary goals being to expand Lyngby campus, to better support a steadily increasing volume of students, research, and industry-without eroding the foundations of the study and work environment (Steffensen, Appendix C, 14:27; DTU, n.d.-b; DTU, n.d.-c). After a five year-hiatus



Picture 1: Photographed on Lyngby campus, depicting a huge poster of the "Transforming DTU" project

and the plans to introduce a new light rail, the project, dubbed "Transforming DTU" (Steffensen, Appendix C, 14:27; DTU, n.d.-a; DTU, n.d.-c), was once again picked up—construction work already clogging up many of the major roads around the central campus in Lyngby. From our perspective, and following the case logic of Flyvbjerg (2006), this proved an ideal case for testing whether our proposed composition could be translated from drawing board to practice. Specifically, we saw an opportunity to involve the users of Lyngby Campus, primarily the students, in evaluating how campus facilities supported its primary function: studying. Not only is the challenge of generating useful insight about study environment complex enough to warrant the need for qualitative inquiry (Felumb, Appendix B, 22:29; Steffensen, Appendix C, 14:27)—the practical nature of a campus being its own, self-contained village, also cemented the need for scalability (Felumb, Appendix B, 24:35, 25:48; Steffensen, Appendix C, 14:27). In other words, DTU seemed to represent both a need for quali-quantitative insight and an occasion to try a new way of going about it. Thus, we conclude on the following problem formulation:

Problem Formulation

Using the Urban Belonging Toolkit, how can we produce quali-quantitative insights about the study environment on the DTU campus, Lyngby?

- As a proof of concept, what does this project say about working with dedicated digital tools for architectural evaluation?

An 'Interesting' Experiment

Following from the problem formation, it should be evident that our project stands at a precarious perch between wanting to create insights about something (in this case the study environment at DTU) and wanting to create insight about this *process* of creating insight. Thus, even though any self-reflective piece of qualitative research could arguably be construed as *experimental*, we still maintain that thinking about this project as an experiment, is fruitful in light of the previously mentioned dilemma. Not an experiment in the sense of double blinds, control groups and statistical significance—but an experiment of combining the previously uncombined. Nonetheless, stating its experimental nature is only the tip of the iceberg, as far as conceptualizations go. For that, we have to take a deeper dive into theory. Specifically, our favorite kind: Actor-Network Theory (ANT).

At the onset, our primary role in the project has been drawing actors together—from apps to students to architects, in what could be called a *networking* exercise (Law, 1992). Entertaining this line of thought, we simply strive to connect the previously unconnected, with hopes that the assemblage can produce insights about DTU's study environment (Jensen, 2012, p. 31). As such, constructing such a network hinges on the collaboration of everyone involved, as one kink in the chain of relations could make the whole network come apart. For instance, if we are met with unwillingness from the students at DTU or if the Urban Belonging app does not consolidate to our purposes—the whole project would be on thin ice. Slightly contrived examples aside, the conceptualization of our role as *heterogeneous engineers*, punctuates an emphasis on our project work as a process of *translation* (Law, 1992)—a term, which we would argue has many synonyms in ANT, be it *enrollment* (Callon, 1984), *interessement* (Akrich et. al, 2002-a) or *thinking* (Björgvinsson et al., 2012). Common among these, is that they refer to the *ordering effects* at play in actor-networks and hence what actors-networks do to maintain their *stability*; i.e. how they persist (Law, 1992, pp. 385-386; Latour, 1990; de Laet & Mol, 2000).

However, ascertaining this mechanic of networks and their effects, does nothing to prescribe the qualities of the insights we seek our network to produce. Furthermore, it complicates matters when the line between description and prospection gets blurred (Vikkelsø, 2007)—in fact, we would argue that the sole goal of the experiment was to describe network effects, it would be built on a false premise of circular reasoning. Something more is needed.

Taking on Bruno Latour's idea to *articulate propositions* rather than *stating facts* (2004-a, pp. 206-214), allows us to both position the type of knowledge produced, as well as partially giving aim to the way we go about producing it. Meaning that our role in the experiment, beyond drawing actors together, is to maximize the occasions for them to *articulate*, and that such *articulations* conveniently can be used to make *propositions* (Latour, 2004-a, pp. 212, 219). Importantly, Latour points out that his conception of *articulations* is not limited to the logocentric sense of the word, but as a means to describe the phenomena at hand (2004-a, pp. 212, 219). The silver lining being, a general move away from *correspondence theory* (Blok & Jensen, 2011, pp. 26-27). By extension, we view this as an opportunity to put emphasis on the process, beyond the findings themselves—not just to ground our research. However, taking the mantra of "the more mediations the better" to heart (Latour, 2004-a, pp. 210-211), neither qualifies the conditions nor the outcomes of the experiment. In other words, while writing *about* our experiment (and what it articulates about field, methods, and theory) might very well be interesting, it does not justify what makes the experiment *interesting; in and of itself*.

The use of "interesting" is deliberate, although the word itself carries very little meaning (which ironically makes it a candidate for ANT's long-standing tradition of using "bad words" (Latour et al., 2003, pp. 18)). It is a good word, however, for asking an important, but deceptively difficult to answer question: what actually makes interesting research? Following Despret (2006), interesting research is not always the product of studying the things researchers are most interested in. In the field of ethology for example, researchers often choose to study primates; owing to, among other things, their expressive behavior and willingness to interact with researchers (pp. 4-6). Less expressive animals, like sheep, thus rarely catch the interest of researchers:

"[...]"they cannot really effectively protest. A cow, you have to treat with a little more respect, because they are bigger than you are. With sheep, you can do what you like, they don't make any obvious protest, they just get miserable."(11) As the etymology of the word

reminds us, to protest means above all to testify. And that is precisely where sheep's problem lies: they have never been able to testify to what interests them since whatever it is that might interest them has been offered no affordance, no possibility of articulation with what interests those who attest on their behalf." (Interview as cited in Despret, 2006, p. 4).

For Despret (2006), *interesting research* has the capacity to produce interesting or unexpected results. However, when faced with the passiveness of sheep, a new device was needed. Thus, when having 22 sheep subjects, Despret introduced a 23rd bowl of food, thus providing a "polite" way for the sheep to surprise the researchers—and articulate new things about the social intelligence of sheep. We have already established that the project—and by extension the experiment—puts plenty of things at stake: We want to make a relevant contribution to qualitative architectural evaluation; we want to produce meaningful insight into the study environment at DTU; and we want to challenge our own role, as researchers, in relation to making data *with* participants. So, what is our 23rd bowl? While our preconceptions from literature on how *networks* are achieved, tells us that making something like this happen is usually a matter marshaling all the 'dirty tricks' one can muster, of allying with the right materialities (Akrich et al., 2002-a; Callon, 1984, Latour, 1992; Law, 1992)—we want to briefly disregard this notion, to find a starting point of the experiment, by assuming a naïve commitment to see how 'hands-off' we can make this process.

So, are we arguing that we should treat students as sheep? Hardly. But we do subscribe to the notion that one of ANT's many contributions to empirical writing, is as an estrangement device (Latour & Woolgar, 1979, p. 29). A way of radically re-describing the world and producing new and interesting stories about humans, non-humans, and everything in between. Thus, we encourage the reader, not to take the following as an attempt at describing how the world is— but as an examination of performances of different ontologies. Metaphysics aside, this means a practical commitment to writing ontographically—of softening the boundaries between theory, method, and empirical data (Gad et al., 2015; Winterheik, 2015). In other words, taking a reflective stance on our own process, as we write about it.

Project Overview

Before we get ahead of ourselves, we briefly want to sketch how our research design has formed the structure of the project. Based on the succession of events, the following three chapters describe and reflect on the months of which the project took place: August, concerning the planning, setup and making of the query design, and PR materials; September, concerning the recruitment of students on DTU and the challenges associated with the data collection; and October, concerning the data output and its analysis.

August: Planning & Preparation

Stakeholders

The first and foremost challenge of planning our data collection was to figure out what to actually *ask* the students. With inspiration from Participatory Data Design (Jensen et al., 2021), we knew the participation of students was tantamount, but we also had to consider who the recipients of the outcome could be and who could help us make the more practical aspects of the project come to fruition. As such, we ended up with the following three primary stakeholders:

ERIK Architects, as the primary receiver of the project findings, would serve as the foundation for the architectural perspective. Conveniently, they also served as an access point to DTU, owing to their status as Clients Advisors on Lyngby campus—and as a way for us to get the funds required for posters or recruitment incentives.

Polyteknisk Forening (PF), being the primary umbrella organization for student activities at DTU, both serve as a way to include a student perspective in the query design, as well as being the de facto gatekeepers for dealing with students at DTU.

If PF is the gatekeeper, Campus Service is in many ways the obligatory passage point (Callon, 1984, pp. 7-8) in terms of formal permissions. Apart from that, their own involvement in the campus rebuilding meant they had an interest in the outcomes of the project.

Through a series of meetings, where we briefly detailed the aim and scope of the project, we discussed with each stakeholder in turn, what they could be interested in, in terms of evaluation, and how our project might help address said concerns.

From Campus Service (CAS), we got in touch with one of their project managers in charge of the study start evaluation. Based on CAS' own evaluations, their primary interest lay in the areas hard to cover via questionnaires. They also seemed quite interested in the aims of the original Urban Belonging project, and thus requested we include questions pertaining to students' "sense of belonging"—specifically, where different study programmes felt "at home" on campus (personal communication, August 12, 2022).

We also spoke to the "socio-political coordinator" of PF, who expressed interest in a number of specific concerns on campus. Apart from well-known issues like poor indoor climate and acoustics—the construction work in the 2nd quadrant³ caused concerns from some students regarding outdoor lighting (personal communication, August 12, 2022). The unavailability of lecture rooms in building 208, meant some students had their lectures displaced to other buildings—often in the evening. This in turn meant that many places around campus felt unsafe for students, as it lacked adequate lighting (personal communication, August 12, 2022).

Finally, we met with four architects from ERIK⁴. During the meeting, we discussed a number of points of interest (as well as methodological considerations). Firstly, they were interested in how well campus facilities supported social activities, such as where students would run into friends or where they would go to hang out. Second, they were interested in where students preferred to study, felt productive or simply what their favorite lecture hall looked like. Finally, they were interested in what made students feel inspired or motivated. Specifically, how (and if) the students perceived life "inside laboratories", where they felt inspired or interior design had an impact on their motivation (personal communication, August 16, 2022).

³ The DTU campus in Lyngby, is divided into four quadrants (DTU, n.d.-d)

⁴ 1) Market- and Development lead, 2) Framework Agreement lead for DTU, 2) Partner and study environment lead, 4) Partner and evaluation lead

Based on these meetings, all we had to do was to translate these interests 'into the app'. However, before we get so far, we need to describe how the app actually functions.

Urban Belonging App Functionalities

The Urban Belonging app's primary function is centered around users answering "Photo Tasks". A Photo Task is simply put, a prompt put forward by the researcher, asking users to take pictures of something.

At the user level, you have three options, on how to respond to a Photo Task:

- Take a picture
- Go for a walk
- Start a reaction round

The first option allows a user to take and annotate a picture. The picture itself has to be taken with the app to collect metadata like geo-tracking and timestamps, and to make sure all pictures have the same formatting, making algorithmic sorting easier (Madsen et al., in review, p. 13). Once a picture has been taken, the user is prompted to reply to the



Picture 2: Screenshot of the interface of the Urban Belong App, depicting a) taking and rating a picture, and b) assigning tags

statement: "Do you feel this is for you?" by rating the subject of the picture on a scale from 1 to 5, as well as picking one or more tags (including a user generated one) from the list. Originally, we wanted to customize the text in the slider and the list of tags based on our stakeholder's concerns. However, while the app is open-source, it is not developed to be malleable on a project to project basis, as we learned from the developer, that any changes of

text in the app would affect all users and projects across all languages (I. Kettles, personal communication, August 16, 2022). Alternatively, developing and publishing our own version of the app, using the source code (Urban Belonging, 2022-c), would be outside the scope of this project. Nonetheless, we did verify the list of tags with the Architects at ERIK, from which we found them to be adequate for our purposes.

The "go for a walk" option, allows the app to track a user's location throughout the entirety of a walk, plotting the Photo Tasks responded to, along the way. While the original Urban Belonging project relied heavily on this mode of engagement (Madsen et al., in review, p. 8), we considered it would be too much to ask the students to take time out of their day, to walk around campus, taking time out of their day. Furthermore, we did not plan to introduce students to the functions of the app through a workshop, the communication of what we



Picture 3: Screenshot of the interface of the Urban Belong App, depicting a) position tracking when "going for a walk", and b) submitting and naming a walk

wanted the students to actually do had to be relatively self-explanatory. Thus, we opted to focus on primarily the "take a picture" option, the rationale being that it would be more akin to students existing data practices of using various social media apps to take pictures.

The final option, "Start a reaction round", allows the user to react (by rating and giving tags) to 20 random pictures, taken by other users. Having participants do Reaction Rounds is an



Picture 4: Screenshot of interface of the Urban Belong App, depicting a) reacting and annotating a picture, and b) a Photo Task giving the option to "Start task" or "Start a reaction round"

opening up the possibility of network analysis (Madsen et. al, in review, pp.15-16). Apart from this, we also knew it would be important to think about how to get students to engage with, and hopefully reflect on, their surroundings on campus (Madsen et. al, in review, p. 16). In this sense, we hoped exposing them to pictures taken by other might 'provoke' students, interesting responses—no matter whether they agree or disagree

with the sentiments of the other students.

While this covers the basic functionalities of the app, the Urban Belonging toolkit also contains a number of scripts intended to help with data processing (Urban Belonging, 2022-d). Nevertheless, it should be clear by now, that the app is formed by the aims of the original Urban Belonging project. While most of the broad features fit our experiment, things like changing the text in Photo Tasks and Reaction Rounds, would require us to launch our own version. As such, the primary thing we could control was the query design-that is, how to manage the prompts given via the Photo Tasks.

Query Design & Methodological Considerations

Making the query design was largely a matter of translating the concerns brought forth in the stakeholder meetings. Despite this, we fully recognize that even defining what constitutes a "study environment"-let alone how to go about describing it-can be a complicated affair (Steffensen, Appendix C, 12:51, 14:27).

Nevertheless, by virtue of relating the case to the field of architecture, a clear emphasis on the physical locations seems straight forward. In a more ethnographic sense however, it is not to say that we consider the "study environment" of the DTU limited to the confines of its campus grounds. Rather, we consider it multi-sited, fractured and distributed (Marcus, 1995). By extension in a material-semiotic sense, asking such questions is a means to elicit performances about the physical surroundings (Mol, 2003)—not a matter of correspondence. Luckily, we were not alone in qualifying the questions to be posed in the app. Based on methodological and case specific considerations, we had a final meeting with the architects from ERIK, where we collectively settled on the following themes: Social Life, Study Activities, and Motivation/Inspiration (personal communication, August 30, 2022).

Originally, we contemplated having a fourth theme, relating to "a sense of safety or comfort", but ultimately, we decided against it, as we found it problematic from a research ethics perspective, to actively encourage students to seek out places they felt unsafe in. However, this fourth theme made an occasion for reflecting on the type of questions we would pose. Specifically, it puts into question what type of affective responses we should appeal to. In the sense that we could either focus on the positive aspects of campus, the negative or settle on more neutral, open-ended questions. Here, we chose to focus on affirmative questions, as the interest from DTU (Steffensen, Appendix C, 14:27) and ERIK's side (apart from the methodological findings) where and which features of campus, new facilities should be based on. Not to mention that students, at least in our experience, can always find things about their university to complain about. We also decided against posing more neutral questions, as they would be tied to the 'Do you feel this is for you'-slider, which is based upon the conception of 'belonging' from the original project and hence not being able to accommodate the four themes in this project. Apart from this, the 'hands-off' approach meant we did not want to rely on giving participants information through a workshop or similar, so the Photo Tasks in the app had to be relatively straightforward and self-explanatory. Additionally, DTU being primarily an engineering university, we thought it best not to pose too vague or "fluffy" questions. We were however under no illusions that posing questions in such a distributed manner would allow us to control how participants responded. Rather, thinking about the Urban Belonging app, as a platform for making Mobile Probes (Albrechtsen et al., 2016), we argue that it might actually be an advantage to allow room for users to reappropriate how, and to what ends, they wanted to use the app. Specifically, Mobile Probes can be described as exploratory tools, centered on the user's subjective world, as a means for self-documentation (Mattelmäki, 2005, pp. 86-87). Furthermore, making the link to Mobile Probes is also fitting, as they are design-oriented and lead to open-ended outcomes (Mattelmäki, 2005, pp. 86, 93). Specifically in relation to our initial conception of asking "interesting questions", by giving students the opportunity to express themselves in different ways; and potentially surprise us in the process. As such, we ended posing a mixture of specific questions, ranging to more open-ended ones, while trying to keep them relatively self-explanatory:

Social Life

With this theme, we take interest in where you go to be social, connect or just hang out on campus, outside of formal study activities.

- What is a good meeting spot?
- What is a good place to hang out?
- Where do you often run into people you know?
- Where do you feel at home on campus?

Study Activities

This theme is about the places around Lyngby Campus (inside or outside) you find is good for studying.

- What is a good place to study?
- Where do you feel most productive?
- Where do you like to do group work?
- What is your favorite auditorium?

Motivation & Inspiration

This theme is about what parts of campus elicit feelings of inspiration or motivation. This could be because of one of the many laboratories around campus or any other reasons you feel inspired.

- Where do you feel inspired and/or motivated?
- Where is research most visible to you?
- Where do you feel an academic sense of belonging?

So far, apart from a few problems with the app, it had been relatively 'smooth sailing'. While we would not go so far as to claim the 'strength of our idea' had carried us, there had been remarkably little resistance in creating our "network". But, as it often goes when plan meets action, careful strategies and constructions start to crumble. New resistances show their head, and you have to adapt, to stay afloat (Akrich et al., 2002-a).

Recruitment Effort

With the query design in order, we set about planning how to recruit participants for the project. Owing to our dreams of a distributed data collection, we had to get information to the users in a hands-off way. The easy solution for that particular problem was to create a website, which we dubbed "Campus Life Perspectives" (n.d.). Said website details the basic premise for the project, as well as necessary information, like where to get the app and how users' privacy is handled. We also made a number of subpages detailing the project and guiding the user on how to use the app. Apart from the website, we also made a poster to serve as the visual



Picture 5: Poster made for recruitment, in accordance with DTU standards on posters

side of social media efforts, and with the intention to hang them on posters on campus—if not as a recruitment device, then at least to remind participants that the data collection is still going

on. However, even though the experiment required us to be hands-off about the process, we still needed a plan in case posters and social media was not enough⁵. Specifically, we planned to set up a stand on campus, handing out coffee and candy as an incentive for. sign-up. With all this in hand—and our perceived alliance with Campus Service and Polyteknisk Forening—we thought it would be a relatively trivial matter to set up posters and coffee stands. As we soon experienced though, doing anything on DTU, as an outsider, can be quite the undertaking.

September: Recruitment and Data Collection

On-site Difficulties

As mentioned, we wanted to put up posters on campus, and we wanted to have the option of setting up a coffee stand. However, in order to prevent flooding the students with offers all the time, DTU has a rather strict policy for 'outsiders' advertising on campus. In our case, this proved quite the challenge, as said policy is primarily aimed at external organizations like startups or other companies-meaning our student project ended up 'falling between two stools'. Usually, we got the impression that internal student projects would be handled through Polyteknisk Forening or Campus Service but seeing as our project is neither a startup nor a DTU project, getting the requisite permissions was quite the merry-go-round. As an example of some of the obstacles: When posters had to be put up, it was customary to pay PF 4.500 DKK ex. VAT. to do the job (quite the steep price-tag from a student's perspective). Similarly, ordering coffee from the cafeteria service, required being registered as an official company or organization with an EAN-number. DTU being a big organization, also meant having 'narrow' definitions of responsibility, both regarding student organizations and administration, making the already difficult job of navigating an unfamiliar institution and its rules as well as figuring out who to ask what and how-a challenge in and of itself. Through this process, we also got the feeling that our somewhat unclear status did not help. As (to take one example) mail threads would often show our requests being 'bounced around' between different offices and administrations-sometimes all the way round to the first person we wrote to. Nonetheless, after a week's worth of relentless mail writing and 'kicking down doors', we got permission to

⁵ Based on advice from Marco Pernarella, regard to own experiences, working with the Urban Belonging App (personal communication, August 11, 2022)

both put up posters ourselves and order coffee for our stand. This also meant that our primary recruitment effort the first week, consisted of a post on Facebook made by PF on our behalf, and one on "DTU Inside" (their intranet), made by Campus Service—netting us our two first sign ups. The institutional resistance we encountered, also meant our first coffee stand sadly had to be without coffee. While somewhat defeating its purpose, it did however provide a valuable lesson for our experiment.

Friday, 9/9, 10:00-12:00 (16:00)

Our first attempt at in-person recruitment was, with only mild exaggeration, an astounding failure. Due to construction work and associated materials filling up the hallway we were in, the only free space to set up our table, was right next to the cafeteria entrance on the 'landing strip' of Lyngby Campus' central building (Building 101, entrance D)—often referred to as the 'mothership' by the people at ERIK (personal communication, August 16, 202). In practice, this made the social situation of trying to catch people's attention pretty unpleasant. Students were usually either in a hurry to or from a lecture or lunch-and the few students who actively passed by our stand, were all on their way to more important business—as we had inadvertently placed our stand right next to the toilets. Realizing that we could not order coffee yet, we had settled on bringing as much candy as could possibly fit on our table, which sadly got more attention from contractors with a sweet tooth, than it did from students. All in all, it was hard not to feel sympathy for 'street-canvassers' trying to convince busy passersby's to donate money to charity. Of the few we did manage to talk to, most shied away as soon as we mentioned "research" and "download our app". After two hours and only one new signup, we decided to move on to greener pastures. As we already had to put up posters and distribute flyers, we allied with an acquaintance on campus, and took a round trip to all the different "Friday bars" around campus. Nonetheless, while we did get rid of most of our flyers and posters-drunk students turned out to be enthusiastic, but ultimately bad candidates for 'complicated' instructions on how to download and use our app. We came away with one positive experience however: The various people we requested help from that day, the ones without any formal responsibility at least, proved very kind and helpful compared to the somewhat bureaucratic reception we were used to by now.

Monday, 12/9, 7:00-12:00

The following Monday, we set up our stand—now allied with a 12L coffee jug. While we learned the hard way that 7 AM is way too early to ask students anything—the free coffee definitely did its job. Armed with a cautious sense of optimism, we happily talked about our project, handing out flyers and coffee in the process. At the end of the day, having given out over 50 cups of coffee, we had only gotten one new signup. Thinking about this in material-semiotic terms, it was clear we needed to adapt our approach to better suit the circumstances. In the language of Latour (1992) we needed a stronger program to counter the anti-program of busy, uncooperative students—we needed to move the frontline on which we engaged the students. Hence, we decided to focus less on noble research intentions and more on what the students would have to do to get their free coffee. From now on, students would have to sign-up to get their free cup of coffee. We also restructured our website, moving away from the research aims we thought made the project worthwhile, and focusing instead on what students would have to do and what *they* in turn would get out of it.

Thursday, 15/9, 9:00-12:00

Thursday a week later, we came back with more coffee and more flyers. This time, based on the advice of an acquaintance studying at DTU-we had moved our stand from the space between the student cafe and the cafeteria, to the other side of the cafeteria, across from the library. This proved a much easier space to engage students in, as people on their way to the library to study, usually had better time to stop and talk, than people on their way to class or lunch. Taking a more firm approach to sign-ups also paid off. At the end of the day, we had gotten over 35 signups. However, juggling the act of persuading students and helping them with the sign up, while also (manually) having to assign them to the right photo tasks on the API side of the app-further emphasized how the app was definitely not designed to recruit people on the spot. Having to first enter their student mail, then wait for and enter a verification code, create a username and a valid password, only for them to wait on us to actively assign them their tasks-we do not blame students for having lost interest by then. That is, if the app was even accessible to students. As the app was intended to accommodate different languages, it meant that it did not switch to English localization by default. Thus, locking people with unsupported language and localization settings out. This also highlights another interesting dynamic of recruiting students to our project: most of the Danish speaking students we tried to talk to, would simply respond with a "no thanks", while international students would often approach us on their own accord. Whether due to the library being a place of study mostly used by expats⁶ or expats just being more outgoing than Danes, we do not know. But it is definitely noteworthy, in the sense that it would be easy to expect expats to have less of a stake in a university they might just be visiting for a semester, than those who will probably have to stay there for several years to come.



Figure 1: An example of the 'new' strategy for recruiting student. It illustrates what students are expected to do to get rewards.

In any case, we now had over 40 participants signed up in the app—but still, only very few pictures taken. We thus decided to move the frontline yet again, adding the additional 'carrot' that you could now also win a gift card for the nearby academic bookstore—if you also took at least 3 pictures in the app. Even if the gift card, as one student remarked, was only equivalent to "half a book".

Tuesday, 20/9, 10:00-14:00

Next week, we were not the only ones advertising stuff by giving out free coffee. Emblematic of the strange character of our project, we were situated between a student stand, promoting a free evening seminar—and a startup promoting their reusable coffee cup subscription service. While this triple booking was due to miscommunication, specifically a booking system we had not been informed about, it did force us to change the approach of the 'elevator pitch' we were giving students. Having to compete with two other booths—one of them handing out free coffee expecting nothing in return—we had to become more insistent. Just like with the

⁶One older student confided in us that most Danish students would not even do their studying on DTU, preferring spaces with more room for that type of activity, sometimes even including other universities

redesign of our website, we decided to *enroll* (Callon, 1984, pp. 10-12) another non-human actor: all the construction work blocking the roads on campus in preparation for the light rail. Instead of leading with "help reinventing how qualitative architectural evaluation is done" and focusing on the research aspects, we decided to go with "You've probably noticed all the construction work, well it's only going to get much worse...". However, while being more forward in our pitch did help bring students over to our stand (including Danish students this time) it further exacerbated a problem we had faced throughout our recruitment efforts: Legitimacy. Many students who would come and speak with us, would assume we were either speaking on behalf of DTU itself or were making a start-up. Which, understandably, provoked a fair amount of skepticism regarding the effect of our project, once they learned we were 'simply' another student project. Some students even deemed our project "unserious", due to its methods "not being technical enough". Specifically addressing problems on campus, also caused students to confide their complaints to *us*, rather than downloading or using the app. At the end of the day, however, we had gotten more sign ups than ever before—but still very few pictures.

Tuesday, 27/9, 10:00-14:00

Our last day recruiting on campus was pretty uneventful compared to the others. There were no miscommunications with double bookings or coffee delivery-and based on our previous changes in approach, we relatively easily recruited another 30 or so students. Regardless, we still had a problem with actually getting students to use the app-even if just to take pictures of each other drinking beers. Thus, during the last week or so of the project, we had enlisted yet another non-human actor in our cause: push notifications. So far, we had used the API's functionality of sending out push notifications to participants using the app, to remind of our presence on campus when we were there. Instead, we sent out a notification every weekday. The contents did not seem to matter much; we tried reminding users how to use the app, when we would be back and so on-ultimately settling on simply "You have x days left to take 3 pictures and have a chance to win a 300 DKK gift card for Polyteknisk Boghandel". Regardless, push notifications always seem to elicit a couple of pictures—likely serving as a reminder to the few students who were actually interested in participating. The only caveat being, that the pictures the push notifications did seem to produce, would usually just be of students' immediate surroundings, creating a plentitude of snapshots of study areas, classrooms and social hangouts. We had also sent out a survey, in the hopes of getting some much-needed metadata on our otherwise anonymous participants. Based on interest from ERIK, we wanted to map out responses, based on study programme, year and whether students were international or not. However, like with the challenge of getting sign-ups to actively participate, not even the promise of gift cards or coffee was enough to make people respond. Out of time and money for 'free' coffee, we thus set about contending with the data we had.

October: Data Analysis and Presentation

Data Output Overview

It should probably not come as a surprise by now, that the challenges with recruitment also

extend to the data. While we ultimately had a total of 101 sign-ups during September, the final tally of Photo Tasks completed was only 40. Even of the 17 who participated, photo-output varied—the majority of the pictures came from a few users, while most participants

only took one or two.



Figure 2: Bar chart depicting how many students (y-axis) had taken how many pictures (x-axis)

The spread of answers across the three themes were fairly equal, compared to the number of questions—with participants favoring more straightforward questions, like "What is a good place to study?" (8 responses), compared to more abstract questions like "Where do you feel an academic sense of belonging?" (0 responses).



Picture 6: Picture taken in response to the Photo Task, "Where is research most visible to you?"

A cursory examination of just the pictures, also reveal a varying degree of commitment to the tasks. Several pictures—specifically ones of people drinking beer or the ones too dark to see anything on—do not appear to be addressing the Photo Task. One participant even responded with a picture of us and our coffee stand, when asked "Where is research most visible to you?".

While gauging the context of the pictures, especially with sparse annotation is difficult in and of itself (Munk, 2019, p. 163), problems with the accompanying metadata does not

help either. Between modern privacy policies on phones and some users not opting in for the geo-tracking function, only a quarter of the Photo Tasks have coordinates attached. Apart from missing geo-data, an unknown bug with the software, also caused four Photo Tasks to lose their associated tags and sentiment rating (Urban Belonging, 2022-b). All in all, the data very much bears the resemblance of "broken data"—full of holes and imperfections (Pink et al.,

2018). In our experience, when dealing with user-generated data (in this case, quite literally), it is oftentimes *more* messy than when dealing with 'machinegenerated' metadata. In fact, as mentioned initially, we expected users to appropriate the app—or at least reinterpret how to use it differently than we intended. In any case, whether due to a human-, technical- or altogether third element, our broken data still has a story to tell.



Figure 3: The 10 pictures which had location data, plotted in Google's "My Maps", lines added to emphasis the borders between the four quadrants

Data Stories

Despite challenges with the data, we prepared for further analysis by making a collage of the pictures taken (Appendix F), with the help of the various scripts included in the Urban Belonging Toolkit—and did a workshop with the architects at ERIK (Appendix G). As the dataset is relatively small, it was also relatively approachable from a purely qualitative standpoint, the pictures themselves became the starting point for the analysis. Looking at all the pictures together, the majority (19 out of 40) are of study or meeting areas—all of them open-spaced. Indeed, all of the pictures (according to ERIK and the geo-data) stem from either the 3rd quadrant (which has recently had a number of new study facilities built) or from building 101 (housing both the library, the primary cafeteria and much more). According to the architects, this would coincide with the students valuing a social presence of other students, as well as architecturally and aesthetically good interior design, including soft and comfortable furniture (Appendix F, pictures 6, 15, 19, 20, 25, 27).

One comment also specified, that although most of the study areas are open-spaced, many of the specific pictures indicate that students also prefer, when furnishings create a "room-withina-room" to study in (Appendix F, pictures 13, 14, 20, 29). The pictures of indoor social spots are somewhat predictable, according to the architects, in that most of them center around the cafes, cafeterias, Friday bars or just a coffee machine (Appendix F, pictures 6, 8, 10, 12, 38). Outdoor places, comparatively, feature green areas, often good weather, and activities (like a basketball court) nearby (Appendix F, pictures 3, 5, 7). While we included network visualizations in the workshop, focus was predominantly on the pictures, not the annotations or visualizations (Appendix G).

It is also worth noting that all of the pictures have a rating of 3 (out of 5) or higher, showing that although some students seemed quite keen on complaining, all of the places showcased have a neutral to positive relation to the participant who took the picture. Speaking of interpretation, while the "Motivation & Inspiration" theme intended to elicit responses regarding how students might feel motivated by research or business activities on campus, participants seem to have taken it quite literally—showcasing either food, sports or beer as motivational factors (Appendix F, pictures 31, 32, 33, 35).

Taking a step back from discerning the qualities of the pictures, we want to establish the conception of quali-quantitative analysis—as it so far has been emplaced as a 'dream' reinforcing our project ambitions. Looking towards Munk's definition of quali-quantitative analysis (2019), we have to consider that our project hinges on a fundamentally different premise. Namely, that in our project, we are in charge of producing data points for our analysis—rather than procuring them online (Munk, 2019, p. 162). Furthermore, a common thread is the need for vast amounts of data for some methods to work (Munk, pp. 169, 174), something we cannot boast about our dataset being. While this discrepancy does not completely disavow our action space, it is rather limiting in some senses. Specifically, regarding *algorithmic sensemaking*, in which relational reasoning typically associated with qualitative fieldwork (revealing emic ordering effects) is emulated quantitatively through techniques like pattern recognition (pp. 159, 164, 172-174)—or *single-level analysis*; in which large volumes of data allows macro patterns to emerge as the product of interactions at a micro level of phenomena, hence embodying both (pp. 159, 164, 168-171).

The prior pertaining to a strong aspiration of ours—had we, say, a 100 pictures or more—to use the tool Pixplot, a computer vision algorithm that uses a convolutional neural network technique to detect feature similarities in pictures and cluster them accordingly (Yale Digital Humanities Lab Team, n.d.). The goal of doing so would have been to view the connections between metadata and the feature commonalities; e.g. showcasing how certain sentiments can be associated to specific features in the pictures they represent.

Wishful aspirations aside, what we are left with, however, is an approach of *complementarity analysis*, as it allows for a mixed methods approach, where the quantitative analysis of "onlife traces" are situated qualitatively in the local environments the data reflects (Munk, 2019, pp. 159, 164, 165-168). The point being, that the data produced is native to the place of inquiry and that our presence at campus helps contextualize what our data has to say. With this comes an occasion to make network visualizations, using the tool Gephi (Bastian et al. 2009). The basic morphology of such network visualizations consists of data points in the form of nodes, and edges that are the connections between them. To visualize said nodes and edges the force vector algorithm, ForceAtlas2, has been used (Jacomy et al., 2014). The algorithm works by introducing repulsion forces among the nodes and attraction forces based on edge connections and their weights (Jacomy et al., 2014). Hence spatializing them according to how things are connected. An important quality of the ForceAtlas2 algorithm is that it is non-deterministic

(Jacomy et al., 2014). This has the consequence that the computation never produces a definite resulting spatialization—relying instead on the expertise of the researcher to determine the meaningfulness of the final layout (Jacomy, 2021, pp. pp. 56-58, 62-72).

The process of visualizing our data, showcases another way in which this project takes a departure from the Urban Belonging project, as it hinged upon having Reaction Rounds to create relational links among users and pictures (Madsen et al., in review, pp. 22-24). By contrast, the query design in this project, splits the overarching themes into separate Photo Tasks, rendering this approach difficult. Specifically, because reaction rounds are bound to the individual Photo Tasks—meaning users have to click through all eleven photo tasks to then react to a few pictures, if any at all, in either.

To alleviate this, our approach has been to use tags as the relational factor in our dataset—and by extension serving as a form of critical metric (Rodgers, 2018). Specifically, we have taken the output CSV of the Urban Belonging toolkit (Urban Belonging, 2022-a) and modified it to make a tripartite network graph of how Photo Tasks relate to pictures, and how pictures relate to tags (Figure 4). To obtain further distinct clusters, emphasized on tasks, the edge weight, between the Photo Task and picture nodes, has been increased. To add a final layer on top, we added the five-point scale of 'Do you feel this is for you?' as colored frames around the pictures, going from red (1) to green (5).

Looking at the graph, shows how certain tags get centered, whereas others get pushed to the fringes of the network. Here, the overall story seems to repeat itself, as it shows that participants seem to associate "atmosphere" and "architecture", when showcasing good places to study or do group work, while "people and community" seem very important to both social and study related activities. The crucial difference between the findings from the workshop, and the ones that comes from the network graph (Figure 4); is that the prior was primarily generated by discussing the contents of the pictures—not by contending with the tags. Ultimately though, network graphs of such a small dataset, work mostly as a visualization that reaffirms the qualitative reading. Specifically, while we would argue that both the network and picture collage tell a story of students preferring to do group work in nice surroundings, with other people nearby—the fact of the matter is, we simply do not have enough data to make wider claims of how students experience the study environment on campus. For instance, that

the students have a tendency to do student work specifically in the 3rd quadrant, is a proposition easily challenged.

One way of doing so, would be that the data collected, simply reflects the specific location (building 101) we have recruited students at—and that the specificities of doing so signifies that other things might be at play. For instance, it could be that the students who frequent the other quadrants simply have no reason to go to building 101 or conversely, that the 3rd quadrant lacks facilities and services lending them to frequent 101. Given that we found such loose ends in our analysis, we referred to the architects at ERIK, who know the DTU campus best (Personal communication, October 28, 2022), who described how the DTU had undergone a process of dispersing campus away from being centered around building 101, and that there in turn had been put a direct effort into creating more services and facilities, as well as making quadrant 3 suitable for group work. Referring to the online FAQs on DTU's website (DTU, n.d.-e), also reflects this. Regardless, the takeaway here is that in our case, a complementarity style of quali-quantitative analysis, works as an occasion to ask follow-up questions that seem meaningful to what we set out to do.



Process Data as Field Notes

Beyond data stories about the study environment, attending the metadata echoes the process described previously. Looking at a time graph (Figure 5) that shows the running totals of signups (red), push notifications (orange) and images (blue), it becomes clear that with sign-ups amassed, the more pictures get taken, yet the ratio of photos to sign-ups remains low throughout.



Figure 5: Running Totals

Figure 5: Timeline graph showing the daily (x-axis) running totals (y-axis) of Sign-ups (red area), Push Notifications (orange area), and Photos (Blue area).

However, what is notable, is the way the graph reflects our story of programs and anti-programs. Specifically, how the 'frontline' moves forward in steps from when we were on campus, is rather reminiscent of the original narrative about the efforts of a hotel manager getting his customers to return their hotel keys (Figure 6) (Latour, 1990, p. 104-108).

The hotel manager successively adds keys, oral notices, written notices, and finally metal weights; each time he modifies the attitude of some part of the 'hotel customers' group



Figure 6: Note. Original illustration of moving frontlines. From: Latour, 1990, p. 107. Copyright: The Sociological Review

The notable observation here is that our in-situ recruitment efforts, not much different than the hotel manager's polite verbal requests in practice, have been paramount to getting students signed up—as the lack thereof has led to very few additions or even none. This being said, having students signed up does not necessarily translate to photos being taken.

Pursuing the narrative of programs and anti-programs further, plotting the same data, but with occurrence counts rather than running totals reveals another effect.



Figure 7: Daily Activity

Figure 7: Bar chart showing the daily (y-axis) cumulative activity (y-axis) of sign-ups (red), push notifications (orange), and photos (blue).

Specifically, by the end of the project, ramping up to daily push-notifications (orange) in combination with the increasingly large amount of sign-ups (red) —seemingly yielded pictures (blue) taken (Figure 7).

To not get ahead of ourselves, claiming a correlation between photos and push notifications (as we did with regard to photos being of students' immediate surroundings), we took one more

precaution, by plotting the time of day (left axis), when push notifications (orange) were sent and photos (blue) were taken (Figure 8).



Figure 8: Hourly Activity

Figure 8: Dot plot matrix showing if any activity on an hourly basis (y-axis) per day (xaxis). The colors indicate: Photos (blue), push notifications (orange), and sign-ups (red).

The hypothesis being that, if the photos were taken around, but after, the time push notifications were sent out, the notifications would have been the trigger for them. So, they did. In this sense the data presented here acts as a form of field note, reflecting the process of recruitment. Claims of correlation aside, these graphs act to punctuate the type of dynamics at play, as they do not provide any insight into what *part* of our program actually led to the photos being taken. This being said, this is what we would like to discuss next.

Discussion

At the onset of the project, we argued how it can fruitfully be viewed as an experiment, with the notion of "how hands-off can we make it?" as its starting point. Put differently, we set out to test how much of our role in the field we could delegate to the Urban Belonging app and the students using it. Going back to the research question, and the notion of viewing the project as a proof of concept, we could even go so far as to view this a form of stress test, a sort of "least likely case" (Flyvbjerg, 2006, 229-237); of "what would happen if a researcher isn't present to make everything go smoothly?". The answer to this should hopefully be clear by now: "not much would happen". Be it the recruitment of students, the challenge of getting them to participate or of dealing with the resulting data, we found we had to move the frontline of our own participation considerately. Despite this, the *trials of strength* (Callon 1984, pp. 8-10) our *composition* (Jensen, 2012, p. 31) went through, provides an occasion to critically reflect on the dynamics at play: on what worked, what did not work and perhaps more importantly, what it would take to make it work.

When looking back at our efforts in September, the first noticeable dynamic was in the difference between simply signing up for something and actively participating. In retrospect, there seemed to be a tradeoff in the use of a transactional approach, in the sense of offering material incentives, like coffee or gift cards, as part of the recruitment process. To borrow terminology from institutional theory (Madsen & Hasle, 2017), offering up a potential or tangible reward might lead to more signups, but that begs the question whether those who then do sign up, do it out of *compliance* rather than *commitment*. In other words, introducing a new program in the sense of "sign up and get a cup of coffee", might be just that-not translating to a program of "take pictures of places you feel your study environment supports you well". The problem being, apart from a slim ratio of sign-ups to pictures, that students would participate out of a sense of compliance, a "something for something", rather than identifying with the aims of the evaluation in of itself. Barring the anonymity of our participants, we would guess that our most active participants probably sympathized with us as fellow peers, rather than because they thought it would have a profound effect on campus development. Two first year students particularly spring to mind, as they both thought our project sounded like "a cool thesis to make", were very keen to participate and hence came back to talk to us repeatedly during our visits to DTU. Interestingly, when evaluating the effects of the "hands-off" approach, a fairly clear narrative about affordances starts to emerge. Which leads us to think about what affordances are associated with describing the experiment as a process of translation. Specifically, on a reflexive note, we are aware that it leads to a particular production of the participants (users), in terms of multiplicity and stability (de Laet & Mol, 2000, p. 227)meaning that the only desired outcome of networking is not always the complete translation of opposing programs of action. Taking a step back, we want to consider how our assumptions

about the students have been challenged. Particularly, that the experiment has been reliant on students 'taking matters into their own hands'. The assumption being that participants take an active part in seeking out places they thought worked well and reflecting on why so. Alternatively, within the constraints of evaluation, we would argue it would be possible to envision a more *reactive* conception of the user. A conception, where the user either reacts to pictures taken by others or, as in the case with the push notifications, is simply being prompted to take and annotate a picture of their immediate surroundings. However, for userinvolvement—and by extension *participation*—to be taken seriously as a normative aim, expecting more from the users might not seem like such a bad thing. As a cautionary note, with this comes the risk of "creative capitalism" in which user involvement can be seen as a form of exploitation, to "squeeze every last drop out of the system" (Thrift, 2006, as cited in Hyysalo et al., 2016, pp. 22-23). Complicating matters further, the affordances that come with using an app on smartphones, means getting tangled into "an all out war for the time of an audience that has more choices than at any point in history" (Klien 2020, as cited in Venturini & Munk, 2021, p. 4). The point being, that adding further expectations to students using their phones becomes a labored endeavor—which somewhat challenges the initial idea of 'retaking agency over the data' from the multinational tech corporations. With this in mind, the ambivalence researchers face in the contemporary scene of user involvement is very much alive here (Hyysalo et al., 2016, pp. 20-23).

In the case of the Urban Belonging Project, to give a counterexample, they did succeed in enrolling their users thoroughly in the participatory efforts. In an interview with Anders Koed Madsen, lecturer at the Techno-Anthropological Laboratory and project Principal Investigator on the Urban Belonging Project, we enquired about how it had come to be and what challenges lie in doing 'data projects' (Full transcript in Appendix E). To fund the project, they first convinced Gehl that it would be both a worthwhile research project, but perhaps more importantly, something marketable would come out of the tool making process. To get participants, the interest organizations⁷ saw a political bargaining chip in gaining more visibility on their cause, and for their members, an opportunity to make their stories heard in front of an audience—quite literally in exhibitions around Copenhagen (Madsen, Appendix E, 12:46, 15:05). In other words, they successfully translated their stakeholders into the network, by

⁷ The organization in question being: Mino Danmark, Dansk Handicap Forbund, LGBT+ Danmark, Hugs & Food, SIND, Dansk Døves Landsforbund (The Urban Belonging Project, n.d.-b).

aligning their matters of concern, with the Urban Belonging Project. So where did we go wrong and what could we have done about it—where did our network come apart?

Some obvious differences between our project and Urban Belonging, spring to mind. First of all, and we say this with no offense implied, most DTU students are hardly in the same situation as people without homes. From what we have seen, they are quite accustomed to, if not necessarily having their voices heard, then at least being offered opportunities to participate in various research or business projects⁸-not to mention constantly being offered complimentary stuff, the least of which being free coffee. A good example of this is the Social Fabric Project, where all participants were handed a brand new Iphone to keep afterwards (Copenhagen Center for Social Data Science [SODAS], n.d.). Similarly, while we did try to ally ourselves with gatekeepers on-site, like Campus Service or Polyteknisk Forening, arguing a legitimate position or promise of effect, one student to another, is somewhat different than speaking from the authority of bigger institutions. Apart from legitimacy, we also experienced a general weariness towards offers directed at students in general-where even the mention of an "yet another app" would send students running. This is not a foreign problem when working with evaluation—or user involvement in general. In an interview with Katherine Norsk, analysis and evaluation consultant at DGI and research assistant on the Urban Belonging Project, we discussed the challenges at large, associated with ethnographically driven evaluation (Full transcript in Appendix D). As in our case, a general weariness towards userinvolvement or "Evaluation Fatigue" (Bossen et al., 2016, p. 159), is a big challenge with qualitative evaluation in general. People are tired of being asked for their opinion or involvement, only for their opinions to seemingly fall on deaf ears (Bossen et al., 2016, p. 159). In Katherine's opinion the antidote is clear, but not necessarily straightforward: Make explicit what the intent behind the evaluation is—and more importantly—how it is going to affect what is being evaluated upon (Norsk, Appendix D, 02:05). In this regard as well, our efforts at translation fell short. Despite our attempts at aligning ourselves with "Transforming DTU", the aims of our research design were most likely too vague, or too exploratory, to encompass the more directed matters of concern of Campus Service, Polyteknisk Forening or even the students themselves. A practical inference from this problem, both in the case of universities and perhaps in general, becomes apparent when comparing our process, with the more routine nature of the study-start evaluations. Being students ourselves we get the impression that

⁸ Due to DTU's close marriage of research, industry and education (Appendix C, 18:11, 20:50)

yearly questionnaires come with its own share of challenges. However, we do see a certain strength in cementing such an effort, as a data practice. Specifically, if it can be showcased how the present study environment has been impacted by last year's evaluation, it would not only be easier to prove to students that their inputs are taken seriously (if that is indeed the intention to begin with (Bossen et al., 2017, pp. 152-153, 159)); but also to make a practice out of people participating in evaluation.

So far, we have argued how the resistances we encountered, and our efforts to adapt to them, paints a wider picture of the dynamics at play, when trying to use digital tools for participatory qualitative evaluation. Following through on our socio-technical inclinations, we would be remiss not to remark on the technical side of these troubles, be it with geo-tracking, user interface or annotations. However, as with the procedural challenges, we expect these can be ironed out—by Gehl, Backscatter or whoever else picks up the mantle (Madsen, Appendix E, 01:20). But we would also argue that our project, in its own small way, hints at a larger challenge to doing data projects.

Data projects, in our interpretation of the phrase—heavily informed by the work of the Techno-Anthropological Laboratory (The Techno-Anthropology Lab, n.d.)—is at its heart a matter of trying to align digital tools and methods⁹, with the interests of external businesses or organizations. Be it to produce a tool, method or map of something, or 'just' to introduce some "multiplicity" to the equation. This duality, the ambition of producing *something* for someone, while insisting on not reducing complexity (Venturini & Munk, 2021, p. 7), seems at once both the strength and the weakness of the idea.

Following Anders Koed Madsens experience with data projects, with the Urban Belonging Project and as head of the Master's in Data-Driven Organizational Development (MDO), the challenge often lies in the difference in conceptions of data (Madsen, Appendix E, 20:34, 22:22). In our 'quali-quantitative dream', data is a way of investigating socio-technical relations, and a way to open up and showcase complexity and multiplicity (Venturini & Munk, 2021, pp. 5-8). Outside the boundaries of this particular research interest, the conceptions of, and interest in, data, are often somewhat different (Madsen, Appendix E, 20:34, 22:22). In case of

⁹Birkbak & Munk, 2017; Rogers, 2013; Munk, 2019; Venturini & Munk 2021; Jacomy, 2021; Venturini & Latour, 2010 and probably many more

the Urban Belonging Project, Gehl's primary interest lay in expanding their own methodological toolset, to fit new digital possibilities (Madsen, Appendix E, 01:20)—so ERIK's primary reasoning for engaging with us, was a wish to investigate the possibility of expanding the toolkit of evaluation. Hence, although both projects rely on aligning research with business interests, the act of opening up the playing field, also invites a host of conflicting interests and conceptions.

In some cases, it might just be skepticism or academic disagreement—as in the case of the DTU student not finding our project "technical enough". Just as likely though, people fail to see the idea in it—or even worse, lack the time or inclination to even try (Madsen, Appendix E, 15:05). In other cases, the 'precarious performativity' of visualizations creates its own set of problems. To take the poster child of Controversy Mapping, Visual Network Analysis, the "epistemic surplus" of network maps, runs the risk of saying too many things at once, or to the untrained reader, simply reproducing pre-existing conceptions (Jacomy, 2021, pp. 59-62, 64-72). Perhaps even worse, is the dynamic first described in Laboratory Life (Latour & Woolgar, 1979)—of erasing all the efforts gone into producing data, so effectively it gets taken for fact—or in this case falling prey to Big Data rhetorics (Jacomy, 2021, pp. 59-62, 76-88), and instead of showcasing complexity, becoming the representative of some miracle tool or method, capable of anything (Madsen, Appendix E, 20:34).

What we want to end on here, is perhaps just this: Doing data projects, like with science (Latour, 1999), is about much more than the tools and the data. Sure, as this project hopefully demonstrates, a big part is how we view and produce data. Not to mention the decidedly learned practice of reading networks (Jacomy, 2021, pp. 56-58, 62-72), and all the hidden data work of adjusting scripts and fixing technical problems. But, even so, it is just as much about managing and aligning different expectations and affordances (Star & Griesemer, 1989, s. 393). In retrospect on our case, and in lieu of our literary discussion, we can thus say with some confidence: Successful data projects—especially participatory ones—are always marathons of interdisciplinarity, of translating between tools, methods, data conceptions and people.

Conclusion

To conclude on this project, we want to briefly reiterate on some of the points made throughout. In recent years there has been an increasing demand for evaluation in architecture. While tools for evaluating the technical aspects of buildings exist, they fall short when seeking knowledge about softer qualities, like how people experience living in said buildings. The premise of this thesis is the argument that this challenge represents an alignment between certain parts of Techno-Anthropology and architecture. Specifically, the research interest of bridging the gap between qualitative and quantitative methods (with digital tools), represents an opportunity to expand the toolkit of evaluation. In the specific case of this project, we attempt to test this premise, by repurposing the Urban Belonging Toolkit for evaluating the study environment of Lyngby campus, at The Technical University of Denmark.

Through a theoretical grounding in a variety of Science, Technology and Society Studies literature—especially related to Actor-Network Theory—we argue that this project can be seen as a process of translation, that benefits from an experimental approach, the 'interesting' part of which being "how hands-off we can make it". Specifically, as such an approach accommodates the dual research interest of the project: to both take the commitment to producing insights seriously, while also articulating the challenges with doing so.

In describing our attempts at recruiting the students at DTU, we illustrate the case- and field specific challenges we met as well as our attempts to accommodate them. Specifically, how the assembly of 'things' was too fragile and too unstable, to build up the necessary legitimacy required for students to engage and participate. Furthermore, any attempts of alleviating this, like introducing material incentives, has led to engagements without active participation.

In light of this challenged process and resulting low volume of data, we demonstrate how the data still tells a story about the study environment at Lyngby Campus. With the participation of architects from ERIK, we illustrate how the data tell a story, among others, of how students seem to prefer open-spaced study areas, with good interior design and the presence of other students. We also demonstrate how this analysis is cooperated on a quali-quantitative level, but that the size of the dataset ultimately limits the applicability of the broader toolkit of algorithmic sensemaking. Despite this, we argue that, in a "complementarity" sense, the visual network analysis of the data, points at potential venues for proposing qualitative follow-up

questions. Beyond this, in terms of evaluating our process, the meta data produced by employing the Urban Belonging Toolkit, has also proven to work well as a form of fieldnotes, supporting the narratives presented and furthering detail about when things happen.

Based on all of these observations, we discuss how our project brings to light some of the fundamental challenges associated with doing quali-quantitative evaluation as a data practice. We argue that the primary challenge lies in aligning network affordances with the matters of concern of all actors involved—from institutions, to students, to architects, and to tools. To meet this challenge, we argue that transparency on all levels of the evaluation process is needed; especially in project conception and the outcomes produced. Apart from this, we argue that reconceptualizing the role of the user, from active to passive, or instigating a long-term data practice might help with the practical challenges of delegating data collection to users. Nevertheless, these still hinge upon successful translation of matters of concern.

Finally, we discuss how our project, in light of a wider literary and case specific context, might be emblematic of some of the broader challenges associated with doing data projects. Specifically, we conclude that the role of the researcher is not just to manage tools and data, but to constantly work towards aligning conflicting data conceptions; whether from tools, participants, or the data itself.

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