

Exploring digital tools for public administration: A case study of a GIS tool for a Costa Rican Municipality

MA Thesis

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Recent developments of digital technologies offer new opportunities for improving public administration with digital tools, and with the pressing hype for digitalization, governments are expected to follow this trend. Even though digital tools offer many novel possibilities, radical improvement of government through them is yet to be seen. The literature recognizes that improving public administration through digital technologies is more of an organizational challenge than a technical one, and it is recommended to have a deep contextual understanding as part of the process to effectively introduce digital tools in public organizations.

This thesis studies the phenomenon of digital tools in public administration. The aim is to explore the introduction of a digital tool in a local government by presenting a case study involving a digital tool aimed at improving local government's responsiveness to citizens' needs. In particular, it studies the case of *Yo Alcalde* in the municipality of Curridabat, Costa Rica. *Yo Alcalde* allows citizens to report maintenance issues in the city directly to the municipal officials through a mobile application. Using a location-based system for making the reports, *Yo Alcalde* collects them as geographical data and visualises them in common map for all the users of the application. The intention with *Yo Alcalde* is to facilitate a new channel for communication with the municipality and overall improve operations for responding to their issues.

The research is based on a collaboration done with the municipality of Curribat in 2016. Based on the field notes and interviews, this thesis explores *Yo Alcalde* within the municipal context. During the fieldwork it became evident that improving the municipality's responsiveness was far more complex than developing a digital interface for citizens' to input their issues. Based on this preliminary insight, the research objective is to explore further the effects of introducing *Yo Alcalde* on the municipality. By reflecting on qualitative data gathered at the municipality, the analysis will provide a holistic perspective on the relationship between the municipality's processes, people and structure, and the tool itself. While exploring the data, the thesis will map challenges, constraints and opportunities for the organization adopting *Yo Alcalde* with the aim to shed light on the complexity entailed in public sector digital projects.

Keywords Digital government, volunteered geographical information, local government administration, public administration, information systems

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Chapter 1

Introduction

This thesis emerged from a practical fieldwork I did in the Municipality of Curridabat, a city in the metropolitan area of Costa Rica. At that time, the municipality was developing a digital tool for citizens called *Yo Alcalde* [I mayor] and I collaborated with the team developing it. My role was to help them improve the existing version and highlight development priorities for it. The collaboration lasted for about three months and at the end I delivered two reports to the team.

Yo Alcalde is meant to provide a new communication channel between citizens and the municipal officials. From the citizens' perspective, it is a mobile application where they can report non-emergency problems such as the state of parks, roads, street lights or waste collection. The mobile application uses a location-based system which allows the reports to be collected as geo-reference data and visualized in a map.

This new digital tool belongs to a bigger innovation agenda. *Yo Alcalde* is part of Mora Altamirano's (Curridabat's mayor from 2007 to 2018) strategy for improving the municipality's administration by providing decision makers with better information about citizens needs and demands through the use of digital tools (project manager, personal communication, 14 July

2016). As a result, *Yo Alcalde* is not only seen as a reporting channel for citizens, but is also intended to serve as a strategic tool for collecting data that could later inform planning, budgeting, management activities or even policies.

However, during the fieldwork it became evident that the introduction of *Yo Alcalde* as a new tool for the municipality came with uncertainties, questions and tensions between the municipality officials' established ways of working and *Yo Alcalde*; adopting a new digital tool which intends to change administrative practices required more than a digital interface. Based on these preliminary findings, this thesis explores the introduction of *Yo Alcalde* within the municipal context as a case study.

Structure

Chapter 2 introduces the case by providing a short account of the Costa Rican context, the municipality of Curridabat and a description of *Yo Alcalde*. In chapter 3, the preliminary fieldwork findings and the research objectives are outlined. Chapter 4 presents relevant literature to inform the analysis of the case. Chapter 5 explains the methods and data used in this research. Chapter 6 presents the analysis of the case and its findings and chapter 7 discusses conclusions and ideas for further research.

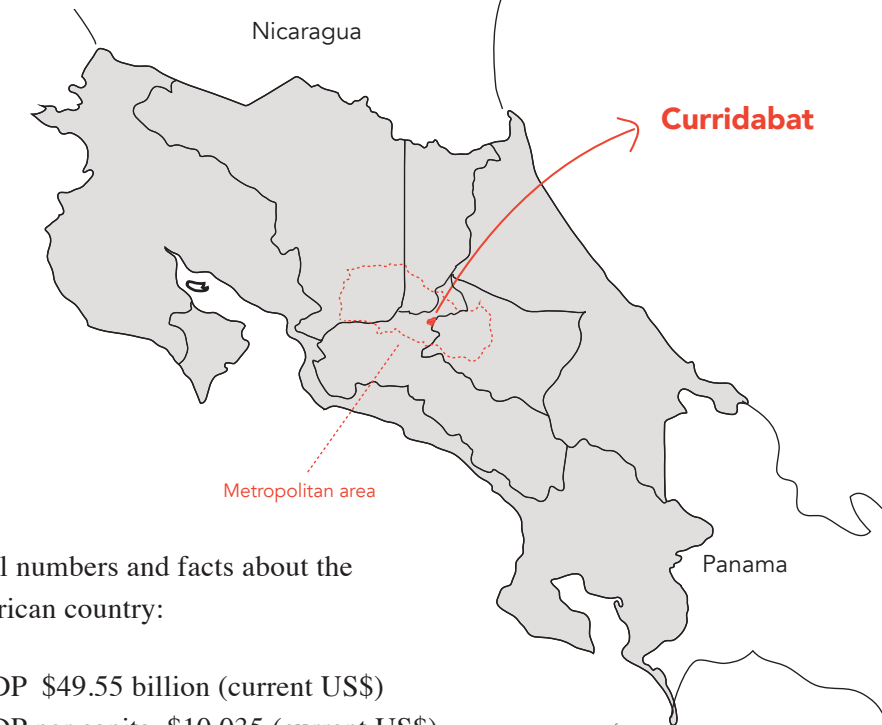
Chapter 2

Case Background

This chapter describes the context of *Yo Alcalde* and the digital tool itself. It provides first a brief overview of Costa Rica focussing on the current situation regarding institutions, citizen-government relations and the roles of municipalities. After, it presents the municipality of Curridabat and finally describes the motivations behind *Yo Alcalde* and details about how it works.



2.1 Costa Rican context



Some general numbers and facts about the Central American country:

- GDP \$49.55 billion (current US\$)
- GDP per capita \$10 035 (current US\$)
- Government system Democracy
- Currency Costa Rican Colón (CRC)
- Area 51 100 km²
- Population 4.758 million inhabitants
- Population Density 95 hab./km²
- Capital San José (1,713 million inhabitants)
- Metropolitan area around 54% of the population
- Life expectancy 79
- Education expected years of schooling 13.9
- Internet users (% of population) 49.4
- Mobile phone subscriptions (per 100 people) 143.8
- No army since 1948
- Territory division 7 provinces, 81 cantons and 470 districts (National Constitution Art. 168)
- Access to internet is not defined as a human right, like it is in Finland.

Based on statistics from the World Bank (<https://data.worldbank.org/country/costa-rica>) and United Nations (<http://hdr.undp.org/en/countries/profiles/CRI#>)

General state of institutions

I was born and raised in Costa Rica. Internationally, the country has a positive reputation. In 2012 Costa Rica was named the happiest country according to the Happy Planet Index¹. It also counts as a sustainable country, scoring 30/180 in Environmental Performance Index 2018².

Despite the good ranks, the country's governmental institutions still face many challenges and are in need to find better ways to deliver public value and services. According to a report by the State of the Nation Programme (2016), the current governing situation is described as being in a state of paralysis, caused in most cases by the weight of political agendas over informed decisions. The same report highlights the need for new governance mechanisms in order to improve coordination and implement strategies for a national democratic and sustainable development. Moreover, it states the necessity to address inefficacy of governmental agencies with regard to taking actions and aligning efforts for (better) policy making (Banco Interamericano de Desarrollo, 2010; Programa Estado de la Nación, 2016). Even though we are surrounded by beautiful nature and happy people, there is much work to be done in our public sector.

Citizen-government engagement

Regarding citizen participation, we (Costa Ricans) do not make a great effort. According to National Transparency Consultation by the National Comptroller's Office (2016), only 28% of the interviewees participated in some kind of citizen, neighborhood group or committee, and only 10% have attended a public hearing in the two years prior to the poll. For the municipalities, 69% of the survey participants think local governments do not offer sufficient spaces for participation (ibid.). When it comes to active citizens reporting or filing a complaint, the survey results are also negative. In the two years prior to the survey, only 10% of the participants raised any complaint to a public institution, and less than 20% of the participants filed one to their respective municipality (Comptroller General of the Republic, 2016).

¹ <http://happyplanetindex.org/countries/costa-rica>

² <https://epi.envirocenter.yale.edu/epi-country-report/CRI>

Along similar lines the State of the Nation report (2017) outlines a general discontent of Costa Rican citizens with the government. The report indicates that satisfaction indicators for political performance are low and that the majority of citizens feel that those who govern are not interested in serving them (ibid. p. 251). Based on these numbers, and my experience as a Costa Rican citizen, there is a clear lack of communication, interest and trust between citizenship and government that needs attention.

Role of municipalities

Costa Rica is divided in provinces, cantons, districts and neighborhoods. Municipalities are the only administrative subdivisions in the country and operate at a cantonal level; we do not have a regional or provincial governments. They are the closest entities to the citizens and their role is to regulate the land use and provide the area with public services such as waste management, urban sanitation, local police, public parks and roads maintenance (Constitución Política de Costa Rica, 1949, Art. 169). Municipalities operate autonomously from the central government. Since 1998 they are decentralized entities with independent political and administrative power over their income through taxation. They have autonomous power to manage and allocate resources, but they do not have legislative power (Constitución Política de Costa Rica, Ley N.7794, 1949).

The decentralization and inexistence of regional governments puts great responsibility on municipalities to manage the complexities of public administration. Reports on the current situation of municipalities shows that despite their efforts, poor governing instruments, lack of resources and capabilities are major issues affecting their performance (BID, 2010; Programa Estado de la Nación, 2016). Furthermore, the same reports identified various challenges caused for example by disperse legal frameworks, poor use or absence of information systems, coordination problems between institutions, weak land use planning and budgeting instruments (ibid). Given the reports' findings, the need for building capabilities and introducing tools to improve administration and better articulated governance in these institutions becomes evident.

2.2 Curridabat municipality

Curridabat is the municipality where I did the fieldwork and which developed and introduced *Yo Alcalde*. Curridabat canton was established in 1929 and is located in the metropolitan area of Costa Rica, in San Jose, the capital city of the country. It is the home of 72 564 inhabitants (Municipalidad de Curridabat, 2017) and its 15.95 km² is divided into four districts: Curridabat, Granadilla, Sánchez and Tirrases. Curridabat is characterized by its highly urbanized development that provides a satisfactory tax income for the municipality (project manager, personal communication, 14 July 2016). Alongside, the city has high economic and educational levels in comparison to other municipalities in the country³.

Even though the city is experiencing economic and commercial development in general, there are according to the mayor's office many disparities between the districts. The districts of Curridabat and Sánchez have high economic and commercial development, but Tirrases is identified to have a large social division among its inhabitants and people living in social risk conditions (personal fieldnotes, July – September 2016). As the mayor mentioned, there is still much work to do for the inhabitants (ibid).

The mayor in place when I was at the municipality, was Edgar Mora Altamirano (2007 - 2018)⁴. He had a characteristic innovation driven management style that made him pursue new ways of governance and administration in the municipality. Mora has an uncommon background for a Costa Rican mayor; he is a Non-Resident Fellow at Harvard Ash Center for Democratic Governance and a champion mayor of the OECD's Inclusive Growth Initiative⁵. He recruited a team of young professionals to help him develop new tools, programs and services to improve the city (personal fieldnotes, 7 September 2016). Some of the team members were hired as external consultants for specific projects, others had permanent positions in the municipality. Among other things, this team was responsible for *Yo Alcalde*.

³ For more details and comparisons with other municipalities check the Cantonal Human Development Atlas (2014) <http://desarrollohumano.or.cr/mapa-cantonal/index.php/ranking-idh>

⁴ Currently he is the minister of education.

⁵ Harvard Ash Center for Democratic Governance and Innovation website <https://ash.harvard.edu> and more about OECD Inclusive Growth Initiative <http://www.oecd-inclusive.com/champion-mayors-doc/champion-mayors-flyer.pdf> and about Mora's ideas about city development <https://www.youtube.com/watch?v=7NrYBdeKOLA>

Organizational structure

In Costa Rica, municipalities are composed of two types of members, the publicly elected members and regular employees, i.e. the civil servants or municipal officials. Every four years a mayor, vice mayor and a municipal council are elected by the citizens. For the council and mayor's office, their role is to propose and approve budgets, municipal regulations and urban planning plans⁶. On the other hand, regular employees do not depend on the elections; they have permanent contracts in most cases. They are in charge of operations, maintenance of the city and service delivery. In some cases, services are outsourced to external companies (e.g. waste collection) and external consultants are hired for specific assignments.

Municipalities have general responsibilities, but each organization can define its own departmental structure. For example, the development of *Yo Alcalde* is mainly the responsibility of the mayor's office while the municipal officials receiving the reports are part of the other departments composed by regular employees. Even though the mayor can issue a directive to use *Yo Alcalde* as an official channel, he does not have the legal power to change work practices in the same way as a manager in a private company (personal fieldnotes, July 2016).

2.3 Yo Alcalde

2.3.1 Starting point

Yo Alcalde was initiated by the mayor as part of a bigger agenda to tackle various problems with the current way municipalities operate. Over the years in government (when I meet him in 2016 it was his third period as mayor), Mora encountered a lack of information, instruments and practices to adjust efforts according to citizen's needs. As a mayor, he believes that, besides the bureaucratic and administrative tasks that comes with the title, his –and the municipality's– job is essentially improving citizens wellbeing (Mora, 2016). In contrast, he felt that the current municipality's operations

⁶ More details about municipalities elections and roles <https://produs.ucr.ac.cr/elecciones-municipales-2016>

are based on legal principles, regulations, bureaucratic processes, budgeting frameworks and political agendas as opposed to addressing citizens' problems and the quality of the city infrastructure or services (ibid; project manager, personal communications, 21 September 2016).

Mora also argued that municipalities are territorial governments, but they suffered under a deficit of territorial data regarding who are the inhabitants and what they need from the city (Mora, 2015). Moreover, there were no mechanisms in place to collect or use such information. The most common information used by local governments are regional or sectoral distributed statistics which in most cases have to be purchased from the National Statistics and Census Institute (personal fieldnotes, September 2016)⁷. With sectoral segregated statistics, a territorial understanding of the city environment, quality and its inhabitants is missing.

In response to the situation, Mora drafted an innovation agenda. The immediate focus was on using technology to gather territorial data and making it available for whoever needs it. The long-term vision is an informed administration which is not only reactive but anticipates and plans ahead. *Yo Alcalde* is developed as a tool towards achieving this vision. It is also one of the first, tailored made, digital tools developed by the municipality (team leaders, personal communications, 21 March 2016).

External influences

In addition to the mayor's motivations, there were other initiatives influencing the development of *Yo Alcalde*. These other initiatives were mentioned as important by the project manager of *Yo Alcalde* (personal fieldnotes, July to October 2016). An international influence is the intention of Costa Rica to become part of the OECD. This event is pressing central and municipalities to readjust public administration to shift towards result-oriented management, open government, data-driven and informed decision-making and strategic planning (OECD, 2015). In similar lines, the central government launched the *National Open Government Strategy* (Oficina de la Presidencia Costa Rica, 2015) in which technological tools are promoted as mechanisms to improve access to (relevant) information, trans-

⁷ The National Statistics and Census Institute of Costa Rica does not share their statics as open data. To gain access one is required to fill in a form requesting information or purchase a 'statistical package' <http://www.inec.go.cr/centro-de-informacion/solicitud-especial-inec>

parency, accountability regarding the use of public resources, and provide spaces for society to influence decision-making processes (ibid). The goal of this national strategy is to kick-start a cultural shift in government-citizen relations.

As inspirations, similar tools and projects as *Yo Alcalde* were mentioned. *Yo Alcalde* was partly based on the open source platform Fix My Street, created by the civil society organization MySociety⁸. Additionally, the project used as a reference Por Mi Barrio [In my neighborhood], a similar tool developed for Montevideo city in Uruguay⁹. As reference of data-driven territorial understanding the organization Centro de Inteligencia Territorial [Center for Territorial Intelligence] in Chile was mentioned several times, a research center focused on the use of geo-data models to evaluate and provide evidence for decisions concerning city development¹⁰.

2.3.2 Its political vision

With the previous mentioned ideas in mind, *Yo Alcalde* was initiated in 2015 by the mayor as a tool to start collecting territorial data about Curridabat's city, enhancing citizen participation and closing citizens-government silos through data and technology by mapping conflicts and relationships within citizens, public services, city infrastructure and environment (team leaders, personal communications, 21 March 2016). By facilitating the input of real time issues in the area, *Yo Alcalde* was meant to create an innovative channel for making reports to the municipality that enables 'faster' solutions and responses from the government (project technical lead, personal communications, 14 October 2016). According to a media publication, the mayor described the tool's benefits as:

“Yo Alcalde permitirá a los habitantes mantener una comunicación más directa y objetiva entre ellos, con la municipalidad y otras instituciones. Los datos que se procurarán colectivamente serán el insu- mo principal para destinar recursos a necesidades reales y trans- formar los procedimientos, protocolos y plazos de atención [de la municipalidad]” (Chacón Jiménez, 2015 on Mora)

⁸ Fix my Street website <https://fixmystreet.or>

⁹ Por Mi Barrio project's Website <https://pormibarrío.uy/faq>

¹⁰ Center for Territorial Intelligence (Chile) website <http://cit.uai.cl>

[“*Yo Alcalde* will allow the inhabitants to maintain a more direct and objective communication between them, with the municipality and other institutions. The data collectively obtain will be the main input to allocate resources to real needs and transform the procedures, protocols and attention periods [of the municipality].”]

The new digital tool is thus also framed as a mechanism to improve processes and streamline operations in the municipality. According to the mayor and the team leading the project, the advantage of *Yo Alcalde* is that citizens are in direct communication with the municipal officials responsible for solving their request. This, in turn, enables a visibility that potentially help both citizens and the mayor to pressure the bureaucratic apparatus that slows municipality’s reactions (Jimenez, 2015). The idea is to use the collected data to provoke a response from the municipality and transform how they serve citizens (team leaders, personal communications, 21 March 2016).

2.3.3 System description

The beta version of *Yo Alcalde* was launched in January 2016 and has been live since then. It consists of a digital tool for citizens to directly report issues in the city to the municipality of Curridabat. The reports are made through a downloadable mobile application open to the public¹¹. The channel is for non-emergency issues, reports are mainly about the city’s infrastructure quality and maintenance. Users make the claims based on pre-established categories that define the subject or facility it belongs to. Based on the categories used in 2016, the reports subjects are the following¹²:

- Roads and sidewalks, for example street wholes, a blocked sidewalk or difficult wheelchair access.
- Damages in the electric infrastructure and city lights. Water issues regarding clean or wastewaters.
- Waste management and bad odors.

¹¹ *Yo Alcalde* app can be downloaded from Google Play (<https://itunes.apple.com/us/app/yo-alcalde/id1071303276?mt=8>) and iTunes (<https://itunes.apple.com/us/app/yo-alcalde/id1071303276?mt=8>)

¹² This category are based on the ones from 2016 when did my fieldwork, currently the have been modified, but changes are not drastic and general themes are similar.

- Sewage system, state of river sides and floods.
- Parks and vacant lots maintenance.
- Irregularities concerning permits and regulations for commercial establishments.
- Good examples, which are not issues but rather things citizens appreciate.
- ‘Other’ category to give users the option to make their claim even if they do not find a matching category.

As mentioned, the mobile application uses a location-based system that allows collecting the reports as geographical data. When users make a report its location is already captured by their phone’s GPS (Global Positioning System). With the location-based systems the reports are shown in a map view. The public reports are accessible, for view only, to all users who download the application.

In addition to the mobile application for making the claims, *Yo Alcalde* also consists of a web-based dashboard as an internal tool for managing the



Figure 2. *Yo Alcalde* mobile application promotional material by Olmo Mezger (retrieved 6.8.2016 from <https://green-and-energy.com/project/yo-alcalde/>)

reports (see figure 3) intended only for the municipal staff, directly or indirectly involved in dealing with the reported issues.

Reporting

After downloading the application, citizens need to create a user account with their email in order to submit reports. After creating the account, the application will open a map view and point the user's location. Then, the user makes the report based on this location or she can relocate the reference point in the map within Curridabat's boundaries. Besides the location, the report consists of a category among those listed above, a text description and photos uploaded by the user. After submitting the report, it will be registered in the user's account and become visible in the public map. The user can later check its status, progress and comments added by the municipal staff.

Handling the reports

When a report is submitted, a municipal official based on its assigned category will be notified with the issue and becomes responsible for handling it. Whoever is assigned to the selected category can then change it if it is not her responsibility. When receiving the assigned report, the staff designates it with a status (received, in progress or closed). The staff can also add an optional free text reply to the citizen who made the report. Afterwards, the citizen will be notified with the new details. These actions are done in the dashboard illustrated in figure 3.

The original report, status and comments are visible in the application for all the users. Reports are shown as a color dot on the map that by clicking on it the user can see its details. As a special feature, each claim has a "apoyar reporte" [support this report] button indented for other citizens to vote it as important issue, serving as a way of measuring relevance for the community.

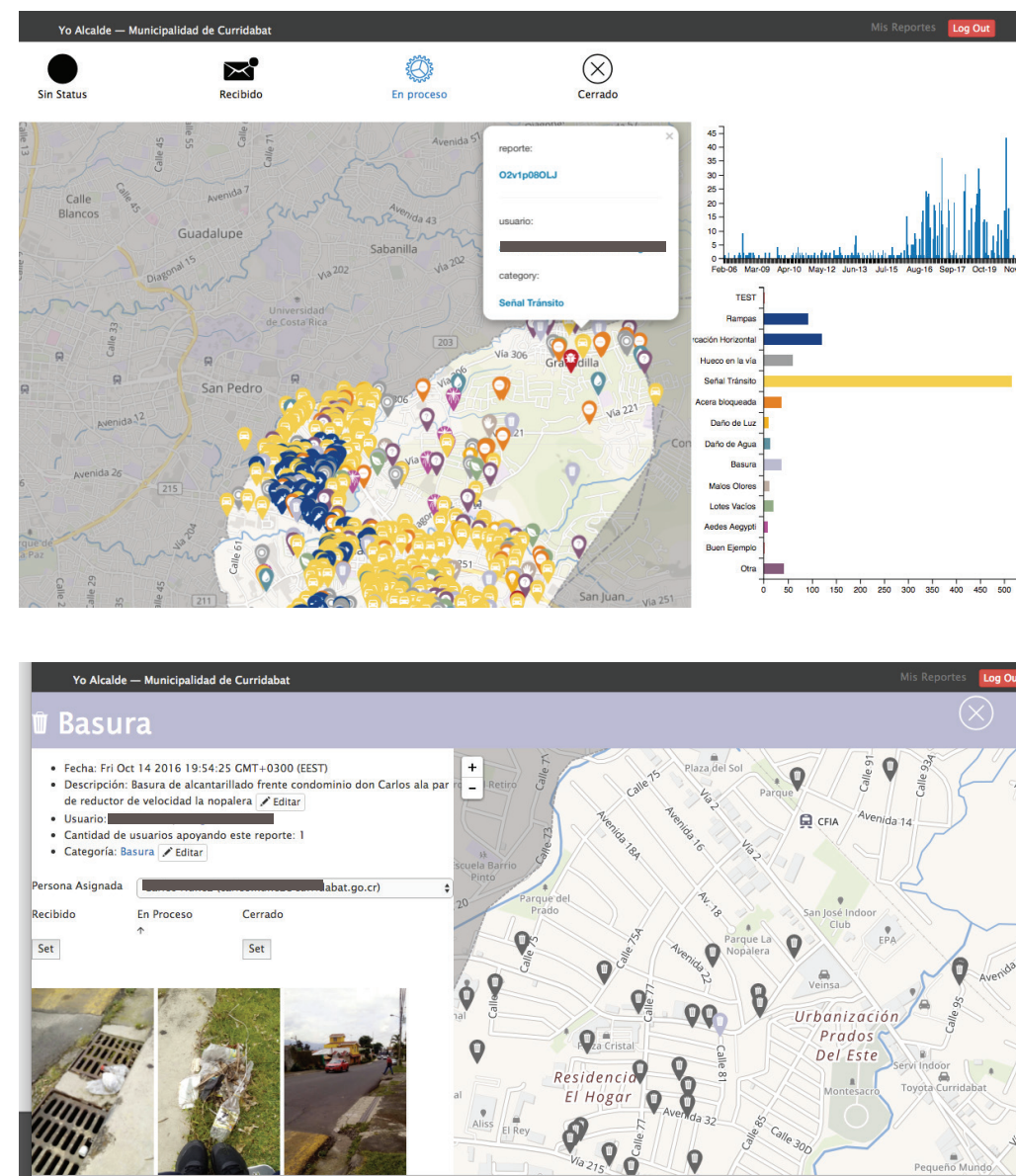


Figure 3. Screen captures of Yo Alcalde dashboard (7.1.2017)

Chapter 3

Research objectives

In this chapter the objectives driving this research are explained. First section outlines the motivations and preliminary findings of the fieldwork. Second section describes the objectives, research question and focus.

3.1 Motivation

Despite the described need for a tool such as *Yo Alcalde*, during my fieldwork it became evident that introducing it in the municipality was a complex task. Making a mobile application for people to report sounds simple, but after working within the municipality I noticed that handling the reports internally and changing response practices required more than a digital interface. According to the municipal officials, handling citizens' reports means different types of cases, internal processes, regulations, and it also involves multiple ways of working. After collaborating with them my conclusion was that the biggest challenge for *Yo Alcalde* was not developing the mobile application; but rather supporting the officials handling the reports.

When collaborating with the team in charge of developing *Yo Alcalde* I found a disconnection between their ideas and the needs of the officials. During meetings and interviews, *Yo Alcalde* was mainly described as a tool for visualizing and collecting citizens' demands. Some comments about new internal processes needed came forward, but no plans or a responsible person for them were mentioned. I could not find a description of how the municipality would adopt the new tool into their operations, or how it would affect current work practices and processes. To sum up, I encountered a significant gap between the mayor's official goal for *Yo Alcalde* (see section 2.3.1 and 2.3.2), the operational reality of the municipality and the tool intended to help them achieve the desired goal.

Moreover, I noticed that this gap generated internal tensions, questions and problems when *Yo Alcalde* was introduced as a work tool for the officials. In my opinion, if *Yo Alcalde* is not articulated within existing practices –and capacities– of the municipality, it could result in a fragile digital layer which disappears when the mayor leaves office. Also, resources may be allocated to develop a great mobile application for citizens, but without a response capacity from the municipality the app cannot fulfill its potential. From the perspective of the officials, if they do not see the value of the new tool, they could neglect its use.

My question is not whether *Yo Alcalde* should be implemented, but rather how to intrinsically connect it to the municipality's context and the people adopting it. In my opinion it is crucial to investigate the municipality's organizational context to understand how *Yo Alcalde* could or should help them achieve their goal of improving operations and service delivery.

3.2 Objectives and research question

Based on the preliminary findings described in the previous section, the objective of this thesis is to explore the role of the new digital tool, *Yo Alcalde*, within the municipality's context. The aim is to understand what happened when this tool was introduced into this particular municipality by analyzing and making visible the influence of *Yo Alcalde* on current ways of working, processes and people involved in managing citizens' reports and claims. In addition, this research seeks to outline what possibilities and re-configurations *Yo Alcalde* brings to the municipality's operations. Overall, the goal is to conceptualize the new tool in the municipal context as linked to its desired effects of changing it (see section 2.3.2).

By mapping how *Yo Alcalde* is influencing the municipality, this research wants to make tangible the complexities involved in changing municipal administration through digital tools. It is intended to illustrate with an example that improving municipal operations and communication with citizens goes beyond building a digital tool, and how contextual awareness is required. With this, the thesis will hopefully provide lessons for further development of this and similar tools.

In order to accomplish these objectives, the following research question will guide this research:

What are the implications and tensions raised when a digital tool is introduced to change municipal administration?

With this research question, the focus is on the strategic potential of the platform to influence the municipality's administration and operations rather than as a citizen participation tool. This is in line with how the type

of information in the reports of *Yo Alcalde* and findings from the literature suggests that the collected data has higher pragmatic value for city management than just increased citizen participation (Ertiö, 2015; also see section 4.2). This choice is also based on my fieldwork findings and data collected during this time. When collaborating with the municipality I was mainly working with the municipal staff handling the reports and other managers interested in the tool, so it was sensible to focus the research on implications for the municipality rather than for citizens.

Chapter 4

Research background

This chapter presents concepts from various fields of study which I will apply to understand the implications of introducing *Yo Alcalde* in the municipality. The first section explains geo-data and its relevance for governments. Second section characterizes the type of tool *Yo Alcalde* is. Third section explores digital tools for improving public sector from a general perspective. The fourth section introduces concepts for exploring digital tools with regard to their organizational context. The final section summarizes the literature findings.

4.1 Geographical information in municipalities

Geographical information is defined as data which is geographically (or spatially) referenced according to its location (Zhang, 2012 p. 208). City administration requires this type of information; for example, the location of public buildings, schools, hospitals, police stations, alongside details of roads infrastructure and natural environment (ibid.). Moreover, geographical data has political value due to policies which include a geographical component such as land use planning, public service provision, environmental conservation, transport and citizen registers (Sieber, 2006p.491).

Geographical information can also include social and economic attributes when it relates to population, household income, mobile subscriptions, and other attributes of a specific area of a city. In countries such as United Kingdom, it is estimated that 80% of the information in local governments has a geographical component such as addresses (Zhang, 2012 p. 208). A central municipal governance instrument in Costa Rica is the Plan Regulador Municipal [municipal master plan] which determines the development and characteristics of the canton areas (e.g. commercial, habitational, conservation) (Programa Estado de la Nación, 2016). The Municipal Master Plan is based on geographical information and some parts are communicated through maps¹³. To conclude, having good registers for geographical information and using it is essential for municipal administration and city development.

Geographical information systems

Tools for using this information are known as geographical information systems (GIS). These systems are described as technological tools to collect, process and analyze geographical data, for example to visualize it in map (Ganapati, 2011 p. 425). Map visualizations are considered important for conveying geographical information that would be too complex to grasp from tables or textual descriptions (ibid.). Some scholars expand the

¹³ Curridabat's Plan Regulador documents can be accessed from here <http://www.curridabat.go.cr/plan-regulador/>

concept of GIS beyond that of being merely a technical tool. For example, Sieber (2006) and Zhang (2012) describe GIS as socio-technical systems which include the technical tools, but also the people, roles, processes and the organizational context involved in orchestrating the use of geographical data. What is most relevant for this thesis is the conception of GIS as socio-technical systems. Even though the technical aspects are important, they fall outside the scope of this thesis.

4.2 Geographical information systems for collecting citizens' input

Regarding uses of GIS, web-based geographical tools can facilitate channels for the collection of geographical information provided by citizens. With the current development of web-based platforms, open source maps and commercially available options, the use of GIS is no longer exclusive to experts (Ganapati, 2011). Nowadays platforms such as OpenStreetMaps or Googlemaps have simplified the development of web-based GIS and with the presence of smartphones, the use of these tools have increased (ibid). The particular use of geographical tools for collecting and sharing geographical data contributed voluntarily by individuals is referred to as volunteered geographic information (VGI) (Goodchild, 2007).

One example of a VGI is Yo Alcade where citizens voluntarily report issues they find in the area. Another example is the mobile application Waze in which users input traffic status and hazards on the road which the application then shares as traffic reports to other users and uses the information for route time estimations¹⁴. VGI tools enable non-geographical experts to contribute location-based information and create a type of collective mapping (Ganapati, 2011). In the case of local governments, VGI tools can serve for gathering information from citizens about place-based issues or use them as two-way communication channels to foster participation (Johnson and Sieber, 2013).

¹⁴ Waze application <https://www.waze.com>

Through the use of VGI tools, citizens can become sensors of the city (Goodchild, 2007). They are described as tools that can help governments learn “what is happening on the ground” through citizens’ reports (Ertiö, 2015 p.315). Residents of an area can identify changes or issues in the place, thereby providing local knowledge to the governmental agencies (Ganapati, 2011). With these new digital channels noticing such issues is no longer dependent on government employees monitoring the area (Johnson and Sieber, 2012 p.66). This collected data can then inform government’s place-based service delivery and planning processes (Brown and Kytä, 2014; Ertiö, 2015). VGI tools can also be used to create a two-way communication stream between government and citizens, where responsiveness to citizens claims can become visible (Johnson and Sieber, 2013 p.66).

Despite the described benefits, the full potential of VGI tools has not been reached (Ganapati, 2011; Johnson and Sieber, 2013; Brown and Kytä, 2014; Aguerre and Bonina, 2018). Reasons and constraints range from adoption challenges to political issues and limitations to reach citizens. For example, Brown and Kytä (2014) highlight how incorporating citizens, or non-expert geographical data into planning processes is not easy “because land use planning is not a single problem to be solved, but rather an ongoing set of social trade-offs” (p.126). Johnson and Sieber (2013) describe issues concerning data quality when accepting this ‘non-expert’ data into expert frameworks or established processes. On the other hand, Ertiö (2015) comments that benefits of these tools can be reached if government agencies “are willing and ready to analyze and use the data” (p.315).

Other constraints concern citizens privacy, integration costs for government agencies and political issues of what can become visible when mapping certain issues (Sieber, 2006; Johnson and Sieber, 2013). Another important constraint is the possible contrast between the jurisdiction of each governmental agency and how citizens experience the area: citizens may report to an agency issues outside their jurisdiction which in turn requires finding new ways for inter-institutional collaboration or limiting citizens input scope (Johnson and Sieber, 2013 p.77; Aguerre and Bonina, 2018).

Similarly, Johnson and Sieber (2013) argue that collecting citizens’ contributed data is not the same as participation. In order for citizens-gov-

ernment to have a productive dialogue and partnership, a transformation for actively integrating citizens' VGI into decision-making processes and policies is needed, which is yet to be seen (ibid p.77-78). Participation is also linked to VGI digital tools limitations. They do not necessarily increase citizen's reach and conflicts are raised when comparing them with traditional participation channels (such as town hall audiences) (Ganapati, 2011). For example, a digital divide in citizens who use VGI web-based tools has been observed. People with higher education levels and from better income neighborhoods tend to use more digital channels, while input from citizens living in lower income areas do not increase radically with these new digital channels (Lu and Johnson, 2016; Aguerre and Bonina, 2018). Participation practice is not simply done by building a VGI tool for citizens.

When it comes to adopting citizen-contributed information and the tools to collect it in governmental organizations, most of the literature describes it as an organizational challenge in which contextual conditions determine whether the information, the tool and new participation practices are adopted and incorporated into decision-making processes and workflows (Johnson and Sieber, 2013). Ganapati (2011) mentions that the organization needs to "value citizens participation" (p.431) and that its culture, people and place matter.

Regarding this challenge, Brown and Kytta (2014) recognize that research in the field will benefit from exploring contextual enablers and blockers for adopting GIS tools aimed at fostering participation. As they see it, it is naïve to ignore the constraints on public sector innovation, and write that "providing freedom and space for innovation is unlikely to be sufficient for a planning professional conditioned to operating in a culture of constraints and risk-aversion until the surrounding organizational culture and social context facilitates it" (Brown and Kytta p.14 on Mulgan and Albury, 2003). For handling constraints when adopting VGI tools, Johnson and Sieber (2013) recommend governments to "identify potential bottlenecks and proactively position themselves to address them" (p.78). To finalize, it is clear that the development and introduction of VGI tools in governmental organizations needs an exploration of their contextual conditions, constraints, capacity and culture in addition to motivation and willingness to use citizens data and the tools themselves.

4.3 Digital tools for improving public sector

From another perspective Yo Alcafe falls into the current hype of governments promoting digital tools for improving their services and interactions with citizens. Nowadays, with the rise of technological possibilities, access to smartphones and internet connection, the presence of digital services is the norm. With the current hype of digitalization, citizens expectations grow and governments are pressed to follow this trend (OECD, 2016).

Digitalization is not new to governments, but what has become relevant is the idea of technology as an enabler for improving public administration. Information and communication technologies (ICTs) are present in most (if not all) government activities. They are an essential part of how public organizations operate. Examples range from managing national statistics, payment processes, email communications, internal communication systems and so on (OECD, 2003). However, the pressing trend of 'digital transformation' characterizes digital tools as mechanisms for enabling better public administration¹⁵. Where "better" could mean improving operations, changing government's approach for anticipating citizens' needs, efficacy and effectiveness of services, and making accountability and transparency more visible (Madsen, Berger and Phythian, 2014; OECD, 2016; UK Cabinet Office, 2017). Under this concept, the value of introducing digital technologies is focused on improvement and change aspects, not simply on the technology itself.

With this perspective, there are great possibilities for using digital projects as a means for redesigning processes and interactions in the public sector. On the other hand, changing government's ways of working requires more than digital tools. Advocates of 'digital government' highlight that "changes involving ICTs need to be accompanied by broader organisation-

al change if they are to be effective. Merely introducing ICTs into exist-

¹⁵ Similar concepts can also be found under the 'e-government' (United Nations, 2016)(Bank), 201AD)or 'digital government' (OECD, 2014). Concepts differ in scope, but they all attribute the value of ICT in governments should aim for better governance by improving efficiency, effectiveness, responsiveness, or accountability and transparency.

ing organizations and work processes will not produce the desired improved outcomes” (OECD, 2003 p.24). Similarly, United Nations (2016) describes information technologies as support tools for achieving sustainable development, but also claim their potential is yet to be seen. They recommend focusing on readiness of organizations to use and adopt these technologies, rather than on the maturity of such (ibid).

Furthermore, scholars describe change by technology in government as a dynamic process. It is considered as a series of phases involving the development of technology, capabilities, infrastructure, but also new inter- and intra-organizational processes in addition to the adoption of new working culture and tools by people (Zhang, 2012). With this said, it is clear that enabling change is not a technical issue rather a mixture of technology, people, processes and organizational context.

It is a common problem that technologies are designed in isolation of the context they will affect, people, culture, systems and their ways of working (Checkland and Holwell, 1998; Heeks, 2002; Nelson, 2007). Particularly in the public sector, even though digital projects aim at improving processes they tend to focus on delivering the new digital service, overlooking issues in the current (analogue) processes and missing opportunities for real improvement (Goldkuhl and Röstlinger, 2010; Downe, 2018). Recommendations to close the gap between the technical design, expectations and reality of use emphasizes the need to understand the organizational context first.

The development of a new digital tool should include mapping the pre-conditions of the new digital service, the actors, existing systems and processes (Heeks, 2002; Goldkuhl and Röstlinger, 2010). It is also important to understand the relationship of the technology, its desired outcome, and the effect on the organization’s ways of working, culture and capacity to adopt the new tool (Checkland and Holwell, 1998; Aguerre and Bonina, 2018). Only then, after obtaining an organizational overview, can one proceed to define the digital tool and its technical requirements as articulated with respect to the particular organization and conceptualized according to the desired change (ibid.).

4.4 Digital tools and their organizational context

As digital technologies are increasingly taking over worklife and organizations, practitioners and researchers noticed how these new systems are affecting more than operational tasks. However, it became evident that introducing information technologies implied a rooted change in how people experienced their work. Moreover, with digital systems new information, processes and objects became visible. The new elements requires both a new type of thinking and conversations about which information is relevant and for whom, and who should have access to what. In some cases, departments that were not working together might now share data and work schemes. Due to such observations, the introduction of information systems in an organization is characterized as an event that brings with it social change. Implications of new digital tools go beyond the technical aspects, they considerably change an organization’s situation. (Checkland and Holwell, 1998; Orlikowski and Scott, 2016)

Based on the observations, a practitioner in the field of information systems (IS) (Holwell) together with one of the leading authors of Soft Systems Methodology (Checkland) developed an approach for understanding this phenomenon. The following account on the approach is based on Checkland and Holwell (1998). Their work is a reflection from their experiences working in the development of IS in multiple organizational scenarios and they define key concepts to grasp information systems (or digital tools) in relation to the organizational context they are introduced into.

Organizations

Organizations are the contexts where new technologies are introduced and where they should operate in, so the concept of ‘organization’ requires explanation. Checkland and Holwell (1998) define an organization as a social unit rather than a rationally unified entity. After comparing different concepts of ‘organization’ the authors conclude that in most cases organizations are seen as a unified collective seeking a common goal and in which

decisions are taken rationally (p.72-78). In contrast, they consider the unit not as a whole; they claim an organization is formed by individuals with different interests who accept to be part of a collective. While roles, structures, norms and values can be observed, and a guiding 'official' agenda exists, the authors stress that an organizational agenda not necessarily is the same as the individual members or groups' interests. Consequently, unified goal seeking from all members of an organization is not possible.

More in detail, Checkland and Holwell (1998) characterize an organization as a dynamic entity, a collective that "has constantly to seek accommodations between conflicting interests upon which action can be based" (p.84). This means the organizational dynamics are not only based on a goal-seeking agenda, but also on recurrent negotiations to create meaning and balance between groups of interest. With this way of thinking about an organization, its context and activity, research related to organizational context is concerned with "the processes by which intentions are formed and action is taken at both individual level and, if accommodations between conflicting views are possible, at the group or social level" (p. 218).

Through this lens, when studying an information system one is not only interested in its instrumental qualities, but also the complex social matters and the tensions in the context it is embodied in. Checkland and Holwell describe digital tools' relation to organizations as systems serving its people with information that enables them to take actions. So, when exploring digital tools the focus is on the produced information, the processes that it hinders and rearrangements made possible with the new tools.

Information systems (digital tools)

Due to the mentioned dynamic situation of organizations, Checkland and Holwell (1998) portray the introduction of a new technology as an event which brings change. New digital tools "will always have implications and consequences beyond the merely technical" (p.7). According to them (ibid.), the development and adoption of digital tools entails both technical and social reconfigurations. Digital tools allow doing things differently, in ways it was not possible before, thus producing new actions. In so doing, processes, objects and information become visible to some parts

or all of the organization. Orlikowski and Scott (2016) highlight how the rendering of the new events and information will affect the dynamics of the organization; and contextual kickstart reconfigurations related to work and social relationships (. Obvious reconfigurations of procedures will happen when they are digitalised, but they will also reflect on structural, social and political aspects. The organization would go through a learning process to build new meanings and adopt the use of the new tools together with the information and data carried in it (Checkland and Holwell, 1998).

Complex situations of this kind should be explored on both the organizational level and from individuals' perspectives which are part of it (Checkland, 2000). Therefore, the influences of digital tools are not constrained to touching the productivity apparatus of the organization, but it also affect individuals (Orlikowski and Scott, 2016). When a process is not manually anymore someone's reality will be very different, they will according to Checkland and Holwell (1998, p.6) experience a 'deep-rooted change' in their life. They explain that this change will create uncertainties, provoke reconfigurations that need to be negotiated in order to create new understandings and culture among individuals and groups; and that this negotiation will not only be about meaning, but also regarding the elements, requirements and information that become visible with the new tool.

For example, in the process of introducing IT, negotiations about what information is accessible and what is restricted and by whom, are matters of politics. In this case, the authors outline 'politics' as a set of processes in which accommodations are continuously achieved in relation to the power disposition between groups or people. Power matters should be taken into account because of conversations raised when developing an information digital system; also based on the fact that 'information' relates to power itself. As mentioned, given access or denying information is an act of power disposition. (Checkland and Holwell 1998, p.8)

Furthermore, other negotiations will happen across the organization among the members and groups. Accommodations needed will also depend on the social interactions among different groups of the organization and its people. Digital tools may bring visibilities to the rest of the organization of some members' work; or data will be shared across several departments

with new tools; and new roles might be created as a result of the new possibilities and questions brought by the information system. To summarize the approach of Checkland and Holwell (1998), an information system influences more than the productive activities of an organization by having implications also for social, political and instrumental matters of its context.

4.5 Summary and synthesis

So far, the phenomenon of digital tools such as *Yo Alcalde* have been discussed from several perspectives. The adoption of tools for collecting location-based data provided by citizens has been outlined from the field of volunteered geographical information and GIS. This was followed by a short account of the implications and considerations needed when digital tools aim to improve public administration based on concepts of e-government and digital government. Finally, I briefly elaborated on how to understand digital tools' influences and effects on organizational contexts and work using concepts from the field of information systems and organizational studies.

Even though the presented literature belongs to different fields of study, they all conclude that in order to have an effect on government services an understanding of the limitations and constraints of its context is required for the development of the tools. From the research background, it also became evident that improving citizens-government communications is not a technical challenge, but rather it is an organizational one where problems to solve and implications to handle go beyond the technical limitations.

To summarize the findings regarding how to understand contextual conditions, limitations and enablers involved in the adoption of new digital tools, the following key aspects should be considered:

(1) An overall organizational operational and technical capacity of the organization for dealing with geographical data and citizen's communications should be understood. This capacity should be considered from the perspective of information systems, processes and organizational culture. (Heeks, 2002; Aguerre and Bonina, 2018)

(2) When it comes to geographical information, a recognition of the bottlenecks for integrating the new information and tools into the municipal workflows is needed. Recognising this bottlenecks should also include new processes for communicating with citizens, not only the collection of their reports. (Goldkuhl and Röstlinger, 2010; Johnson and Sieber, 2013; Aguerre and Bonina, 2018)

(3) It is important to understand the socio-political aspects of the organizational context and how culture, motivations, barriers and enablers for adopting new digital tools are part of the challenge. (Checkland and Holwell, 1998; Zhang, 2012; Brown and Kyttä, 2014; Aguerre and Bonina, 2018)

(4) In order to understand the socio-political context of the organization, one should consider how tensions, conflicts and new meanings of work arise when introducing a new tool. These aspects should be explored from the perspective of individuals, groups and the organization as a whole. (Checkland and Holwell, 1998)

In general then, we conclude that it is important to map current processes, culture, technical capabilities, people and dynamics when introducing new digital tools in organizations. These considerations are important in order to achieve the intended change or vision, in this case of improving municipal administration and citizens-government communications.

Chapter 5

Methods

This chapter explains the methods used in the research. A justification of the chosen method is outlined in the first section. Then a detailed description of the data collected in the fieldwork is presented. Final section describes how the data was used and the case analysis organized.

5.1 Case study as a research method

Case study is chosen as the method to study Curridabat municipality's context and the effects of introducing *Yo Alcalde* into its work practices. Case study is described as a research strategy for investigating a phenomenon in close relation to its context, by drawing from multiple data sources and aiming at facing theory with real-life examples (Piekkari and Welch, 2018 p. 345). This method is recommended to use when boundaries between the research subject and its context are difficult to draw (Yin, 2009 p.20). The choice of case study is based on the empirical data collected during my fieldwork at the municipality, and due to the social aspects encountered when studying a digital tool as a mechanism for change, rather than focusing on its technical characteristics.

The qualitative data collected during the fieldwork and practical experience are combined with theoretical knowledge to analyze the case. Given this thesis' goal to grasp the intrinsic relationship of the digital tool within the municipality, I decided to do a single case study. A single case study allows an in-depth exploration of the social dynamics and complexity inherent in the particular context of the case (Piekkari & Welch, 2018). Doing a single case analysis supports a holistic approach, where parts are studied in relation to the whole and not as a set of variables, and where a rich contextual description is needed for creating understanding. Focusing on specific conditions of a phenomenon-in-context could yield theoretical insights and knowledge for future actions (ibid.). The purpose is to uncover particularities and to understand the implications of the new digital tool, not to compare it to similar platforms or theory itself, and a single case study research allows this.

5.2 Fieldwork and data collection

This research is based on fieldwork done in 2016, from July to November at the Municipality of Curridabat, Costa Rica. During this time, I was a

design student collaborating with the development of *Yo Alcalde*. There was no formal contract or payment from the municipality, but we agreed I will use this practical work for my thesis.

It was my personal interest in working with a project for the Costa Rican public sector related to data or technology that lead me to contact the Municipality of Curridabat. I approached them in December 2015 through their ‘innovation office’ promotional website (no longer available), and agreed on a collaboration with the project manager of *Yo Alcalde*. In March 2016 I had an online meeting with the project manager and the technical lead in which we exchanged ideas on how to make my work beneficial for everyone. I started my work at the municipality in July 2016.

When I was at the municipality a beta version of *Yo Alcalde* was already live, for which I was asked to “generar una propuesta sobre cómo podríamos dirigir esta herramienta través de un proceso, antecedido de un diagnóstico de diseño de experiencias” [“generate a proposal on how we could direct this tool through a process, preceded by a diagnosis of design of experiences”] (project manager email, personal communication, 14 July 2016). My role was to help them improve the current version of *Yo Alcalde*. After my time at the municipality, I delivered a report listing improvements for the internal dashboard used by the officials handling the reports (see section 2.3.3). I also presented to the project manager an overview of how the tool relates to the officials’ work and described how it could support municipal administration. Both deliverables were meant to help further develop *Yo Alcalde*. However, I sent the report via email, and the final presentation was only to the project manager, so I am not aware if my work had any effect.

Approach

I approached the practical work at the municipality as a design research task, where my role was to produce insights to improve *Yo Alcalde*. As a designer (and creative sustainability student), my practice is influenced by concepts from designing for services (Kimbell, 2011), transformation design (Sangiorgi, 2011), systems thinking (Checkland, 2000), politics in design (Winner, 1995) and others. In my design practice, I am interested

Interviews with municipal members

Activity	Participants	Date	Recorded	Key questions or ideas
Online meeting/ Interview with Yo Alcalde's project leads	Project manager and technical lead	31 March 2016	Notes	Coordinate the collaboration and understand current state of <i>Yo Alcalde</i> , their vision, and material or information guiding the project
Informal interview	Mayor	19 July 2016	Notes	Short discussion about what <i>Yo Alcalde</i> is for him and how he sees the tool influencing the municipality.
Informal interview	Project manager of <i>Yo Alcalde</i>	29 September 2016	Audio recording (41 min) and transcribed	What is the vision for <i>Yo Alcalde</i> ? Why is it relevant to develop the tool?
Semi-structured, onsite interview	Technical lead <i>Yo Alcalde</i>	14 October 2016	Audio recording (1:24 min) and transcribed	What is the current state of <i>Yo Alcalde</i> ? What is the vision for it? What do you need help with?
Semi-structured, onsite interview	Analyst from planning department, municipal official	18 October 2016	Audio recording (57 min) and transcribed	How do you use citizens' claims and reports in your work? What are the current processes and how could <i>Yo Alcalde</i> improve/affect your work? What are the challenges of the tool?
Semi-structured, onsite interview	Engineer from road management department, municipal official	18 October 2016	Audio recording (1:02 min) and transcribed	How do you handle citizens' claims and reports? What are the current processes and how could <i>Yo Alcalde</i> improve/affect your work? What are the challenges of the tool?
Semi-structured, onsite interview	Head of recycling programme, municipal official	25 October 2016	Audio recording (32min) and transcribed	How do you handle citizens claims and reports? What are the current processes and how could <i>Yo Alcalde</i> improve/affect your work? What are the challenges of the tool?

Table 1. Detailed list of the interviews done in the municipality of Curridabat as part of the fieldwork.

in understanding the problems, its context, possible implications and long-term change as opposed to jumping into producing solutions.

With these concepts in mind, my observations during the fieldwork looked at influences affecting the development of *Yo Alcalde*, the municipal context containing it, and the social dynamics happening around this particular digital tool. My practical work focused on user research involving municipal officials to understand what this tool meant for their work practices and what they need from it. I had an external role in the municipality, I was not integrated into their day-to-day work. This allowed me to interview officials as an outsider, and choose my research focus, but constrained me to work alone and not in close collaboration with the *Yo Alcalde* team or the officials.

Data

All the data collected can be categorized as qualitative data. During the fieldwork multiple research methods and sources were used for creating a holistic understanding of *Yo Alcalde* in the municipality and to produce the final reports. Table 1 details the interviews done as part of the fieldwork, and table 2 the activities I participated in.

All the listed activities were documented as field notes, and some interviews recorded in audio format after obtaining the interviewee's consent. In some cases, a prior protocol was designed for the interviews. Throughout the time at the municipality, I had three status update presentations with the project manager of *Yo Alcalde*. Additionally, I had access to a shared folder with internal documents and reports about *Yo Alcalde*. Direct correspondence with the team are also used as sources. To finalize, my time at the municipality counts as participatory observation; when I had an interview or activity I stayed working in their premises. Findings from these observations were recorded as fieldnotes.

Furthermore, outside the fieldwork I had two expert interviews. The first was with a Finnish expert helping cities build data systems and advocating for open data in government (21 June 2016, Helsinki). The second was an online interview with an expert leading the development of *Por Mi Barrio* [Around My Neighborhood], a tool similar to *Yo Alcalde* in Uruguay

(9 November 2016). Both interviews helped me understand general circumstances in projects related to geo-data and municipalities.

Participant observation activities at the municipality

Activity	Participants	Date	Recorded	Key questions or ideas
Participant observation in department presentation for the mayor's office	Mayor 2 staff members of the innovation office, Territorial manager, Environmental department members, Road network department	20 July 2016	Notes	Each unit presented their work to the mayor. The key points were: what work are they planning to do during the present and next year.
Internal meeting of <i>Yo Alcalde</i> 's software development team	Technical lead 3 software developers	1 November 2016	Notes	Regular meeting about the development of the <i>Yo Alcalde</i> to plan tasks and revise work. (The developers do not work at the municipality)
General meeting with the head of departments handling the <i>Yo Alcalde</i> 's reports	8 officials 2 members of planning department Project leads (project manager and technical lead)	2 November 2016	Notes	Group discussion about the state of <i>Yo Alcalde</i> , organized by the team in charge of it, for the officials responsible for handling the reports.

Table 2. Detailed list of activities I participated at the municipality of Curridabat as part of the fieldwork.



Figure 4. Fieldworld image by the author. User journey mapping activity with *Yo Alcalde* team.

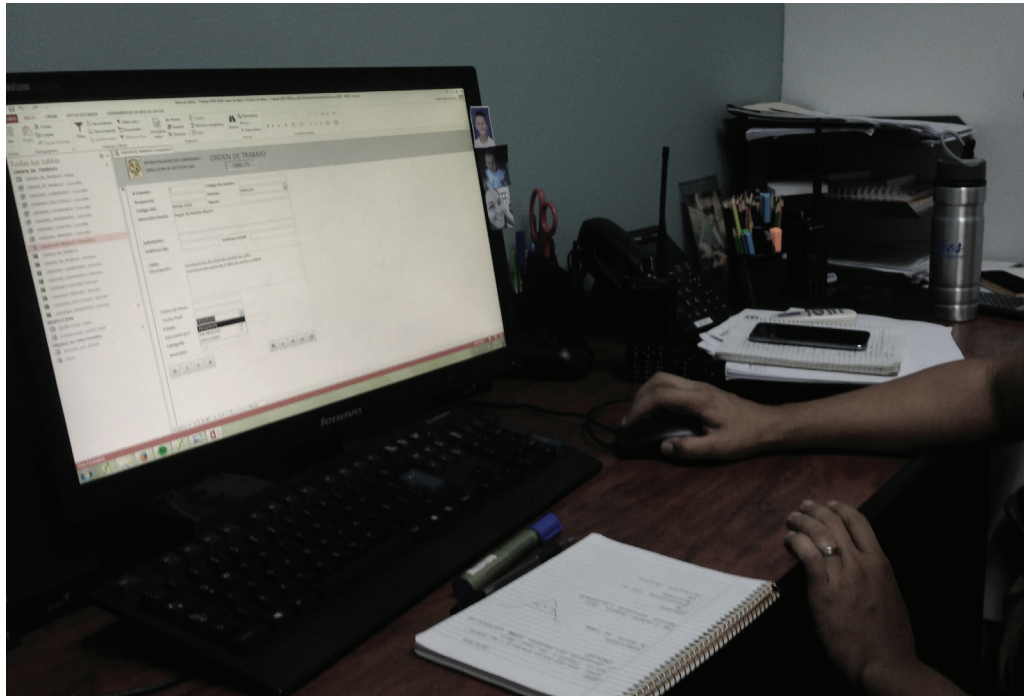


Figure 5. Fieldworld image by the author. Official's office and his self-made database for managing work.

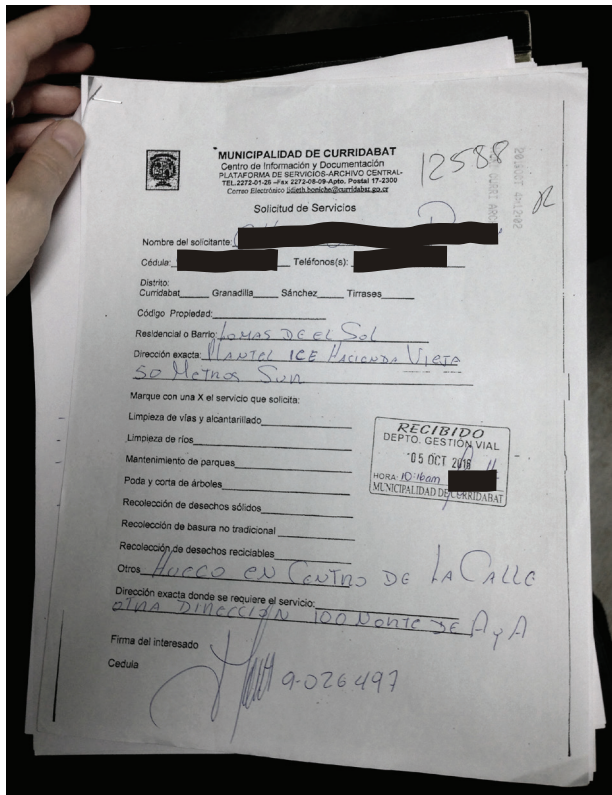


Figure 6. Fieldworld image by the author. Paper form of citizen's requests.

5.3 Analysing the data

To understand the implications and tensions arising from the introduction of *Yo Alcalde* to change the municipal administration, the analysis will be driven by four areas of interest outlined from the research background findings (see section 4.5). Table 3 presents further details about the areas of interest.

- General readiness of the organization for adopting the tool,
- the operations and processes in the municipality,
- the new type of work this tool brings to municipal officials, and
- the general socio-political context of the municipality.

The data analysis was framed using these areas of interest. All the interviews were transcribed and the fieldnotes were organized for the analysis. The data was explored as an iterative process, where findings were constantly refined and organized under themes. Finally, the analysis chapter was organized based on the themes.

Analysis areas of interest

a) Readiness of the organization	b) Operations and processes	c) New type of work	d) Socio-political context
Overview of the implication of the new tool for the organization (as a whole).	Bottle necks for integration the new tool	Meaning of the tool for the staff adopting into their work	Tensions and negotiations between individual and groups
General capacity, systems or infrastructure in place (digital capacity)	Opportunities for improving current and processes	What work becomes visible	New accommodations brought by the new tool
Capabilities and culture (bureaucracy)	Mapping current processes affected by the new tool	Integration into workflows and practices	Ways of working

Table 3. Case analysis areas of research outlined from the research background findings (section 4).

Chapter 6

Yo Alcalde and the municipality of Curridabat

This chapter presents the analysis of *Yo Alcalde*, the new digital tool for citizens to report issues in the city directly to the municipality's officials (for details see section 2.3). The first section provides an overview of the municipality's current systems to handle citizens' requests. Second section describes the new processes enabled when introducing *Yo Alcalde*. The following section explains the constraints and challenges limiting the municipality's response capacity. The fourth section illustrates how this new tool changes work practices from the perspective of the officials, and the final section comments on the approach for developing *Yo Alcalde* and provides a short account on the current state of it.

6.1 Readiness of the municipality to adopt the new tool

6.1.1 General situation

Before going into details about the practices surrounding *Yo Alcalde*, it is useful to describe the general state of practices and administration in the municipality. This situation determines much of established processes that will be mentioned later. When interviewees described the current situation in the municipality, the comments were linked to the challenges listed in section 2.1 (role of municipalities). Nowadays municipalities are independent from the central government. However, many of the current processes, structures, mechanisms and tools in place are inherited from the time they were under the central government. As the manager overseeing municipal operations explained:

“Durante muchos años el ministerio de planificación puso muchas prácticas administrativas sobre las municipalidades. Se crearon unos procedimientos y estructuras municipales uniformes para todos los gobiernos locales, que en realidad no responden a la realidad de cada territorio. Las vocaciones de Curridabat son completamente distintas a las de Limón [otra localidad en el Caribe] y puede ser que nos hayan impuesto una estructura municipal que replicaba al estado central.”

[“For many years the Ministry of Planning defined administrative practices on the municipalities. Uniform municipal procedures and structures were created for all local governments, however, they do not necessarily respond to the reality of each territory. The vocations of Curridabat are completely different from those of Limón [another locality in the Caribbean coast], and it may be that they imposed us a municipal structure that replicated the central government.”]

Under the influence of the central government, the administration of the municipality is based on processes rather than on results (OECD, 2015). *Yo Alcalde*'s project manager explained that with this model of administra-

tion, municipalities performance is evaluated according to their capacity to execute the planned budget. This evaluation focuses on how good they are at planning what to spend and then reporting how effective they were at spending it. Another interviewee commented that these expenditures reports are justified by themselves, and not with regard to citizens' needs or demands. Therefore, the organization's performance is not measured by service delivery results. Instead, it focuses on budget use and planning. With a process-based model of administration the municipality is constrained and focuses mainly on the administration of financial resources. Monitoring citizens' satisfaction or service performance was not a priority before *Yo Alcalde* was initiated. Based on the interviewees' comments and my observations, the official accountability reports from the departments mainly consists on justifying budget expenditure.

Other interviewees commented that current practices are related to a culture of doing things as established because they have been like that for years. A interviewee then described that many people are used to work under the vision and structures established by the central government. Even though during my time at the municipality I encountered people constantly finding better ways to deliver services, they have to comply with the old bureaucratic, established processes which do not seek for responsiveness towards citizens' expressed needs.

6.1.2 Tools for managing and sharing information

Before introducing *Yo Alcalde*, there were no common digital tools to collect, manage, share or analyze citizens' requests or reports in the municipality. Regarding the collection of citizens' requests, all interviewees answered that there are no internal tools to visualize or share them among the municipality, even less to the public. There is a digital archive used for storing scanned versions of paper forms filled at the municipality and mail correspondence from citizens. However, the officials described this digital archive as a registry for storage only, rather than as an administrative tool. Moreover, the project manager said that there was no digital tool prior to *Yo Alcalde* with which one could easily get an overview of incoming citizens' requests and reports.

The officials handling the reports mentioned there is no common tool for managing the requests either. Due to the lack of a common tool, each unit described how they manage their requests in their own spreadsheets or databases. Several interviewees described their processes, but commented that they are not sure how their colleagues work or what information they use. Similarly, during a group interview all the participants mentioned that documenting requests depends on each unit, even on each person. The situation was similar for geographical data and information about ongoing projects or work; officials commented that these are neither visible nor shared among units.

This situation may be influenced by the lack of a general database or administration tool in the municipality. According to one manager, there is no digital infrastructure for sharing information. As he explained:

“no hay una base de datos de la municipalidad, pero se compró una plataforma para manejar toda la información y vamos a durar como seis meses instalandola”

[“there is no general database of the municipality, but we bought a new platform to handle all the information and it will take us six months for installing it”].

There are also no digital tools for evaluating the response to citizens' requests or effects of citizen participation in other forms. The planning department mentioned that a systematized process for assessing citizen participation results is missing. The interviewee said that he knows about efforts being made, but there are no general records about them. He also mentioned that he does not have an overview or clear picture of what people are asking from the municipality and that he relies on the reports made by each department but that is neither mandatory nor consistent.

Clearly, ways of working and information among the municipality is fragmented and its format depends on each unit. There is no centralized tool to manage operations or have an overview of them, similarly for citizens requests and demands. *Yo Alcalde* is thus a digital tool that does not particularly resemble the ones already in use by the municipality. *Yo Alcalde* also went against the current practice by linking information about citizen's requests across departments. Moreover, it is also a tool for management and

the mayor's office to get an overview of what (some) citizens are requesting.

6.2 New processes

6.2.1 Options for making requests and reports

One of the purposes with developing *Yo Alcalde*'s mobile application was to make it easier for citizens to communicate with the municipality. Before *Yo Alcalde* the formal options (according to the municipality's rules) for posting a request or report an issue were: visiting the municipality's Service Desk to fill a form or send a letter by post mail. For example, I could not find a request or report form in the municipality's website (2016 version) and according to interviews there is no general 'request or report' forms available on the website. Only one interviewee mentioned they have their own online form for waste collection issues, but she said that it is neither easy to find nor popular in use.

Now, *Yo Alcalde* provides new digital access for citizens who own a compatible smartphone with internet connection, and who are familiar with similar map-based mobile applications. However, from the perspective of the municipal officials the possibility for instant reporting enabled by *Yo Alcalde* worried some of them. When discussing with the mayor and the project leaders of *Yo Alcalde*, their expectations were that citizens start demanding things more actively from the municipality. They were promoting the mobile application with such purpose internally in the municipality and externally to the public (see section 2.3.2). This provoked among some of the officials responsible for handling the reports concerns about increases in the amount of issues to take care of. Some officials were worried about the work load the app could bring, as one mentioned "*vamos a ser una municipalidad que se dedique a apagar incendios*" ["we are going to be a municipality dedicated to off putting fires"]. He then expressed they might need mechanisms to balance their workload in case that happened.

6.2.2 Information and communication flows

Internal transit of requests and reports

Introducing *Yo Alcalde* creates new information flows in the municipality, especially since there is no common tool for managing citizens' requests (see section 6.1.2). As described in the previous section, there are two formal ways for posting a request or a report, either at the municipality's Service Desk or sending a letter. After a request enters the municipality, it transits through many steps before reaching the official supposed to take care of.

The internal transit steps for citizens' requests was described by the interviewees as follow: (1) the claim enters through *Plataforma de Servicio* [Service Desk], either as a letter or as paper form. (2) The claim then goes to the Archive department to be filed and stored in a paper format, and is scanned for the digital archive. (3) Then the request returns to Service Desk (4) which distributes the requests to the relevant departments depending on the subject. (5) Finally, the request lands in paper form on the officials' desk. The reported issue can also be accessed in the digital archive by using an identifier code to search the database (resulting in accessing the scanned version of the paper request).

When discussing the established processes with the officials, most of them described them as quite inefficient. The manager in charge of general operations said that procedures need to be improved and commented: "*es ilógico... las cosas pasan primero por el Archivo que la persona que tiene que llegar*" ["it is illogical... things [claims] go first through the Archive than to the person it should reach"]. In this flow of information, the priority is not to reach the relevant officials, but rather to store the claim in the Archive system. According to the findings, a claim could take two days to reach the official responsible for the reported issue.

Now with *Yo Alcalde*, requests became reports in a digital map and they would go straight to the department in charge of the reported subject. When reporting through *Yo Alcalde*, the user selects a category depending on the issue, and these categories are linked to a municipal official responsible for

the subject (section 2.3.3). With the new tool the internal trajectory for a request reaching the responsible official is shorter. This new flow also reduces distribution work for Service Desk, provides an automatic archive of requests and registers them in *Yo Alcalde*'s dashboard (illustrated in figure 3).

However, this distribution based on categories is an unfamiliar process in the municipality. Through the formal process a Service Desk staff, who knows the municipalities departments and responsibilities, distributes citizens' requests to the different units. Now the user making the report chooses the category. In a group interview, officials mentioned that many times the assigned categories were incorrect and reassigning the correct one demanded time and extra work for them. This is work they are not used to do. The officials also voiced the concern that the current categories were not working for them. On different occasions the project technical lead asked them to send him the suitable list of categories and labels, so he could change them in the system. However, in my time at the municipality few units made a detailed list of their categories.

Answering the requests

After a request reaches a staff member, some bureaucratic steps are required to give an answer to the person who posted it. One interviewee that is used to receiving requests, mentioned that if the request entered via Service Desk, then the answer goes through them too. He described the mandatory process as: (1) writing a formal answer in a letter format; (2) printing the document, (3) and taking it to Service Desk, (4) where the letter will be scanned and filed in the Archive before (5) it is finally sent to the citizen via mail.

When I asked if all their work flow was like this, he answered yes, "*todo se imprime, alguien lo escanea y hay una bodega de Archivo con todos los papeles*" ["everything is printed, someone scans it and there is an Archive storage room with all the papers"]. Another interviewee explained that this procedure is based on traditional correspondence. In words, he said that "*es la comunicación formal, tradicional y legal porque que queda constancia en los instrumentos de la vieja escuela*" [it is the formal, traditional and legal communication because evidence is registered according to old

school instruments"]. He was referring to the time were most communication was done through letters and documentation in government was made in paper archives. Most of the officials described these formal requirements as time consuming and as reducing their attention for solving the reported issues. However, they said these bureaucratic processes are municipal regulations, so they follow them to avoid legal issues.

With *Yo Alcalde*, the answering flow is also simplified. Now the requests are not on paper forms, but rather linked to a user account. Therefore, the official responsible for giving an answer to the citizen can do it via email or directly through the report. Regarding this new process, an interviewee commented: "*es mucho más fácil dar una respuesta por correo electrónico que por medio físico, qué es lo oficial establecido*" ["It is much easier to give an answer by email than by physical means, which is the official way"]. Answering through *Yo Alcalde* reduces the steps required for the officials and for archiving them.

Communicating progress

Even though writing an answer is easier through *Yo Alcalde*, answering reports made through it requires more than a written comment. According to the project technical lead, *Yo Alcalde* is a strategic support tool for the municipal response capacity. He described it as a tool which enables a better citizen-municipality communication "*donde el ciudadano ve el proceso, interactúa sobre lo que está pasando y los pasos internos se evidencian*" ["where the citizen sees the process, interacts about what is happening, and the internal steps become evident"]. He refers to features in *Yo Alcalde* that allow the users who reported an issue to monitor its progress according to the assigned status of 'received', 'in progress' or 'closed' (see section 2.3.3).

Having to change the report's status requires extra work from the officials. Before, they just had to send a one-time answer. Now they have to communicate with the citizens' more than once. The officials commented that this status feature is not simplifying their work. According to their comments, the new required steps are: (1) the official receives a report, (2) if she is not responsible for the issues, she assigns a new category to it, (3) otherwise, she is supposed to write a comment about receiving the report to

the citizen and change its status to ‘received’. (3) Later on, when a solution is planned for the issue the official is supposed to change the status to ‘in progress’. (4) Finally, when the issue is solved the status should be changed to ‘closed’. These actions of updating the status requires a more active communication from the officials which they are not used to.

Many officials also voiced the concern that the current way the dashboard (see figure 3) was designed, i.e. its features and functionalities, were not making their work more efficient. In addition, in my observations it became evident that introducing this new tool shed light on needed communication strategies, protocols and formats for the answering the reports as municipal representatives, as much as rules for answering times and new steps.

On the other hand, the management was concerned about the criteria for ‘closing’ a report. Questions were raised regarding who changes the report’s status to ‘closed’: the official responsible for fixing the problem, the citizen who reported the issue, or other. As one member of the mayor’s office mentioned: “*cerrado no es lo mismo que cumplido*” [“closed is not the same as solved”]. They also commented that it can happen that an official close the report even though the citizen’s problem is not necessarily solved. Defining the criteria for closing a report is not a simple task since acting upon a report to solve it is not simple. I will return to this issue in section 6.3.

Yo Alcalde and official channels

In general, changing the communication processes and information flows raised the question of if these new reports are official reports falling under municipal regulations. Reports made through *Yo Alcalde* do not follow the established, legal, internal process. About this matter, an interviewee mentioned that he wants to see “*como Yo Alcalde se vuelve con el mismo peso legal or formal en comparación de la los instrumentos viejos*” [“how *Yo Alcalde* becomes with the same legal or formal weight compared to the old instruments”]. When discussing the issue in the municipality, management said *Yo Alcalde*’s reports are as important as the letters and forms filled at Service Desk. They also pointed out the need for new rules to make the new reports official. This, in turn, requires negotiations with *Con-*

traloria de Servicios [Services Comptroller] which is under the municipal council and who supervises the Archive department.

However, none of the interviewees pointed out who is responsible for defining the new processes, rules and their legality. This challenge was recognized by some in the municipality but it was not clear who is responsible for the processes or who should define the new processes.

6.2.3 Internal (inspection) reports

Another aspect with *Yo Alcalde* is the possibility to create internal reports (or inspections) in the municipality. When I was at the municipality, walkability in the city and sidewalks quality was a priority in the mayor’s agenda. In order to improve on the sidewalks quality a new person was hired, by the mayor’s office, with the role of *patrulla peatonal* [pedestrian patrol]. The *patrulla peatonal*’s responsibility was to inspect the state of sidewalks from the perspective of citizens with reduced mobility (she is in a wheelchair herself). Before *Yo Alcalde*, there was no municipal tool designated for making geo-referenced inspections. Now the *patrulla peatonal* uses *Yo Alcalde*’s mobile application as her work tool for reporting accessibility issues in the streets of Curridabat.

The *patrulla peatonal* maps issues she encounters in the city using *Yo Alcalde* which is then supposed to be used for resource allocation and prioritization regarding improving Curridabat’s sidewalks. The resulting maps also help the mayor visualize problems in the city. Similarly, other officials commented they see a great potential for *Yo Alcalde* as an inspection tool. Prior to *Yo Alcalde* officials who were outside the office somewhere around in the city did not have a tool to help them report issues as work to be done. The new option for making reports embedded in *Yo Alcalde* is not only changing citizens ways for reporting, but also internal reporting procedures.

Despite the potential as inspection tool, creating the new role of *patrulla peatonal* generated some tensions among the officials. The *patrulla peatonal* was not only reporting issues regarding sidewalks, but also other issues that she came across. This meant that more reports were reaching the municipal officials, and thus that their workload increased. Moreover,

the reports were now also visible for others. In a general meeting about *Yo Alcalde* the officials mentioned their discomfort. An official referred to the *patrulla peatonal* as “*nos viene a poner trabajo y nos desmotiva*” [“she brings us more work and demotivated us”]. This new role somehow monitors the quality of others’ work regarding city services which is something new for the officials.

As a positive sidenote, the most innovative unit commented they had a training session with the *patrulla peatonal* to define what and how to report. After collaborating with the *patrulla peatonal*, the officials said they are now receiving relevant information from her which is helpful for their work. Despite this positive case, not all units seemed eager to collaborate.

6.3 The constraints on responding to citizens’ requests

The mayor’s intention with *Yo Alcalde* was to collect reports from citizens and use this information to pressure the bureaucratic apparatus to increase the municipality’s responsiveness (see section 2.3.2). However, the municipality’s bureaucratic apparatus is quite complex. Most of the officials I interviewed mentioned that improving the municipality’s response capacity was a challenge beyond a digital tool. One of the officials highlighted this issue as one of the biggest challenges *Yo Alcalde* faced. He clearly described the situation as:

“El tema es cómo responder [los reports]. Hay que definirlo, no solo a nivel técnico, sino político y de administración. Como hacer para dar a vasto y responder a tiempo con cada uno de los reportes. Digamos, al principio la expectativa en cuanto a tiempos fue muy alta, pero es un poco difícil que de un pronto a otro, con una herramienta nueva poder responder con esos tiempo de manera tan célebre, sobre todo con los recursos municipales. Entonces hay que hacer un acomodo de recursos y distribución de tareas y responsabilidades para poder dar una buena prioridad a lo que entra a Yo Alcalde.”

[“The issue is how to respond [to the reports]. We have to define it, not only at the technical level, but also at the political and adminis-

trative level. How to handle and respond on time each of the reports. At first, the response time expectations were very high. However, it is difficult that suddenly with a new tool we would be able to respond with a notorious timing, especially with the municipal resources. We need to have a rearrangement of resources, distribution of tasks and responsibilities in order to give a good priority to what comes to *Yo Alcalde*.”]

He also made remarks about the mayor’s office and management’s expectations to improve response times and how limited resources and reality constraining the officials work should also be taken into consideration. All the interviewed officials who had responsibility in responding *Yo Alcalde*’s reports stressed that this is a complicated process and negotiation about fair response times are needed.

When asking the officials about what is required to solve a reported issue, the common answer was ‘it depends on the case’. As one of the managers said when describing the possible cases: “*aquí se abren una serie de universos paralelos que hay que controlar*” [“this opens a series of parallel universes that we have to control”]. He was referring to the many options and constraints officials have when dealing with the reports. The following parts will described some of the constraints mentioned in the interviews.

There are no one-fits-all solutions for the requests

All the officials mentioned there is no one solution for all the requests. As they explained, is not the same if a neighbor reports an illegal alcohol sale in a house or a store and requesting a missing sidewalk in a community. According to the officials’ descriptions, reports can take many forms, demand different efforts, resources, and even transit through different internal procedures before they can be solved. The following list summarizes possible scenarios for solving an issue, collected through the interviews and fieldnotes. Answering a citizen report or complaint might become one of these activities:

- Check a premise’s permits and notify the establishment if they are breaking the law.
- Prepare a budget modification case to present to the municipal council.

- Programme and coordinate daily tasks with the municipal staff working around the city (e.g. park maintenance, cleaners, construction workers, waste collectors).
- Coordinate with service operators and monitor their answer.
- Design and make blueprints for a construction, then plan work with the municipal construction workers.
- Prepare a public tender and go through a procurement process to hire an external company to solve the issue.
- Notify other institutions about the problem (e.g. the Ministry of Health or the Costa Rican institute in charge of water and sewage systems).
- Contact the citizen or other who posted the claim to inform about limitations of the request.

These are just the possibilities I found during my time at the municipality. It is reasonable to expect there to be more. As the officials said, all reports and request can not be considered as equal. Hiring an external contractor for building infrastructure requires more effort than coordinating with waste collectors to visit a neighborhood.

Municipality's competences and responsibilities scope

Other issues raised in the interviews concerned the competence and responsibility of the municipality. Some citizens may report issues that do not fall within the responsibility of the municipality. One example which was mentioned was citizens constantly reporting water issues for which the Costa Rican Institute of Aqueducts and Sewers is responsible, not the municipality. Similarly, other interviewee mentioned that traffic police matters were commonly reported, again outside their scope. Among the officials, the rules and procedures for handling reports outside their responsibility's scope was not clear.

Different perspectives on this challenge came up in the interviews. Some officials said they sometimes collaborate with other institutions by having a direct contact person who they forward the report to or doing joint inspections with them. However, I noticed disagreements between management and officials about how to handle such reports. At some point it was for example suggested by the management to make it mandatory for the officials to update the citizens on the progress of the work related to such re-

ports. This was not well appreciated, here is an example from an interview regarding this topic:

“En algún momento dentro del procedimiento que se quería en Yo Alcalde, decía que nosotros, funcionarios municipales teníamos obligaciones de dar seguimiento a trámites que resolvía otra institución. Para mi, eso era completamente inviable. Es un tema de competencias.... Esta bien, el ciudadano pone su queja aquí, él quien tiene enfrente es la muni[cipalidad] pero si eso tiene que ver con el MOPT por ejemplo, y yo no puedo darle una respuesta, entonces sigo quedando mal yo, cuando el que está quedando mal es otro. Deberíamos tener la posibilidad de que la persona, cuando se remita otra institución sepa a quien se le está remitiendo.”

[“At some point in the process of *Yo Alcalde* it was said that we, municipal officials had the obligation to follow up claims that other institutions are handling. For me that was completely unfeasible. It is a competence issue ...I understand, the citizen puts her complaint here, the one facing her is the municipality, but if the issue has to do with the MOPT [Ministry of Public Works and Transport] for example, I cannot give the citizen an answer for their work. But then I'm still the one not serving her, when the one doing wrong is someone else. We should have the possibility that the person, when referred to another institution, knows who is being referred to.”]

Most of the officials acknowledged that citizens will keep reporting issues outside the municipality's scope, but they were concerned about them become extra work. They explicitly said they should neither be held responsible for the job of other institutions, nor responsible for communicating the results of external work to citizens. Based on the officials' comments and reactions, it was evident that negotiations were needed among them and management to define how to deal with external reports.

Budget constraints

Most of the interviewees mentioned the budgetary mechanisms of the municipality as an important constraint, if not the biggest one. As described in section 6.1, the municipality is mainly administered and evaluated based on budget expenditures, thus imposing many rules to the officials with re-

gard to financial resources. As an interviewee described the situation: “*pueden haber cosas que no se pueda atender porque no estaba el presupuesto para atenderlo, o que lo que hay presupuestariamente sea lo que la gente este pidiendo*” [“some things cannot be addressed because there is no budget for them, or what is budgeted is what people are asking for”]. Therefore, in some cases budgetary mechanisms are determining whether a reported issue can be solved or not.

However, the manager explained that budget modifications are possible, but not easy. He illustrated this process as follows: (1) when a request reaches the municipal official, she first checks if it is a quick fix. (2) If the claim requires a bigger project and resources, then she verifies if there is preassigned budget to solve the citizen’s problem. (3) When a budget is not assigned and the official, the mayor’s office or management considers the problem important, a budget modification can be requested. (4) Then a request with justifications and reasons needs to be presented to the municipal council. (5) The municipal council approves or rejects the budget modification. For these situations, the reports generated through *Yo Alcalde* can easily serve as evidence for applying budget modifications. As a manager commented about requesting budget modifications: “*con buena información se justifica, este consejo municipal ante datos reacciona muy bien*” [“it can be justified with good information, this municipal council reacts very well to data”].

As it was just illustrated, solving and answering citizens request is complicated. Making request or reports through *Yo Alcalde* does not change municipality’s restrictions and limitations when it comes to dealing with them. Pressing the municipal response capacity intended by the mayor needs more than a digital tool; and showing citizens internal processes is not as simple as adding a status or a comment in the reports. Based on the staff’s comments, negotiations about what are sensible response times and procedures according to the municipal resources and current regulations were needed. Other concerns touched upon matters such as which processes should change or improve, and which ones should stay the same. Defining rules for answering requests from citizens’ was one of the most challenging non-technical issues I found during my time at the municipality.

6.4 New type of work for the municipal officials

6.4.1 Managing work, managing reports

From the officials’ perspective, a report from a citizen entering the municipality represents work they need to manage. During my time at the municipality, my impression was that *Yo Alcalde*’s development was focused on the mobile application for reporting, rather than on the dashboard for the officials (see figure x). Even though reporting is key, the biggest challenge for adopting *Yo Alcalde* in the municipality is how to manage the reports in order to streamline operations, where *Yo Alcalde* should support the day to day work of the officials.

Several issues were raised around this topic. Comments from the officials included systems integration, data formats, access to information, and even that smartphones are not considered official work tools. When talking to the staff responsible for dealing with the reports, both wishes and rejections about *Yo Alcalde* were present. Motivated officials wanted to manage all their tasks in a single system to avoid double efforts or multiple spreadsheets to update. For others, motivations were not yet there. Regarding this subject, one of the officials commented:

“La herramienta tiene un potencial enorme, pero también tiene una necesidad de brete enorme para que se adapte a lo que necesitamos. Yo estoy muy enganchado con este tema, pero sí he leído en otros compañeros una resistencia por que les modifica su estado de confort.”

[“The tool has enormous potential, but it also needs a lot of work for it to adapt to what we need. I am very motivated with the subject, but I have read in other colleagues a resistance because it modifies their comfort status.”]

Adapting *Yo Alcalde* to the officials’ work is also complicated due to the lack of general tools to manage requests in the municipality (see section

6.1). Each unit or even person has their own way of managing them. For example, one interviewee described how he created a database to control his work, projects done and tasks to do. Another official collects her unit's claims in a spreadsheet shared with external service operators and other colleagues. Others mentioned that they use calendars to manage their work, so a claim could then become one task in their calendars. Most of the staff mentioned that *Yo Alcalde*'s dashboard should integrate into their work. As they explained, from their point of view a report means a task they need to coordinate or manage as 'work in progress'.

What about the other request and reports?

Another challenge raised among most of the interviewees was how to manage the reports entering the municipality through informal channels. So far, the described options for reporting an issue to the municipality are the official, formal ways (section 6.2). Nevertheless, life is messier and reports reach the officials from many other informal channels. As a manager explained "*Yo Alcalde sirve como una interface de contacto con la ciudadanía, pero la ciudadanía se comunica con la municipalidad de distintas formas*" ["*Yo Alcalde works as an interface to interact with citizens, but citizens communicate with the municipality in different ways*"]. Reports to the staff and even to the mayor come from many sources. When asking about these informal channels, the interviewees answered that reports reach them through the following informal channels: calls to their office phone, emails, sometimes the municipal Comptroller of Services informs them about a problem, sometimes even via WhatsApp to their personal phones. moreover, the municipal council or the mayor's office can send them reports, and workers on the field also registers issues. In addition, the municipality receives multiple complaints and requests through social media and in the 'open comments' of their website pages, as shown in image X.

Many times, the officials mentioned the need to centralize all the requests and reports. If they manage their work in the same tool then they have better control over their activities and their workflow. One interviewee summarized it nicely when saying

"al final cada caso termina siendo una historia muy particular y uno

tiene que tratar de reportarlas [documentarlas] todas. Si uno no busca la forma de documentar entonces es un enredo"

[“at the end, each case is a particular story and you have to try to document them all. If you do not find ways for documenting them, then it is a mess”].

These informal channels create a challenge for *Yo Alcalde*. The issue is not that people are reaching the municipality through multiple means, the challenge is how to capture all these informal reports in a systemized way to keep a consistent register. This resonates with the advice the project leader of a similar tool, Por Mi Barrio (PMB) in Montevideo (Uruguay). He explained that PMB worked in Montevideo because the city already had a centralized digital tool for citizen requests. So, PMB was a new channel for citizens, but it was integrated with the city's internal tool. This is also captured in one official's comment. He mentioned that before *Yo Alcalde* they had their own ways of managing reports and requests; now *Yo Alcalde* brings a particular process for handling requests along the others, not to replace them.

Documenting work

For some of the officials it is important to keep records of their work, in particular for presenting accountability reports. For example, one official mentioned that he has to constantly show his work progress to the cantonal road network board. He wants to use *Yo Alcalde* as a tool to help him register all the construction works, both large and small to ease preparing the reports for the board. Other officials asked for the system to allow them to register inspection reports when working outside the office, in the city, so they immediately have a record of work to be done.

Other departments commented they want to collect data to create metrics and indicators of the current services to improve delivery and planning. Also, the mayor is asking the officials for these numbers. In an internal meeting I participated where departments presented their work to the mayor's office comments along the lines of 'what is not measured does not exist', 'what metric are you using?' and 'if there is no metric, we are only assuming' were uttered several times. Another use for a systematized reg-

isters and documentation can help the officials with information when held accountable by citizens or media, as one member said.

If documenting and keeping track of work is relevant, *Yo Alcalde* facilitates the registration of some requests but not all. Therefore, if creating inclusive and realistic records without only depending on *Yo Alcalde*, according to officials, ways for documenting all requests without bringing more work to the officials should be considered.

6.4.2 Visibility of work

Before *Yo Alcalde*, there was no centralized way to share and visualize citizens' issues. Now, with the geo-data collected through *Yo Alcalde* the reports are displayed on a public map in the dashboard (figure X) instead of hidden in the Archive databases (see section 6.1). This map visualization generates a different sense of what is happening in the area contextualizing several issues at the same time. The shared map also brings other reports to the users' attention. If you post a claim at the municipality's Service Desk, you are not able to see what others are requesting. With *Yo Alcalde*, users can see what their neighbors are reporting in the common map.

Whereas the new tool contextualizes the claims (or needs) in the territory, for the officials responsible for the claims this new tool means visibility of their work. As described in section 6.1, the current Archive systems is mainly for storing requests and each unit described how they manage their requests in their own spreadsheets or databases. Therefore, when citizens requests become visible internally in the dashboard, this also means that work to be done (or not done) by the official is also visible.

This new transparency brings accommodations and uncertainties mainly in working practices for the staff handling the reports. In the new dashboard (figure X) reports become interactive, they can be filtered and sorted by category, status, area and so on. The value of this new format of reports does not lie in storing them (as the Archive which is also possible), but rather in the possibility of administering them and use the data to make further analysis of territorial phenomenon and service provision.

Managers and others in monitoring roles can now have a view of what

inhabitants are asking for and where. They can also see which issues have been solved and which need attention. As one interviewee mentioned: "*a mi lo me sirve es que este abierto, que yo pueda ver cómo se va ejecutando el presupuesto internamente*" ["what is good for me if it is open, so I can see how the budget is executed internally"]. Another official made the remark that yearly reports about executed work by the departments was not done systematically. Therefore, for him the potential of *Yo Alcalde* was better records and as he said "*lo ideal es fiscalizar más automáticamente*" ["the ideal would be to audit more automatically"]. The intention of *Yo Alcalde* is to bring transparency and data regarding citizens' issues, which was not possible before.

6.4.3 Accountability uncertainties

The visibility embodied in *Yo Alcalde* generates both opportunities and fears among the municipal staff. According to the interviews, most of the staff responsible for the reports are concerned about how their performance will be measured with the new system; if the metrics will be based only on *Yo Alcalde* or whether the non-register, invisible requests entering through the informal channels would also be considered. One member expressed "*nos preocupa que va alimentar la herramienta para hacer cambios*" ["we are worried that [information] would feed the tool to make changes [in the organization]"]. Table 4 shows the differences of data and visibility depending on the channel the request reached the officials.

6.5 Developing *Yo Alcalde*

Another important new process in the municipality is the actual development of *Yo Alcalde*. Before *Yo Alcalde* the municipality used to buy "off the rack" digital tools. Therefore, merely developing this new tool brings a new challenge for them since the development involves many negotiations and uncertainties to handle across multiple stakeholders and interests. One official noticed this challenge and described it as follows: "*cada nuevo cambio [del systema] genera una dinámica distinta. Cada una de esas*

Requesting and reporting channels comparison

Channel	Format	Access and visibility
Service desk	Paper form Scanned version with an ID code in the archive system	ID code list in Archive system
Post letter	Paper letter Scanned version with in the archive system	ID code list in Archive system
Yo Alcalde (internal or external)	Interactive reports with - Location (Geo-data) - Images - Category - Description - Status - Comments	In Yo Alcaldes internal dashboard shared across departments and in the public mobile application
Informal channels	Email, phone, in-person requests, messages to personal cellphone, colleagues and requests from other departments or the municipal council	Only for the official, in their emails or personal spreadsheet (if recorded somehow)

Table 4. Comparison of the different channels from which the official receives requests and reports.

dinámicas hay que ir evaluándolas en reuniones grupales” [“Each new change [of the system] generates a different dynamic. Each of these dynamics must be evaluated in group meetings”].

During my time at the municipality I noticed a disconnection between the people developing the tool and the officials supposed to adopt into their daily work. I participated in a meeting with *Yo Alcalde*’s software developers, and I asked how can I help (regarding my fieldwork). They replied that it was important to understand how the officials work. One of the developers said:

“Nosotros tenemos un problema, es que actualmente no tenemos la menor idea de que hacen los funcionarios, nos sería útil saber que software tiene, usan y que les hace falta.”

[“We have a problem, currently we have no clue about what the officials do, it would helpful to know what software they have, use and what are they missing.”]

From the perspective of the officials, some saw the potential of the tool and were willing to collaborate in the development process. However, they also state very clearly, that for adopting *Yo Alcalde*, the tool should ease their work not make it more complicated. About the challenge, an official stated that:

... “[Yo Alcalde] tiene que ser eficiente en el sentido de que si me ayuda a mejorar lo que ya hago o a lograrlo de una forma más fácil. Pero si me mejora algo, pero no lo logro, yo voy a seguir usando mi forma vieja y tediosa porque es la que me esta funcionando ahorita, eso hay que considerarlo también.”

[... “[*Yo Alcalde*] has to be efficient in the sense that if it helps me improve what I am already doing or achieve it in an easier way. But if something improves, but I do not achieve what I need to do, I will continue using my old and tedious way because it is the one that is working for me right now. And this must be considered as well.”]

While *Yo Alcalde* started out as technical tool to be developed, it quickly became an administrative and somehow political project for the municipality.

2018’s approach

In order to address the concerns and expectations from the multiple stakeholders the team developing *Yo Alcalde* had to change their approach. When I visited the municipality back in 2016, *Yo Alcalde* was developed somehow disconnected from the officials and the operational capacity of the municipality. However, a new project manager took over in September of 2017 and changed the approach.

I meet her in December 2018 at the municipality. She explained how they now have mesas de trabajo [working groups] to address the multiple stakeholders’ needs and concerns. These working groups are formed by the software developers, a representative from the municipality’s IT (information technology) department, the officials handling the requests and management. The new project manager mentioned that negotiations about the needed improvements, features and priorities for *Yo Alcalde* happen in this

working groups. As she described, they are now having a collaborative approach.

To finalize this story, the new project manager also mentioned *Yo Alcalde* is now developed as an internal tool for municipal operations. The mobile application is still open to the public, but they decided to focus on developing features for the municipality instead. When describing this new approach, she told me it was based on the fact that most of *Yo Alcalde*'s reports were coming from internals, i.e. officials and not citizens.

Chapter 7

Discussion

This final chapter discusses the findings and realisations from the case study. First the case will be presented, followed by lessons and limitations of the research. Finally, it also provides recommendations for further research.

7.1 Conclusions

This thesis aimed at illustrating with an example the complexities surrounding digital projects defined as tools for improving public administration. In particular, I was interested in exploring the implications and tensions raised when introducing the digital tool Yo Alcalde in the municipality of Curridabat, Costa Rica. Through a review of existing literature from different fields of study, the challenges related to introducing these tools were outlined. In doing so, the need for contextual awareness as part of the process for developing and introducing digital tools in government organizations became evident (Brown & Kytta, 2014; Goldkuhl & Röstlinger, 2010; Johnson & Sieber, 2013).

In order to make tangible the complexities of the case, a holistic frame defining key aspects for understanding contextual conditions and relationships was drawn from the literature. It resulted in a case analysis which provided findings from multiple levels and perspectives. The analysis provided an overview of the municipality and the role of Yo Alcalde with regard to the current administrative setup. It also described processes and operations of the municipal officials. Furthermore, tensions between groups in the municipality, motivations and reactions of individuals regarding the new tool were also presented.

Based on the analysis findings, one can conclude that the complexities surrounding Yo Alcalde go beyond technical or operational limitations. For the municipality Yo Alcalde is more than a new digital tool. It is a new digital system that does not resemble any of the existing ones in the municipality which brings drastic change in day-to-day work and operations and thus requires multiple new rules and processes to be defined by the municipality. In addition, through the introduction of Yo Alcalde work among the departments becomes linked and visible and this has an impact not only on work practices but also on internal politics. As described in the analysis, processes in the municipality are not designed for attending, collecting or analysing citizens reports, so the new tool shed light on issues with established processes and requires completely new ones. For the management and the mayor's office who is the owner of Yo Alcalde, it becomes a project they

have to manage in close collaboration with the officials, which based on my observations did not seem to be the usual practice. The analysis confirms observations in the literature which describes the introduction of digital tools for improving government's administration as more of an organizational challenge than a technical one which in turn should be supported by organizational change processes (Checkland & Holwell, 1998; OECD, 2003; Zhang, 2012).

In the preliminary findings (see section 3.1) I described that the biggest challenge for Yo Alcalde was not developing the mobile application, but rather supporting the officials handling the reports. However, after analysing the case my view changed. In my opinion the biggest challenge faced by the municipality is that Yo Alcalde is so new and different from how the municipality normally functions. Then the challenge is how to manage all the new reconfigurations and accommodations need, the radical change brought with the introduction of Yo Alcalde in the municipality.

7.2 Lessons learned and limitations

Personal learnings

Looking back at the work for this thesis, I got the opportunity to experience exactly how complex and complicated public sector is in Costa Rica. When comparing this thesis with the fieldwork deliverables I see a difference in focus that allowed me to explore the case at more levels. For the delivered final reports, I focused on the requirements of Yo Alcalde for the officials to manage the reports. Even though during this time I noticed the complexity that Yo Alcalde implied, I was not able to fully grasp a holistic perspective of it until exploring it for the purposes of this thesis.

If I would have the chance to do a similar project, I would expand my knowledge in organizational theory, change management and readiness of organizations for adopting a data-driven administrative approach. In addition, I would also include stakeholder participation as part of the collaboration. With the lessons from this thesis in mind, it seems reasonable to first focus on developing a participatory and inclusive culture within the municipality if the goal actually is for municipality to become more responsive

and participative rather than simply introducing the digital tool.

Research limitations

As all research, there are limitations and risks of biases and misinterpretations. In this case, one limitation is the complexity of the context, and my time and role at the municipality. This could result in an oversimplification of it in the analysis. The organization is a local government entangled in political influences, legal and bureaucratic legacies and particular structures and processes. Consequently, the data collected during the fieldwork does not represent the full picture of the organization, it only focuses on a small part of the municipality's practices. In addition, an envisioning workshop with the owner and leading stakeholders of the project was not possible to arrange. Therefore, the vision intended for the platform is constructed from promotional media, internal documents and interviews and adhoc encounters.

Another limitation is the interpretative part of this study. The findings are based on my interpretation of the context and the data, my idea of what the tool should be, my personal experience working in IT, and the literature. Most of the time I worked by myself, which could have resulted in a short-sighted perspective. Even though I recorded the interviews with audio as well as carefully taking notes distinguishing comments from my assumptions, not all biases can be eliminated.

This research is not meant to serve as an accountability report for Yo Alcalde status nor the municipality; it is a limited representation that hopefully informs the development of similar platforms. I do acknowledge that the officials' work, as well as the Yo Alcalde project team, are highly stressful and constrained by the context. They need to deal with policies, laws, (internal and external) politics, regulations, budgeting and accountability mechanisms, all of which are not necessarily built to facilitate innovation. There were too many things happening at the same time at the municipality. Meanwhile, I was in a very comfortable position having time to focus on one task where I could discover the potential of Yo Alcalde and its implications within the municipality.

7.3 Further research

During this research, many interesting angles and questions emerged from both the fieldwork and the research background. Yo Alcalde was analyzed in isolation of other municipal tasks and other geographical information systems. The use of geographical information in municipal operations and for enabling territorial analysis in the municipality could be an interesting topic. Similarly, Yo Alcalde was supposed to be one piece of the puzzle for becoming more evidence-based governance. This research did not cover the role of it in this bigger agenda. Finally, one major theme is the actual citizens participation enabled by the tool, what is maps, what it leaves behind, how the reports are used and how citizens' information can actually be integrated in the municipality's operations and decision-making processes.

References

- Aguerre, C., & Bonina, C. (2018). *Por Mi Barrio Hallazgos, Lecciones y Futuro* [In My Neighbourhood, Findings, Learnings and Future]. Montevideo. <https://doi.org/10.5281/zenodo.2531028>
- Banco Interamericano de Desarrollo. (2010). *Las Municipalidades en Costa Rica: Evaluación del sistema tributario y la administración presupuestaria y financiera de los gobiernos locales. Alternativas para su fortalecimiento* [Municipalities in Costa Rica: Evaluation of the tax system and the budgetary and financial administration of local governments. Alternatives for its strengthening]. Retrieved from <https://publications.iadb.org/handle/11319/2596>
- World Bank. *e-Government*. Retrieved November 16, 2017, from <http://www.worldbank.org/en/topic/ict/brief/e-government>
- Brown, G., & Kytä, M. (2014). Key issues and research priorities for public participation GIS (PPGIS): A synthesis based on empirical research. *Applied Geography*, 46, 122–136. <https://doi.org/10.1016/j.apgeog.2013.11.004>
- Chacón Jiménez, K. (2015, November 13). “App” de la Municipalidad de Curridabat abre canal digital para los [‘App’ of the Municipality of Curridabat opens digital channel for citizens]. *El Financiero*. Retrieved from <https://www.elfinancierocr.com/tecnologia/app-de-la-municipalidad-de-curridabat-abre-canal-digital-para-los-ciudadanos/3R-VA4T7QL5HNXJUXP2BYXID6A/story/>
- Checkland, P. (2000). Soft systems methodology: a thirty year retrospective. *Systems Research and Behavioral Science*, 17 (S1), S11–S58.
- Checkland, P., & Holwell, S. (1998). *Information, Systems and Information Systems: Making Sense of the Field*. London: John Wiley & Sons, Inc.
- Comptroller General of the Republic. (2016). *Consulta Nacional de Transparencia* [National Transparency Consultation]. Retrieved from <https://cgrfiles.cgr.go.cr/publico/docsweb/enpt/index.html>
- Constitución Política de Costa Rica (1949). Retrieved from <http://pdba.georgetown.edu/Parties/CostaRica/Leyes/constitucion.pdf>
- Downe, L. (2018). *Why it’s never a good time for service design*. Retrieved March 10, 2019, from <https://blog.louisedowne.com/2018/04/03/why-its-never-a-good-time-for-service-design/>
- Ertiö, T. P. (2015). Participatory Apps for Urban Planning—Space for Improvement. *Planning Practice & Research*, 30(3), 303–321. <https://doi.org/10.1080/02697459.2015.1052942>
- Ganapati, S. (2011). Uses of Public Participation Geographic Information Systems Applications in E-Government. *Public Administration Review*, May/June, 425–434.
- Goldkuhl, G., & Röstlinger, A. (2010). Development of public e-services - a method outline. In *7th Scandinavian Workshop on E-Government (SWEG-2010)*, January (pp. 1–15).
- Goodchild, M. F. (2007). Citizens as sensors: web 2.0 and the volunteering of geographic information. *Geofocus*, 7 (420893), 8–10.
- Heeks, R. (2002). Information systems and developing countries: Failure, success, and local improvisations. *The Information Society*, 18(2), 101–112. <https://doi.org/10.1080/01972240290075039>
- Jimenez, S. (2015, September 30). “Yo Alcalde” busca cambiar experiencias de vecinos en Curridabat [“Yo Alcalde” seeks to change the experiences of neighbors in Curridabat]. *LaPrensaLibre.Cr*. Retrieved from <http://www.laprensa Libre.cr/Noticias/detalle/86638/yo-alcalde-busca-cambiar-experiencias-de-vecinos-en-curridabat>
- Johnson, P. A., & Sieber, R. E. (2013). Situating the Adoption of VGI by Government. In *Crowdsourcing Geographic Knowledge: Volunteered Geographic Information (VGI) in Theory and Practice* (Vol. 9789400745, pp. 1–396). <https://doi.org/10.1007/978-94-007-4587-2>
- Kimbell, L. (2011). Designing for service as one way of designing services. *International Journal of Design*, 5(2), 41–52.
- Lu, Q., & Johnson, P. A. (2016). Characterizing New Channels of Communication: A Case Study of Municipal 311 Requests in Edmonton, Canada. *Urban Planning*, 1(2), 18. <https://doi.org/10.17645/up.v1i2.621>
- Madsen, C. O., Berger, J. B., & Phythian, M. (2014). The development in leading e-government Articles 2001-2010: Definitions, perspectives, scope, research philosophies, methods and recommendations: An update of heeks and bailur. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 8653 LNCS, 17–34. https://doi.org/10.1007/978-3-662-44426-9_2
- Mora, E. (2016). *El ciudadano como radical libre* [The citizen as a free radical] [video format]. Retrieved from <https://www.youtube.com/watch?v=EeL6BKxbHdI>
- Mora, E. (2015). *Atlas de la Experiencia Real del Ciudadano* [Atlas of the Citizen Real Experience] [video format]. Retrieved from <https://www.youtube.com/watch?v=Y5uffQI3ImA>
- Mulgan, G., & Albury, D. (2003). *Innovation in the public sector*. Retrieved from http://www.sba.oakland.edu/faculty/mathieson/mis524/resources/readings/innovation/innovation_in_the_public_sector.pdf
- Municipalidad de Curridabat. (2017). *Nuestro Canton Datos Generales*. Retrieved November 11, 2018, from <http://www.curridabat.go.cr/datos-generales/>
- Nelson, R. R. (2007). IT Project Management: Infamous Failures, Classic Mistakes, and Best Practices. *MIS Quarterly Executive*, 6(2), 67–78.
- OECD. (2003). The e-Government Imperative. *OECD e-government studies*. Paris. <https://doi.org/10.1787/9789264101197-en>
- OECD. (2014). Recommendation of the Council on Digital Government Strategies. *Public Governance and Territorial Development Directorate*, July, 12.

- OECD. (2015). *Estudios de Gobernanza Pública Costa Rica: Aspectos Claves* [Public Governance Studies Costa Rica: Key Aspects]. Retrieved from <https://www.oecd.org/gov/Cost%20Rica%20Highlights%20ESP.pdf>
- OECD. (2016). *Digital Government Strategies for Transforming Public Services in the Welfare Areas-OECD COMPARATIVE STUDY*, 63. Retrieved from <http://www.oecd.org/gov/digital-government/Digital-Government-Strategies-Welfare-Service.pdf>
- Oficina de la Presidencia Costa Rica. (2015). *Estrategia Nacional de Gobierno Abierto* [National Strategy for Open Government]. San José. Retrieved from <http://gobiernoabierto.go.cr/estrategia/>
- Orlikowski, W. J., & Scott, S. V. (2016). Digital Work: A Research Agenda. *A Research Agenda for Management and Organization Studies*, 88–96. Retrieved from <https://dspace.mit.edu/handle/1721.1/108411>
- Piekkari, R., & Welch, C. (2018). The Case Study in Management Research: Beyond the Positivist Legacy of Eisenhardt and Yin? In G. Cassell, C., Cunliffe, A. L., & Grandy (Ed.), *The SAGE Handbook of Qualitative Business and Management Research Methods: History and Traditions* (pp. 345–358). 55 City Road, London: SAGE Publications Ltd. <https://doi.org/10.4135/9781526430212>
- Programa Estado de la Nación. (2016). *Vigésimosegundo Informe Estado de la Nación en Desarrollo Humano Sostenible. Animal Genetics*. San José. Retrieved from http://www.estadonacion.or.cr/files/biblioteca_virtual/022/PEN-22-2016-BOOK-BAJA.pdf
- Programa Estado de la Nación. (2017). *Informe Estado de la Nación en Desarrollo Humano Sostenible*. San José. Retrieved from <https://estadonacion.or.cr/2017/assets/en-23-2017-book-low.pdf>
- Sangiorgi, D. (2011). Transformative services and transformation design. *International Journal of Design*, 5(2), 29–40. <https://doi.org/10.1080/21650349.2013.827103>
- Sieber, R. (2006). Public participation geographic information systems: A literature review and framework. *Annals of the Association of American Geographers*, 96(3), 491–507. <https://doi.org/10.1111/j.1467-8306.2006.00702.x>
- UK Cabinet Office. (2017). *Government Transformation Strategy*. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/590199/Government_Transformation_Strategy.pdf
- United Nations. (2016). *E-GOVERNMENT SURVEY 2016*. Retrieved from <https://publicadministration.un.org/egovkb/en-us/reports/un-e-government-survey-2016>
- Winner, L. (1995). Political Ergonomics. In R. Buchanan & V. Margolin (Eds.), *Discovering Design Explorations in Design Studies* (pp. 146–170). Chicago: The University of Chicago Press.
- Yin, R. (2009). *Case Study Research* (5th ed.). London: Sage.
- Zhang, X. (2012). The use of geographic information system in local government's modernisation A case study from the northwest of England. *Transforming Government: People, Process and Policy*, 6(2), 206–222. <https://doi.org/10.1108/17506161211246935>