

The Construction of Interactivity in Public Space - A Study of the digital Interactive Installation “Colour by Numbers”

Author: Linda Ryan Bengtsson

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1 Introduction

The development of interactive information technologies has significantly influenced the field of interactive visual art with more and more interactive artworks being exhibited in galleries, museums and other public spaces, actively engaging the public in the artwork (*Edmonds and Muller 2006*). These artworks lend themselves to new ways of communicating with an audience through *interactivity*, a term that has become almost synonymous with new media or digital media applications. How interactivity can be defined, approached and investigated is an ongoing discussion (*Stromer-Galley 2004, Sundar 2004, Newbagen 2004, McMillan 2002, Kiousis 2002, Richards 2006*). However, what interactivity specifically entails within a digital media context and what implications it has for the medium and the users, requires in-depth and case-specific research in order to generate a grounded and nuanced understanding of interactivity.

Various epistemological and methodological approaches to interactivity exist, depending on the disciplinary tradition and purpose of a given research project. The objective of my research—which is a part of my dissertation project—is to generate grounded knowledge and understanding, by investigating how interactivity is constructed and experienced within digital artworks in public spaces. In order to achieve this, I will investigate a number of specific interactive public displays through the conception and experience of interactivity, focusing on the relationship between the artist, active users, passive viewers and the artwork itself. The point of departure in this research project is the contention that there is a need to find new ways to approach and understand interactive media experiences, beyond the established approaches used within media research (*Peter Lunenfeld 2000*). The aim of this project is to contribute to both methodological and theoretical deliberations on interactivity within this field of research.

The first case investigated, the interactive light installation *Colour by Numbers* (CbN), will be presented in this paper. At first the installation will be portrayed providing a general illustration of CbN, explaining the technological functions and describing the exhibition space. Thereafter follows a theoretical discussion on the term interactivity and a clarification of the understanding of interactivity within this research. Subsequently the method and the specific approach in this case are presented, followed by the results from the analysis of the project. The final discussion within this paper will be on methodological aspects on how to investigate interactivity, based on interviews with artists, active users and observers, applied on the installation CbN.

2 Colour by Numbers – A digital interactive art installation

The artists Erik Krikorz, Milo Lavén and Looove Broms were the creators of the interactive light installation CbN. CbN was placed within a 72 m high tower at Telefonplan (figure 1.1 and 1.2), a public square south west of the centre of the Swedish

capital Stockholm and could be viewed and interacted with from October 23 2006 to April 1 2007. The tower used for the installation at this date empty, but was earlier part of the Ericsson telecom company and carried the Ericsson logo until recently.

Telefonplan (translates into “The Phone Square”) used to be the centre of the Ericsson company (mostly known to the public for their mobile phones). Today only a small part of the Ericsson business is left at Telefonplan and the factory building hosts since 2004 the University College of Arts, Crafts and Design (Konstfack). The area has changed the last 10 years from a declining industry sight (due to Ericsson’s cut backs and move of production) to an area focusing on design and arts.



Figure 1.1 The tower at daylight

(From www.comourbynumbers.org Courtesy of the Artists of CbN)



Figure 1.2 Colour by Numbers at night

Due to the placement of CbN in a tower rising above the surrounding buildings, the artwork could be viewed from various parts of Stockholm. It could also be observed through the Internet (www.colourbynumbers.org) via a live camera distributing non-sop images of the installation. People from all over the world where able to control (c.f below) the artwork by manipulating the colored lights through a touch-tone telephone technique.

2.1 Navigating CbN

The top ten floors of the tower where used for the installation. Each floor contains four windows facing north, south, east and west. A lamp comprised of 36 red, green and blue lights was placed behind each window (figure 1.3). By using touch- tone technique, the phone functioned as a controlling device where the red-, green- and blue-colored lights could be combined into new colors, functioning as the colors on a computer display. Each color could either be added or subtracted individually by using the keypad on a telephone. When calling CbN a pre-recorded instruction voice guided the caller through the functions. The control of the lights where conducted in two steps. First the caller

would choose which floor to control by pressing 0 to 9, where 0 represented the top floor and 9 the bottom floor. Thereafter the colors of the lights within the installation could be modulated following the scheme in figure 1.4, allowing the user to interact during a maximum of five minutes. When someone where calling the tower, the line was occupied to others.



Figure 1.3 Lights used in CbN.

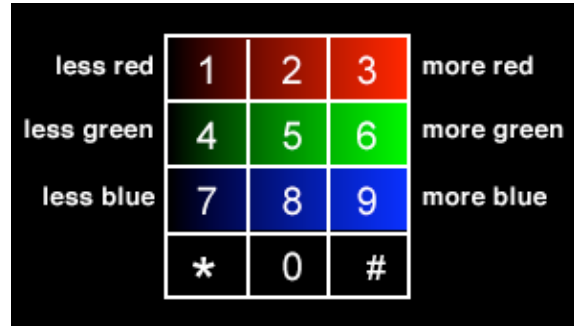


Figure 1.4 Scheme of light control.

(From www.comourbynumbers.org Courtesy of the Artists of CbN)

3 Searching for a definition of interactivity

There are, as noted in the introduction, several different approaches and definitions to interactivity, depending on traditions and purpose. Therefore, before further discussing CbN, the understanding of interactivity in this survey will be presented. Through out the conducted research the approach to interactivity is that interactivity is a consequence of the possibilities of the medium. It is not necessarily used within all digitized media. It is when the possibility of audience participation through manipulation is used within productions that interactivity occurs. Interactivity appears within the context of digital media when it allows users to actively influence the production. To be able to understand the complexity and to see how different aspects relate to each other, my research will take a wider approach to interactivity as phenomenon placed within a framework, defining the conditions for occurrence of interactivity. Thereby we hopefully can take one step forward to understand the aspects that contribute to the construction of interactivity within a public space.

Interactivity framework:

- Interactivity is technology dependent. The medium affects the message (*Halves 2002*). Interactivity occurs in a human-computer environment, allowing information to be manipulated in real-time by users (*Manovich 2002*). This feature can, like clay, be constructed in any form. It does not in it self carry a value and there are no predefinition of how interactivity can be used.
- Interactivity is action driven and the user or users takes the action. The possibility of manipulation allows the user to act in relation to the production (*Aarseth 1997, Ryan 2001*).
- The action is partly dependent on the design, a consequence of how the project is created (*Sundar 2004, Ryan 2001, Bolter and Gromala 2003*). The design relates to the technical architecture and the aims of the creators. But there are also other reasons to act, which are individual and general such as experience, pre-understanding, creation of meaning etc. It is dependent on different aspects that are to be further investigated in relation to the specific object of study.

Interactivity is dependent of the medium, the design and technology of the production. The production is experienced and understood through the actions by the users. To understand interactivity is to further understand the relation between active users, content, passive viewers and design. Therefore, to gain further understanding of interactivity, the relationship between the different parts that affects interactivity will be further investigated.

4 Methodological approach

Grounded theory conceptualizes theory grounded in the empirical world (*Strauss and Corbin 1990*). In this research grounded theory has been used to generate theory concerning the construction of interactivity within a public space. The methods used in this study consist of in-depth personal interviews with the artists and the local users and audience, and a discussion with a focus group (c.f below). Also non-technical literature was used to gain further understanding of the project such as the CbN website, Internet blogs and texts collected from local, national and international media.

The initial approach was to conduct in-depth interviews with the artists and a focus group, however upon analysis of the first round of data collected from the artists, it became clear that there where other important aspects to include in the survey. Therefore, to further understand the implications of CbN, the role of the website created to live-cast CbN and how the local public living close to Telefonplan related to CbN, needed to be investigated. This resulted in interviews with people living in the neighborhood and collecting data from other media sources concerning the installation.

4.1 Survey participants

First the artists where contacted as the survey depended on their participation. After their acceptance to participate in the survey, each interviewed was conducted individually for about one hour.

The focus group was collected through contacting different universities in the Stockholm area, specifically approaching educations concerning art, media and digital technology. This selection was made to bring together individuals with interest within the subject area, that where curious to test and discuss different aspects of the project and thereby bring further depth into the survey. The focus group used and observed CbN for one week and registered their encounters and observations in a diary during this time. An 1½ hour discussion was conducted with the focus group, and their diaries where collected.

The local users and audience where approached through the artists. They distributed an e-mail to people living locally that had contacted them during the period of the exhibition. Concerning validity this can be a problem as they all had a positive attitude and a pre-conception of CbN. However in this case this can also be considered as a benefit as these individuals had an understanding of the installation, they had observed and/or used CbN over a longer period of time, and possible reflected over the significance of the installation. Out of the six in-depth interviews conducted three had used it regularly, two tested it once but mainly observed and one informant observed CbN. Four interviews where conducted in person and two over the phone.

4.2 Description of analysis

The analysis of the collected material was conducted in steps. After the transcription, the interviews with the artists, the local users and the focus group where initially

analyzed individually. Grounded theory where used to analyze the data (*Glaser 1978, Glaser and Strauss 1967, Strauss 1987, Strauss and Corbin 1998*). Each interview and the focus group discussion where coded using line-by-line analysis (*Strauss and Corbin 1998*). The analysis was conducted through applying terms to different parts of the material, using open coding. Going through these terms several times, similarities and dissimilarities in the data could be recognized which defined categories and sub-categories. For each category their properties and dimensions where identified resulting in a few different phenomena. The non-technical data where used to support statements by the informants.

4 Analysis of Colour by Numbers

4.1 Framework

There are three main aspects that are of significance in relation to the creation of CbN. These aspects form the conditions, set the framework under which the installation was created. These are:

- Local elements - the specific area and tower within which CbN was placed
- Aims - the artists' aims and purposes
- Technology – the technology designed and used for the installation

Local elements and the technology used are presented above but the aims and purposes of the artists need further presentation.

The initial idea was to make some form of artwork within the tower at Telefonplan. The building thereby set the physical frame of the installation. The thought to bring technology into the installation where also part of the initial idea as the artists wanted to make a piece "*where new technology meet the old worn building*" (*artist 1*). Through the installation the artists hoped to contribute to the discussion concerning the re-formation of the area and start a discussion regarding public space, who the actors in the public space are and who can or cannot influence this space. Therefore they wanted to open the public space to the public by allowing individuals to influence their own environment in a way that would be acceptable and approved by the community, but not created through commercial interests. The possibility to interact with the installation thereby constitutes a central part of the production as this makes it possible for individuals to express themselves.

The artists aim was to design an interface that should be easy to learn and simple to use "*we wanted grandma be able to use it*" (*artist 2*). The feedback should be direct and the technology as "invisible" as possible, only detectable by the users. The phone became a suitable device, as this is a technique that most people are familiar with. The use of the phone also made it possibility to interact with the installation remote and geographically independent. Other essential aspects expressed by the artists were that the production should be attractive, entertaining and possible to observe at a distance, hence the use of lights.

There was a thought of connecting to the history of the area but the artists themselves did not see this as a necessity. The architecture of the tower formed the physical conditions for the creations, but choice of place and the specific building would also become part of the making of meaning to the audience. The use of the phone as controlling device created a strong association to the mobile phone industry that for a

period of time dominated the area, further enhanced by the name of the square, Telefonplan (the Phone Square). To the audience and users, the mixture of art and phone-technology associated to the history and present change of the area and became part of their understanding of CbN.

4.2 From testing to perform

Learning stage

All individuals interviewed using CbN went through a learning stage. Several of the informants figured out how the navigation system functioned, however what seemed to be most problematic was to understand how the addition and subtraction of the colored lights functioned. The direct visual feedback seems to have been important in the initial stage of use. If there was no obvious connection between the lights and pressing of the buttons on the phone, it was thought that CbN did not function. This could happen when all the lights were white and the caller didn't understand that red, green or blue needed to be subtracted to be able to create new colors. Those that did not pass the first learning stage only called once. One informant did not understand that there was direct feedback and thought that the pattern created would be staged later that evening. The informant still thought it worked though. Another informant found the navigation so difficult that the informant thought that mainly the artists themselves were calling to manipulate the installation. Those that got past the initial learning stage would stop listening to the voice instructions when calling the installation, and navigate without instructions.

Development of use

After learning how to navigate the installation the users started to experiment with the control of the lights. Quite soon they developed different strategies of how to use the tower. It seemed important to find a way to stimulate the use by finding a purpose with the design created. One of the informants living in the area would for example, if there were a colorful sunrise, make the lights of the tower match the sky, hoping that someone would notice that there was a connection between the tower and the sky. It was also observed that the permanent flight warning placed at the tower often were included in the patterns created in different ways. The environment of CbN became a source of inspiration to create new appearances.

Two of the informants created individual patterns that became a personal signature that others would recognize. It became a way to communicate to friends and viewers that might recognize the signature, and sent the message "now I am here" as one of the informants put it. Through making individual signatures users started a form of dialog with each other. One of the informants explained how this could develop:

"I could create my colors and then it would change into another specific pattern. Then I would re-create my pattern where after it was created back to the other pattern again. And it would continue that way. So obviously, as far as I can understand, or believe, or imagine maybe, someone else observed this. There was some kind of interaction with another human."
(Informant 1)

All the informants living locally interacting with CbN called the installation during the whole period of the exhibition, the intensity however, declined with time.

The focus group also developed another way to use the installation. They became interested in the change of the light itself and allowed this to become part of their use. By changing the lights during the limited time of five minutes, the users created an animation of lights. One of the focus group-members that visited Telefonplan realized that the underground passed over ground just next to the installation. The informant would then change all the lights when the underground passed by, creating a movement that hopefully would catch the underground travelers eye.

*"I felt like taking part in the production when the underground passed. Okey, it isn't me that built the tower. It isn't me that installed the lights. But right now it is my show".
(Focus group C)*

Over time the users interaction with CbN became planned acts where the users wanted to create attention or/and form meaning through their creation. Moving from use of CbN to making planned actions. These actions seem to depend on two main factors, the urge to perform to an audience or/and finding ways to communicate. The limited possibilities of expression forced users to find new forms of expressions. To create meaning and attention, users made references to the environment of CbN and created animations.

4.3 Building relationships

Developing a relation to CbN

To the informants living in the area, that observed the tower every day, the tower was at first something interesting and new. However over time CbN moved from being a distant installation to become part of their home and every day life, independently of they interacted with the installation or not. Two informants described it as follows:

"I looked at it every day when I came home. I couldn't say it was like a friend but rather like a goldfish or something. It became part of my home environment that was beautiful to look at."

"Yes, it became some form of relation, and also some form of company, some feeling of not being alone or security or something" (Informant 4)

CbN became a form of company mediating presence and generating security. Several of the informants also started to care about CbN and felt responsibility towards the installation. They would change its appearance if they thought it was distasteful or if nothing had happened over a longer period of time. The informants living locally would also show the installation to friends and family, being proud of having such artwork in their neighborhood.

The focus group on the other hand did not grow as strong relationship to CbN as the informants living in the area. To them the installation where a way to communicate and perform but did not develop further. In difference from the informant living nearby they only observed and interacted with CbN for a short period of time with a set mission. They didn't have the everyday contact with the installation over a longer period of time. This might also be why their interaction where more focused in on the movement and a short staging rather than the continuous expression of the tower. To

them CbN mainly existed when performing and a way to communicate and express themselves.

The relationship created to the installation differs depending on the geographical position to the installation, the time of exposure to the installation and level of use. People living in the area seemed to build an attachment to the installation, as it became part of their local environment over time. This is indifference from the focus group that did not have the everyday experience of the installation or a long-term interaction. The continuous change of the tower created and awareness of other users and mediated presence to the locals. With interaction the caring grew stronger as they also could affect the appearance of tower if it seemed unused or misused.

The presence of an audience and other users

Through their own observations of the tower, informants become aware of the presence of an audience. They realized that it was possible to communicate with others and that they affected the installations appearance through the design, and hence became part of a larger production.

“When I started to interact I became more a part and felt that I could control the art work and thereby control what other people saw. I then had a more active role as I was co-producer of something.” (Informant 1)

The interaction gave the user experience of taking part of the creation. They identified the limitations of possible influence of the installation however at the time, in relation to the audience, they where the producers, the communicators. This made them conscious of their own ability and that others could have an opinion about it, in the same manner as they had opinion of what others created.

“At first I thought it was scary. It was like, oh what have I done now? That didn’t turn out well and now every one can see it. But it was cool to be able to manipulate something that others could see.” (Informant 4)

The presence of an audience triggered the willingness to perform and communicate. As one of the focus group members noted:

” If it wasn’t placed where people could see it I don’t think I would have liked to interact with it” (Focus group B)

The users wanted the audience to see their creation, hoping that someone else would appreciate and hopefully understand what they communicated. The understanding of a possible audience made users think around who the audience where and their physical position to the installation. Informants living in the area anticipated that the audience where others living in the area and the southern parts of Stockholm.

The focus group on the other hand where aware of the possible global audience via the Internet as they also used the webpage to view their own interaction. The web was also a way to present their creations to friends that could only observe the installation through Internet. One of the informants tried for example to create a performance to a friend by making the friend watching the live video on the web at the same time as the informant would change the appearance of CbN. Through the web page users could create their own audience by inviting friends, family, co-workers etc.

Relationship to and through other users

When the informants living in the area discovered CbN, most of them first thought it was a computer-controlled installation changing over time. However by observing the tower for a while and finding information about the installation on Internet or through other media, they discovered that it was possible to call and change the tower. With the understanding of that individuals were controlling the lights, the interest for CbN grew stronger, independent of if they utilized the possibility to interact or not.

*"When I thought that it was computer controlled I could think that it looked nice. But I became more interested of it when I knew that there where a person that had created it."
(Informant 6)*

The presence of others, through CbN, generated interest in observing what people would create and watching the change of the tower. The observers wondered who the users were and discussed taste and their appreciation or dislike of what was created in relation to users designs. The observers also noted the movement of light in two ways, firstly the formation of animation when changing colors and secondly the movement between what appeared as different users and how they built upon and connect to each other's design.

The observation of what was created also inspired users to develop their own design by for example following others and make an individual signature, or building on others creations by for example changing certain windows or subtracting a specific color. However the relation to other users were ambivalent as it also could generate frustration, as one of the informant said:

"It was always upsetting when half an hour later someone else had called and completely ruined the art work that I had made." (Informant 1)

This informant would deliberately withhold the phone number to prevent others from destroying of the creations and bringing down the risk of the phone line being occupied. In general though, other users were appreciated as they created the experience of presence of others. Through the creation of dialogues, with individual signatures communication between two users were established. Users also identified that others were inspired by what they created, and that others built upon their design. This was experienced as a way to be acknowledged by other users and they succeeded to communicate.

The individuals living in the area had the same relation to other users as they had to their audience, assuming that the people interacting with CbN were people living in the area, even though they were aware of the live broadcast via the Internet. They thought of other users as locals, possibly the neighbour below or across the street. The focus group did not reflect as much on other users as the locals, probably as they did not observe the installation to the same extent.

Discovering that there were individuals that changed the installation and not a computer enhanced the experience of CbN. Through this understanding the tower viewers would experience the presence of others. Users started to build relationships to each other through creating dialogs and building on each other's constructions. The observation of users also triggered fantasies around who they were, why they created what they did and made it more interesting to try to figure out what they wanted to say with their creation.

Change of relation to Telefonplan

CbN became a landmark of the area, not only to the informants living in the area but also the focus group participants. Through CbN the tower could be singled out from other towers around Stockholm, and seen from different parts of the city. The placement outside the city center enhanced the possibility to experience the installation. The fact that there were no competing lights from signs and advertisements in the area made it more visual than it probably would be in the centre of the city.

The placement of CbN in a neighborhood with many residential buildings gave the possibility for locals to connect to the installation over time. The installation made local users aware of their neighbors, as they would reflect on others living in the area through identifying other users as neighbors, experiencing their presence through CbN. To individuals living in the area aware of the history and recent change of the area, CbN also became a symbol for the change of the area from an industrial area to a centre of art and design, even though the installation had nothing to do with the art school as such. The choice of placing of the installation within that specific area thereby created further meaning to the installation itself.

5 The Construction of interactivity – preliminary conclusions

Through the study of a digital interactive installation placed in a public space, I will start to build a theory by identifying the conditions and factors within which interactivity is constructed, in this form of productions. The theory builds upon conclusions made through exploring the relationship between artists, the construction of the installation, users and audience within the specific installation Color by Numbers. This is an initial stage and these first steps towards a theory cannot be considered general, rather a discussion and preliminary conclusions. Further studies are needed to bring further depth and reliability to these conclusions.

Through the analysis of the material the following factors and conditions are identified as essential to the constructed interactivity:

Framework

The aims and purposes of the artists with the location of the installation and technology used, makes the framework for the interaction. The artists' aim and purposes are the main factor in the final result and creates the conditions for interaction. In addition, their choice of location and technology bring further meaning into the production. Local elements contribute to the understanding and experience of the audience and users. The local environment can bring inspiration to users in their interaction and the audience might associate, through their earlier knowledge of the area, into the understanding of the production.

Perform

With learning the interface and understanding how it functions the user must find ways to further explore the interface, moving from testing or playing to perform planned actions. The ability to develop the interaction makes the user wanting to continue interacting with the installation. To perform can become a way to express one self, communicate and create attention through the installation.

Communication

To users the experience of communicating is an important factor. Through interaction and interface it is possible to develop a form of language or association that is thought to create meaning to others. Part of this process is to learn to interpret what other users communicate. The audience does not necessarily need to understand the design the right way or give feedback to the user, it is the illusion of communicating that is important. By developing forms of communication relationships to an assumed audience and other users can be created.

Presence

Through the understanding that some one else is interacting with the installation, it creates the experience of presence to the audience and other users. This enhances the willingness to observe and makes the audience and users try to interpret the users constructions. The presence of others also triggers the interest in finding ways to communicate and create dialogs.

Time

The development of ways to communicate, perform and mediate presence needs time. At first the installation need to create such interest that audience and active users continue to want to take part in the installation. Then, with time, relationship starts to build and develop.

Public Space

Having earlier knowledge, understanding and/or relationship to the specific public space where the installation is placed, might bring further understanding and experience of the installation. This also enhances the possibility to build a relationship to the production especially when being physically close, able to continuously observe the installation over time.

Relationship

Through the installation different relationship can be developed between users, between users and the audience, to the installation itself and the specific area where it is placed. How strong this relationship becomes depends on the geographical position in relation to the installation, the time of exposure to the installation, level of interaction with the installation, possibility to communicate and perform through the interface and the earlier understanding of the space within it is placed.

There are dependencies between these factors, which are to take into account in the construction of interactivity. The technology must allow individuals to modulate the appearance however interaction with technology alone do not construct interactivity. The design offers liberty in the interaction, allowing users to develop their own expression and perform and/or communicate. However to perform or communicate depends on the presence of an audience or other users, which can be offered through the placement within a public space. The experience of presence is also a necessity for relationships to develop through the installation. The factors presented are identified within this specific case. There are most probably further factors to be found and that the same factors are not necessarily present within other cases. Therefore this work will continue by exploring several interactive digital artworks in public space, identifying further factors affecting the construction of interactivity.

6 Discussion

The methodological approach to this initial case studied was to allow openness to the direction of the study. This generated further interviews with individuals living close to the installation, which became a central part of the survey. Through having a focus group and the interviews with locals living in the area there where possible to make comparisons between for example different forms of use and building of relationships, that might not have been identified otherwise.

A focus group discussion was conducted instead of individual interviews. The aim was to benefit from a discussion where participants further explore their thoughts through each other, resulting in a more useful data material. Initially it was suggested to create focus groups out of the local informants as well. This was not carried out, as it would be difficult to set up this meeting. In retrospect this was to prefer as the locals living in the area had quite personal and individual experiences with and through CbN, which might not been expressed in a group. Making a focus group would also been less anonymous, which might make individuals hesitate to participate.

Initially when planning the analysis it was assumed that categories such users, artists or creators, audience would be identified within the material. However, going through the data and posting categories onto different parts of the interviews it was realized that there where other phenomena rising out of the material. The division between users, artists and the audience is present; however by identifying other phenomena the relationship between artists, users and audience becomes evident. These phenomena become the aspects affecting the construction of interactivity, rather than identifying the role of artists, active users and the audience.

The openness of this method also resulted in a large quantity of data where other aspects in relation to the specific case could be identified, however not directly connected to the construction of interactivity. These are the role of the website in the international exposure of the artwork and the spreading of CbN on the net, and how various actors where part in the process of bringing up the installation and the prolonging of the exhibition. This might be further explored and included in the survey.

Grounded theory as methodological approach seems, in this case, to be appropriate. However to bring it further strength to this study comparable studies need to be conducted. To create a comparable survey I suggest interviewing users that have a deeper relation and understanding of the area as well as constructing a focus group without a previous relationship to the space. Thereby able to identify different forms of use and approaches to the installation as well as making the use within the specific case be comparable. I also suggest keeping an open approach to the next case studied, as there might be other aspects that are necessary to take to consideration.

I special thanks to all interviewed for your time and engagement enabling this research.

DRAFT