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Do cemeteries have a future?

Sustainability and urban socio-technical change at the Viennese Central Cemetery

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Abstract

With the help of conceptual tools from science and technology studies for studying the city, I am seeking to address a new site of exploration -- the sustainable urban cemetery. My intention is to advance the context of urban cemeteries as an engaging research prospect for the social sciences, while revealing that cemeteries are in fact valuable socio-technical entities, deeply embedded in the city's assemblage.

As an empirical example, I am addressing the Central Cemetery in Vienna (orig. Zentralfriedhof Wien). Being the city's largest urban cemetery, it offers an intriguing research site for analysing the surroundings of its establishment, cultural heritage, function, organisation, and imposed practices. Particularly, I am interested in its processes of adaptation and change to the city's current societal challenges. My investigation is focused on identifying understandings of sustainability and change imposed by the administration of the cemetery through framework strategies and active practices.

The situational analysis emphasizes multiple understandings of sustainability and change. The interview data uncovers the fact that the administrators consider sustainability a harmonization tool for addressing issues related to the preservation of the natural environment, to the efficient use of resources, and for increasing the social and cultural significance of the cemetery.

From the perspective of Actor Network Theory and urban assemblages, we can argue that the cemetery's image has transitioned from the expression of commemorating past life, towards a structure composed of networked human and non-human elements (e.g., environmental, social-technical, institutional, cultural and historical), that articulate together both the obdurate and the flexible character of the cemetery.

Zusammenfassung

Mit den begrifflichen Hilfsmittel der Sozial- und Wissenschaftsforschung im Bereich der Stadtplanung, untersuche ich in dieser Arbeit ein neuartiges Forschungsfeld – den nachhaltigen städtischen Friedhof. Mein Ziel ist es, städtische Friedhöfe als „Forschungsgegenstand“ für die Sozialwissenschaften zu fördern und gleichzeitig aufzuzeigen, dass Friedhöfe wertvolle sozio-technische Entitäten sind, die tief in der Assemblage einer Stadt verankert sind. Diese Studie macht dies am Beispiel des Wiener Zentralfriedhofs. Als größter städtischer Friedhof bietet er ein faszinierendes Forschungsfeld um seine Gründung, sein kulturelles Erbes, seine Funktion, seine Organisation sowie die auferlegten Praktiken einer Kontextanalyse zu unterziehen. Insbesondere interessiere ich mich für seine Anpassungs- und Veränderungsprozesse an die aktuellen gesellschaftlichen Herausforderungen der Stadt Wien. Meine Untersuchung konzentriert sich auf Nachhaltigkeit sowie den sozio-technischen Wandel dem der Friedhof unterliegt und von der Friedhofsverwaltung durch Rahmenstrategien und aktive Praktiken auferlegt werden.

Durch eine Situationsanalyse werden die vielfältigen Konzepte von Nachhaltigkeit und sozio-technischem Wandel aufgezeigt. Meine Interviewdaten zeigen, dass die Friedhofsverwaltung Nachhaltigkeit als Harmonisierungsinstrument betrachtet, um Fragen im Zusammenhang mit der Erhaltung der natürlichen Umwelt, der effizienten Nutzung von Ressourcen und der Erhöhung der sozialen und kulturellen Signifikanz des Friedhofs anzugehen.

Aus der Perspektive der Actor-Network Theorie und urban assemblages behaupte ich, dass sich das Bild des Friedhofs vom Ausdruck des Gedenkens an vergangenes Leben, hin zu einer Struktur entwickelt hat, die aus vernetzten menschlichen und nichtmenschlichen Elementen (z.B. ökologische, sozialtechnische, institutionelle, kulturelle und historische Aspekte) besteht, die sowohl den unnachgiebigen als auch den flexiblen Charakter des Friedhofs artikulieren.

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1. Introduction

Considering the contemporary social and cultural concerns posed by old public cemeteries in developing European cities (history and tradition, immobility, conservation of the past, religious cults, etc.), a constant preoccupation for the city administration and urban planners is to impose collective strategies formulated around the efficient use of land space and better social and ecological practices in the urban space.

In Europe, the urban cemetery has gradually increased its status in society, not only representing a site for commemoration and human emotion, but also bridging a strong relation between individuals, culture, technology, and society. From cultural history, we learn that the function and role of European catholic cemeteries is deeply embedded in the identity of each community. Remarkable changes in their organization, appearance and landscape were accumulated through the era of civilization and modernization (Rugg, 2006). In the humanities field, the cemetery ceased to represent a place for burial and for commemorating the lost ones and has been progressively regarded as a site that embodies a city's social history and transition through time.

From different academic perspectives, the value of cemeteries has continuously evolved. While urban history is preoccupied with the landscape and domestication of natural settings for accommodating individual ideas of afterlife (Schuyler, 1986; Rugg, 2006; Hayden, 1997, 2014), in the cultural studies, the emphasis falls on visual and physical expressions of death and mortality (Francaviglia, 1971; Aries, 1981; Brown, 1993). In the fields of architecture and geography, cemeteries are a good research site for studying landscape management and burial practices, architectural structure of memorials, mausoleums, tombs, also regarding common attitudes towards nature and death (Lewis, 1983; Sloane, 1991; Francis, 2003). From studies on cultural history, cemeteries signify life and community, surpassing the concept of death and separation. As an example, in studying Jewish cemeteries and communities, the historian Tim Corbett claims that after the second half of the nineteenth century, the civic society in Central Europe developed a profound feeling of self-consciousness, which was expressed in lively monuments and grave memorials (Corbett, 2016).

My research proposal is to move further from previous understandings on the cemetery's identity and role in the urban space and adopt a social sciences approach, bringing the urban cemetery for exploration within the field of science and technology studies.

There has been little attention given to studying cemeteries in the social sciences. Although there are a handful of social urbanists preoccupied with the shaping of social fundamentals within the urban space, yet cemeteries have not been considered a significant research topic as part of the city's built environment.

Therefore, my ambition is to bring cemeteries into focus in the social sciences and to highlight their socio-technical character, defined by practices of social change with sustainability. Being deeply embedded in the surrounding built environment, I would like to investigate how cemeteries accommodate to current changes and challenges, and how they are shaped by these transitions. In time, social and cultural norms are negotiated to fit in with existing social orderings present in the rest of the city. Furthermore, with the help of STS concepts, we should shift away from the common understanding that cemeteries are connected to the past and therefore, are obdurate and fixated spatial entities, and start to reflect on the nature of their progress which gradually make them move towards modernity.

Related to the cemetery's nature of its progress within the city, I have developed a set of questions where the cemetery's contextual relationship to the rest of the city is emphasized. How is the urban cemetery dealing with today's societal challenges present in the surrounding urban space? How is the cemetery adapting to commonly agreed solutions[1] to address the challenges that big cities are currently facing? How is the cemetery being shaped by processes of adopting change with sustainability practices?

These are just a few of the questions for which I believe, science and technology studies are of central concern. Why STS? The study of cities within the field of science and technology studies is benefiting of a more inclusive perspective, based on the impact of society on the built environment. STS scholars involved in studying the city's dynamic elements do contest the technological deterministic character of the built structure and point towards the mutual shaping of society and technology principle. They are arguing for the sense of ambivalence inherent to technologies, their potential of resistance being negotiated through reconstruction process, from which the structures gain new social effects. Urban studies regard the city as dynamic and complex sociotechnical entity that after its stabilization accumulates fixed structures. Later, the inherent arrangements become unchangeable, obdurate and immobile to further redesign plans (Hommels, 2005b).

[1] The majority of EU programmes for innovation and urban development imposes framework strategies for tackling climate change, energy efficiency, mobility, population growth, and so on.

Moving on to the connection between science and technology studies and sustainability, scholars of urban studies interested in how sustainability is built or achieved in the city have been and drawing upon science and technology studies for analysing the dynamics of urban change, moreover, on how knowledge is produced, translated or contested among different urban landscapes. From the desire of having new insights over the built environment, the principles of socio-technical change are positively acknowledged within STS, for delivering new ideas for the advantages of sustainability at every level of the developing the urban space.

In shorter terms, I will direct my investigation to underlining the role of the contemporary cemetery as an active part of the built environment and strongly tied to the urban life of the city. In order to look at how a cemetery, in general, is both shaping and being shaped by the surrounding built environment, I am planning to address the Viennese Central Cemetery (orig. Zentralfriedhof Wien) as the empirical case study. Being the second largest cemetery in Europe, the Central Cemetery is intriguing for the surroundings of its establishment, cultural history, social and institutional role, function, principles and codes which construct it. The function of the Central Cemetery is of particular interest to me for looking over the shaping of its socio-technical character (accumulating both obduracy and flexibility), with focus on accommodating or hindering sustainability practices.

Consequently, I am launching an investigation on the different meanings of sustainability and their prospects of gaining space and inclusion into the Viennese Central Cemetery. In this sense, I will conduct a study for analysing the perceptions of administration personnel regarding particular practices of sustainability. Moreover, I am interested in exploring the meanings of sustainability formulated by the administrators and how they make sense of it. This regards a careful exploitation of the translations and negotiation practices in applying sustainability, in accordance with the general directions promoted within the rest of the city.

2. State of the Art

The overall context of my research is to discuss the role that the urban cemetery plays in the built environment of the city. My research interest is to investigate the role of the Viennese Central Cemetery from the perspective of urban socio-technical change and sustainability, concepts that become more and more present in studying the city and the built environment (Hommels, 2005b; Farías & Bender, 2009; Blok, 2013). The theoretical and methodological standpoints for this study are based on the interdisciplinary field of science and technology studies with concepts from the urban studies – collectively named STS and the City. From this field, I will elaborate on the concept of urban socio-technical change developed in the context of urban assemblages (Farías & Bender, 2011) and include angles of obduracy (Hommels, 2000, 2005a, 2005b) and sustainability (Blok, 2013). The thesis is an examination of the networked character of the Viennese Central Cemetery within the city's built environment where dominant elements such as society, technology, ecology, culture, history and change come together and articulate a particular meaning and role of the cemetery.

In this chapter I will be drawing on a set of both former and recent contributions from the science and technology studies in analysing the city with focus on urban socio-technical change. In doing so, my plan is to relate to previous works in this field that help us better understand the fundamental elements which build up the city (infrastructure, housing, energy, architecture, environment, transportation, and so on).

Before STS scholars began studying the urban space, technology development in the city was primarily a topic for urban sociologists and urban historians. Beginning with the 1990's, a number of social scientists became more and more interested in scrutinizing the progress of technologies in society and started researching the shaping of urban technologies.[2] Gradually, several urban sociologists started shifting their research away from technological development and set a new viewpoint determined by new challenges – the environmental and ecological demand.

[2] Anique Hommels offers detailed reviews of the increasing interest of STS scholars in studying the city, comprised in the article 'Studying Obduracy in the City' (2005a) and in the 1.st Chapter of the Unbuilding Cities book: Viewing cities as technological artefacts (2005b), p. 15-21

Science and technology studies scholars tried to understand how society and technology shape each other in complex technological systems[3] and looked at energy resources, city extension plans (bridges, highways, housing), communication, transportation, and others. From their findings, the authors formulated new concepts such as socio-technical systems (Guy et al, 1997; Guy and Marvin 1999; Graham and Marvin, 2001), metabolic city (Swyngedouw, 2006; Cronin, 2006; Burgess, 2008), the symbiotic city (Amin & Thrift, 2002), the urban built environment (Winner, 1998; Gieryn, 2002; Graham and Marvin, 2001; Guggenheim and Söderstöm, 2009; Kibert et al., 1999,2000,2003), urban assemblages (Farias and Bender, 2009; Farías, 2011; McFarlane, 2011; Blok, 2013; Ureta, 2014), panopticon and oligopticons (Hermant and Latour, 1998), etc.

In my opinion, these resources are valuable contributions for understanding the processes of knowledge-making in the urban sphere and for understanding the role of socio-technical articulations in a changing built environment. The fundamental lesson we can learn from their studies is to acknowledge for the impossibility of understanding the city by analysing its technological systems individually and rather start 'seeing' the city as composed by networked living organisms. The elements that compose it are permanently shaping one another, creating complex entangled networks. For example, some case studies show us that a large technological system is not only driven by technological innovation, but shaped by economic, social, cultural, environmental surrounding factors, which are deeply embedded in the urban landscape.

From these contributions, I choose to select a few papers which focus on the concept of socio-technical change, present in diverse settings of urban life. Further on, I would like to draw on specific sub-concepts developed within STS and the City and urban socio-technical change, such as urban assemblages and obduracy, where the socio-technical nature of the built environment is acknowledged and researched.

2.1. The concept of urban assemblages

From a theoretical and methodological approach, the development of STS and the City is based on actor-network theory (Callon, 1986; Latour, 1999, 2005; Law 1999). ANT is relying on the principle that 'the social' arises out of networked human and non-human elements. In applying ANT, scholars have to consider that there is no primacy in the agency of human actors in regard

[3] Thomas Huges, Jane Summerton, Amin and Thrift, Marvin and Graham were among the first science and technology studies scholars that approached the 'technology in the city' topic and focused on large technical systems (LTS)

to material objects in constructing ‘the social’. STS and the City draws upon the capability of ANT from science and technology studies. Within the science and technology studies, actor-network theory is often directed towards acknowledging the agencies of both human and non-human actors and their involvement in equal measure in the way cities and their infrastructures are set in place.

The idea of considering cities as urban networks of both users and material objects (i.e., nature, technology, buildings, etc.) began at first with the urban sociologists Graham and Marvin (2001) and Amin and Thrift (2002). They assumed actor-network theory to be an appropriate tool for investigating social and technological reimaginations of emergent cities in both Europe and the US. Then, Manuel DeLanda (2006) is the first scholar who focused his work on establishing the spatiality of urban phenomena such as city transformations and re-imaginations. He assessed the significance of ‘urban assemblages’ term to studying the city beyond the geographic and spatial perspective. The assemblages constitute historical constructions bound to the course of time - “they are made in time and they dissolve in time. They have no essence, nor are they logical outcomes of a theory of process.” (DeLanda, 2006, p. 97). Manuel DeLanda explains that often, assemblages are based on unstable networks, prone to change due to external alterations which come with time, while most of them are stabilized. Thus, a city is constantly under a double process of transformation, composed of a combination of stabilized and destabilized elements. He points out that simultaneously, an assemblage can have components working to stabilize its identity, as well as components forcing it to change, or even transforming it into a different assemblage.

The book ‘Urban Assemblages: How Actor-Network Theory Changes Urban Studies’ (2009) from Ignacio Farías and Thomas Bender is offering us useful hints on why actor network theory is suited for analysing the urban condition. The authors illustrate that “ANT is reshaping our view of urban infrastructures, built environments, ecologies, urbanities, practices, spaces, economies and other central issues of urban studies” (Farías & Bender, 2009, p. 7). Their fundament of analysing the urban condition with ANT originates with the idea promoted by Bruno Latour in ‘Reassembling the Social’ (2005), where Latour points out the relevance of using ANT when analysing the relationship between social and technological settings. Latour states that, in the human – non-human relations, the objects, through the nature of their connections with humans, quickly shift from being mediators to being intermediaries, counting for one or nothing, no matter how internally complicated they might be. “This is why specific tricks have to be invented to make them talk, that is, to offer descriptions of themselves, to produce scripts of what they are making others—humans

or non-humans—do" (Latour, 2005, p. 79). He argues that the agency of non-humans is shaped and reshaped by the intentions, meaning, symbols or language allotted by humans. Subsequently, Thomas Bender (2009) implies that the responsibility for action cannot be subjectively attributed solely to the humans or to non-humans, but to the entity of networks which, as well, carry traces and proofs of past associations. Therefore, both are part of dynamic, aggregated networks where their factors and connections cannot be taken separately.

The postscript of Farías' and Bender's book, named suggestively 'Reassembling the City', offers a detailed explanation for engaging ANT in urban research, arguing for its general idea of heterogeneous human—non-human agency. When applied to the study of metropolitan life, it helps to envision and understand the city as co-evolving through complex combinations of nature, technology and society which cannot be taken separately.

Colin McFarlane, in the article "City as an assemblage: dwelling and urban space" (2011b), initiates a new dialogue aimed at the advocates of assemblages, bringing together the theory of assemblage and the concept of dwelling (from geography). He claims for the usefulness of the concept of assemblage for engaging with the 'processual, relational and generative (i.e., historical) nature of the city' (McFarlane 2011b, 651). His perspective on assemblages is similar to that of Farías and Bender's, still McFarlane mostly emphasizes that the assemblage is created only through the actions or agencies of the actors involved and the external elements that interact with the technology. Furthermore, the interactions between the two cannot be seen as individual proprieties of the elements involved, yet only as an interactive whole (McFarlane, 2011, p. 653).

Based on the heterogeneous character of investigating with urban assemblages, McFarlane considers that the concept of assemblages is a tool serving fundamentally the social field. Here he emphasises the direction given towards using actor-network theory for rethinking the city. The same subject was tackled before by Ignacio Farías.

As a conclusion, Farías and Bender's collection of studies presents a set of insightful concepts with focus on diverse conditions of urban life. While their aim is to propose new conceptual guidance and boundary work between the social and the urban, my interest is to accommodate the relevant theoretical guidelines which resonate with my case study and research inclination.

To this benefit, I would like to take upon their idea of the city as an assemblage of networks. When applied to the study of metropolitan life, it helps to envision and understand the city as co-evolving through complex combinations of nature, technology and society which cannot be taken

separately. Considering the processes of re-adjusting the built environment, the commitment for accommodating the natural environment has become fundamental in architecture practices (Moore and Karvonen, 2008). Looking at cities, the urban landscape is often constituted as an ensemble of the built environment and nature, where discourses of sustainability are playing a mediation role between socio-technical elements and nature.

From a methodological standpoint, I am planning to apply actor-network theory in the context of urban assemblages for analysing the network of relations between human and non-human actors, which together form and shape the built environment of the Viennese Central Cemetery. For the data analysis I will be using actor-network theory applied for urban empirical analysis, while also looking at various meanings of sustainability and any present form of obduracy. The analysis of the actor-network will provide us with the framework of entanglements between humans, technologies, materials, and other elements for helping us understanding the cemetery's built environment as co-evolving from the combination of nature, technology, society and so on. As the research situation involves a multitude of actors and situations, the first tasks will be directed to identifying the important actors present in the built environment of the cemetery, and then to scrutinizing the way the actors shape the character and function of the Central Cemetery.

In addition to a thorough explanation of the advantage of studying the city using ANT tools, the concepts of urban socio-technical change and obduracy offer an insightful perspective to the relation between change and stability. For researching the city assemblage and its actor-networks, Farías and Bender advise us that together with the co-evolution and change of the urban built environment, we must consider the fixed and immobile character of the built structures. In the case of the Central Cemetery, we can identify several material structures, as for instance, the church, the tombs, old arches, and crypts, which gain stability with time and become obdurate to change. Their obdurate character can be accounted, for example, through their architectural, cultural, and historical value they have attained in time.

In the next two subchapters, I would like to reflect on the conceptual contrast between obduracy and urban socio-technical change, to reach a better understanding the importance and dimensions of the relation between change and stability, and how it can be researched in practice.

2.2. Taking obduracy into account

Anique Hommels has concentrated many of her studies on developing an obduracy theory based on her intriguing reflections comprised into case studies, analysing the role obduracy is playing in urban socio-technical change. Her claim in this regard deems that not long ago, STS studies

considered obduracy from a social constructivist approach (SCOT) – meaning that during the design and construction process, new technologies were still malleable, but after establishment they would become fixed or obdurate (according to the interpretative flexibility perspective). Hommels asserts this issue with an incentive to STS scholars for looking into the reconstruction of existing technologies and the different implications these processes have for obduracy.

Hommels' understanding of obduracy contains different meanings, as she claims that obduracy is to be considered as a phenomenon and not as a characteristic of technologies. She further notices that obduracy is mostly related to the interactions taking place at local level and can also comprise early choices and decisions which often reside for longer periods.

In the book Unbuilding cities (2005b), Hommels is approaching obduracy through analysing three reconstruction projects in the Netherlands - a shopping mall, a highway and a suburb quarter. As research method for the case studies, the author is developing three conceptual models to address how obduracy is constituted for each particularity. The models consist of dominant frames, embeddedness and persistent traditions. Each of these models is developed based on the conceptual backgrounds from STS with urban studies: Social Construction of Technology, Actor-Network Theory and Large Technical Systems. Anique Hommels is integrating the three obduracy models in her case studies in order to show that the city is a much larger socio-technical ensemble than the technologies studied earlier in SCOT and ANT research.

> "It appears that in analyzing empirical studies the epistemological differences between different approaches in STS—and even between STS and urban studies—become less acute. Indeed, as I have shown, combining the three heuristics is far more fruitful than artificially keeping the boundaries between disciplines and perspectives." (Hommels, 2005b, p. 186)

As the concept of obduracy entails different meanings and models which are bound to the technology or the built environment to be studied, I find it both interesting and relevant to look at the Viennese Cemetery from the socio-technological artefact perspective. The cemetery can be explored as an assemblage of human interactions (communities, institutions, visitors), constructions (tombs, church, memorial stones, administrative buildings, transportation, infrastructure) and representations (place of burial, contemplation, meditation, etc.). I personally believe that the concept of obduracy is important to assume here, for the possibility of visualizing traces of redesign/readjustment of the built environment bound to what the cemetery should

represent today. Thus, I would like to consider the reactions related to technology obduracy for understanding the nature of obduracy present at the cemetery.

Further on, the concept of obduracy and its three models stem from complex case studies driven by Hommels in the Netherlands. In my opinion, we need more attempts at probing obduracy and contestation practices with examples of case studies in the urban space. Researching diverse case studies could unveil other understandings of obduracy or other useful socio-technical change related aspects, for example.

While obduracy helps us look at the past and determine how certain structures became immobile, the concept of socio-technical change looks at past transition processes to determine how change will happen in the future.

2.3. Urban socio-technical change and sustainable development

The concept of urban socio-technical change was subsequently brought-in by Jane Summerton in 1994 and by Graham and Marvin in 2001. Firstly, they looked at socio-technical change in the context of infrastructural systems which provide cities with resources. They observe how infrastructure networks (mainly electricity) become, with time, stabilised and durable. They get to be "embedded" in the urban landscape and sustained by complex institutional arrangements.

> "The conceptualization of a socio-technical system (ex. electricity, transportation) does not only comprise the physical artefacts and technology, but also actors, institutional rules and norms for operating, cultural values and economic resources to construct and maintain them." (Moss, 2014, p.1434).

From the existing research on socio-technical change, Moss synthesised a conceptual plan for researching socio-technical change in urban settings. His plan firstly indicates at the importance of historical trajectories and path dependency to understanding options for change in the future; secondly, it highlights the value of conceiving socio-technical transitions as messy and contested in the process of reconfiguration; and thirdly, it is guiding towards a transitions analysis for providing a framework for understanding and promoting socio-technical change.

An interesting case study that takes upon Moss' history and path dependency perspective comes from the sociologist Kate Woodthorpe. She explored three dimensions of what the Central London Cemetery and Crematorium represents in the 21st century. In the article 'Sustaining the contemporary cemetery' (2011) she stresses the idea that cemeteries are a site where community

and spirituality co-exist while playing contrasting roles in their development and meaning. Her case study is showing how this specific cemetery is caught-up between a site of mourning and a place for change and redesign. The particularities of this study show that some of these conflicting views (old tombs vs. new technologies) will prevail over the other views, being bound to the priorities set by the dominant actors.

On the relation of sustainability and urban change, STS scholars interested in urban studies mainly focused on sustainable architecture and design (Moore, 2001; Moore & Karvonen, 2008), sustainable infrastructures (Coutard and Guy, 2007; Graham and Marvin, 2001) or set the task for building ecological sustainability (Blok, 2013). These papers entail important concepts for extending urban theory with boundary work from geography, architecture and science and technology studies. They are often putting into focus inscription practices, construction processes, architectural design or the challenges of construction redesign.

As result of ongoing literature reviews, many STS and urban scholars still address the emergence of sustainability as dominated by social responsibility and concern for the future, permanently shaped by prevalent natural, cultural, social, technological, economic or/and political visions. Their research focus often falls on how sustainability is constituted around different perspectives of redesigning the urban space according to increasing socio-technical demands and collective imaginations.

Since my investigation does not focus on infrastructure or production processes, I will only draw on a few papers that mention the topic of understanding sustainable practices within the built environment.

Moore and Karvonen (2008) bring together a new strand of research for science and technology studies, which has seldom been in focus to STS and the City scholars. Starting from the argument that the built environment embodies human intentions and mediated understandings of the world, their question addresses the realities of architectural design in shaping the world with the help of STS tools; they examine the relationship between STS analysis and design thinking with respect to the built environment, by focusing on sustainable architecture practices.

Their views regarding conceptualizing sustainable architecture emphasize the fact that its understanding has become dominated by strategies of climate-change and energy efficiency, with the objective of improving the economic performance of buildings. Their critique addresses how little attention is payed to the architectural production, also to the relationship between

architects/experts and users/community, and finally the impacts of buildings to the surrounding built environment.

For examining the design practices of implementing sustainability, Moore and Karvonen chose to focus on three types of housing designs: context-bound, context-free and context-rich. By focusing on these diverse architectural contexts, their plan is to identify and analyse competing conceptions of sustainability related to buildings.

Further on, Steven Moore and Andrew Karvonen lean on the value of STS research and ambitions to continue investigating the design of the built environment. The authors built their arguments on the background of STS scholars for directly engaging with communities in resolving their problems.

Practices of designing the built environment within the practices of technology assessment for construction and architecture offers new challenges for STS research, considering the field's potential of rethinking and remaking the cities as 'enormous socio-technical artefacts' (Aibar and Bijker, 1997). Next, Moore and Karvonen highlight the benefits brought to design thinking from the social sciences, as

> "the analytic approaches of social science tend to separate the constituent elements of past events in order to examine and draw conclusions that will help to shape the future." (Moore & Karvonen, 2008, p. 42)

Moore and Karvonen's study is valuable for the concept of sustainable architecture developed along other concepts specific to STS research: socio-technical artefacts, design and inscription practices (Akrich, 1990) and the urban built environment. It makes a good case especially for the relevance of positioning it within STS and urban studies, for the way of argumentation and employment of STS for design thinking. As for my personal investigation, there are a couple of lessons I will further assume in researching urban socio-technical change and sustainability within the cemetery's built environment. For example, the perspective of involving communities and users in defining the action and role of the surrounding built environment at the Central Cemetery. Interaction between actors coming from different hierarchies can show us what practices, elements and preferences of users dictated change or redesign in the past. Looking past construction processes, it can show what preferences are negotiated today between the administrators and the visitors in other structural settings. Further on, I believe that by analysing the interactions and networks that took place in the past and are still reflected today or continue to emerge, can give us a glimpse of what shapes its future.

The article ‘Understanding sustainable cities’ (1999) by Guy and Marvin discusses the course of making sustainable cities in different local settings. They are engaging in a critical discourse for understanding sustainable cities, with the scope of extending the initial definitions and understanding of cities. The shift towards a broader and inclusive perspective is fundamentally based on ‘the highly contested nature of the urban change’:

“[…] cities represent a theatre of competing voices, each contributing to the on-going social construction of sustainability. This way of seeing stresses the critical importance of recognizing different styles of infrastructure management, shaped by locally specific social and technical contexts. Different actor groups within a single locality interpret sustainability in different ways, holding very different opinions as to how technical networks should be managed more sustainably in the future.” (Guy and Marvin 1999, p. 273)

As my main question is regarding sustainability practices in the cemetery, their fundamental argument for a better understanding of sustainability is very useful. There are making a research proposal comprising an observation task, which should be followed by a deep analysis of competing visions of what a sustainable city might become. Their inclusive perspective of sustainability research is bound to my task of looking at sustainability perceptions at the cemetery, while bearing in mind that sustainability cannot be reduced to a single definition, vision or meaning.

The book of Kruger and Gibbs (2007) “The sustainable development paradox” consists of a conceptual discourse on finding a consensus between the dimensions and politics of sustainability, looking for a unifying definition of what sustainability entails. They draw on a definition from the Brundtland Commission Report called “Our Common Future,” which states that sustainable development is ‘the’ development that “meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987, p. 24). As Kruger and Gibbs call it, this definition accounts on the existence of rather fundamental, but complex entanglements between economic, political, social, and environmental factors.

The above list of science and technology papers is valuable for its thematic connection with my own research. Exploring sustainability in the built environment reveals the extensive nature of the cities, both fixed and malleable, shaped by the network of social, political, economic, and cultural demands. From STS and the City, we learn to look at the city as a large socio-technical artefact, where negotiations of its structure and role are inscribed in the (re-)design stage of its built environment. Then it gains stability and becomes unchangeable (or obdurate). As Anique

Hommels shows, technologies become obdurate through being part of an imagined technological frame, or embedded in the networked assemblage, or even become durable, meaning that they manage to dwell longer than expected.

Going through numerous papers and contributions to STS and the urban studies, there are still a quite a few topics which are left unaddressed when it comes to socio-technical change, sustainability and the built environment. For example, for analysing and studying the built environment, I believe it would prove insightful to investigate different meanings of sustainability given by various social groups in transforming buildings and urban structures. As well, case specific understandings of sustainability could emerge from collective imaginations for building new technologies in the urban space. Based on existing reviews, research within STS reveals that sustainability analysis and its case studies are mainly focused on architectural planning and design thinking.

Getting a hold of the cemetery's history is a crucial step while researching socio-technical change and sustainability. To understand the situation at hand and the direction of change, it is relevant to look at the past and identify what elements, associations, actors, and events contributed to its stabilization within the city's urban and social life.

The document collection phase about the history of the Central Cemetery conducted online has returned a handful of textual resources, some being taken from scholarly publications in both English and German languages (Bedoire, 2004; Acar, 2010; Schmölzer, 2015), as well as other local newspapers and cultural websites promoting Viennese history. Among these, the webpage of the cemetery itself contains a short description regarding its history, but the information presented there is unfortunately incomplete for a more detailed inquiry.

The history of the Central Cemetery will be used for translating the situational analysis outcome, and it will help me develop an informed perspective for the interpretation of the networked relations framework.

For understanding the context in which sustainability and change are formulated at the Central Cemetery, first I would like to look at the broader meanings and direction given to sustainability and urban change in the city of Vienna. I would thus like to shortly investigate what does it mean to build sustainable urban space in Vienna. For answering this question, I am planning to determine the general framework followed by the city municipality and what does the framework for achieving sustainability entail, as well as what societal challenges are addressed.

Despite that none of the mention STS papers directly address the status of urban cemeteries, I believe they constitute the fundamental step towards thinking of the Viennese Central Cemetery as a sustainable socio-technical entity and an active part of the city assemblage. By employing various understandings of sustainability, I would like to investigate processes of adaptation or resistance to socio-technical change.

3. Research question

Taking upon STS and the City's notion of socio-technical change, the topic of redesigning the built environment is mainly supporting continuous research on more reliable, sustainable architectural practices. We have to keep in mind that socio-technical change in the city is not universal, yet it depends on each site and culture, environment, specific actors and the relations and negotiations between them which together make up that certain urban assemblage. Nowadays, within the technological advancement discourse (e.g., Smart Cities and Communities[4]), sustainability is indispensable for employing the most efficient practices and technologies available (see EU Directives[5]). From new construction to redesign of old artefacts, the challenge is to be less resource consuming by the means of energy efficiency, recycling capacities or reducing glasshouse emissions.

The topic of redesigning the built environment helped me formulate my overall question - how does socio-technical change happen at cemeteries and what is it understood as change, who is involved into the decision making, what practices and challenges are driving the shift towards social and technical advancement or improvement.

It is interesting to see how the actors, being human or non-human shape together, in time, the character and function of a cemetery. That is why it makes sense to look at the relation between humans as users (administrators, workers, visitors or sport enthusiasts) and nature as materials (animals, birds, trees, parks, green spaces, gravestones, church and afferent buildings, crypts, the lifeless bodies) of the built environment.

3.1. Research question

How are sustainability and urban socio-technical change practiced at the Viennese Central Cemetery?

The research question in this form aims at identifying and subsequently, understanding what practices of advancement and change are present or being applied within the cemetery directly or indirectly. Therefore, I will first start with identifying sustainability in different timeframes -- from establishment until today. Then I would like to focus on the ongoing planning practices (burial,

[4] Smart Cities and Communities Act 2017; 2019-2020
[5] EU Research and Innovation Programme, 2011

section planning, waste management), infrastructural networks (internal bus line, water and energy systems) and environmental concern (ecological and biodegradable materials, optimization of water, energy, and fuel consumption). Furthermore, I am interested in exploring how the framework of sustainability at the central cemetery is shaped by the general direction framework set by the municipal authorities such as the City Council in Vienna.

3.2. Related sub-questions

In relation to the process of investigating how sustainability and change are practiced today at the Central Cemetery, I have formulated a set of follow-up inquiries I would like to address throughout the research phase. These topics are bound to the analysis of the interviews and of the notes from my field observations taken in 2016, where I could retrieve interesting and important findings on which I have based my research.

> Question 1: What practices and decisions have influenced the transition of the cemetery towards change, and eventually, to modernity?

At the very beginning I started looking at the history of the Viennese Central Cemetery for exploring the societal challenges that drove the establishment of a large cemetery outside of the city. As well, my interest in its establishment arose from collecting knowledge about its built environment, mainly on how it was constructed and imagined for over 100 years.

The history of the central cemetery is the key point for starting the investigation. A first step towards understanding sustainability is to determine circumstances of change and reasons of imposing it in the cemetery since its establishment. Having knowledge of the past events -- e.g., the conditions of establishment, religious disputes and so on -- would offer an informed perspective of what the cemetery represents today. By engaging in a brief document analysis on the social and cultural history of the Viennese cemetery, I was interested in learning the details of events, practices or important decisions which have influenced the transition of the cemetery towards change and eventually, to modernity. As well, I would like to explore the idea of the open cemetery (i.e., shared commemoration space for eleven religious cults) was planned and adjusted with the social, religious, political and cultural demands. Here it was intriguing to find out who the main actors involved into its establishment were.

For this I have engaged in a document analysis about the establishment and functioning of the cemetery, starting with the fundamental factors and actors which contributed to its formation. From the sources I found, I have proceeded to identify the nature of the challenges which

instituted with the founding of a new cemetery. As well as highlighting the changes negotiated with the civil and religious society, stakeholders, and city representatives.

The complete history and how it relates my investigation is further discussed in the 6th chapter in the data analysis part of this thesis.

Question 2: How are sustainability and change made visible in the cemetery today?

The field observation I was mentioning above was driven from my desire to examine traces of modern procedures and sustainability practices visible directly on the cemetery grounds. Here I was looking specifically at building structures such as the cemetery church, memorials, statues, and tombs with historical significance. Furthermore, I have tried to identify if there are entanglements of new and old structures and how they fit together. But mostly, I was interested if and what kind of sustainability (e.g., environmental, social or technological) can be spotted just from a walk through the cemetery. In fact, my intent was to account for practices which can be related as factors of change and are directly noticeable on site. As a result, in the data analysis chapter I have elaborated a set of personal observations on the theme of social and technological change with sustainability practices that I considered visible in the cemetery.

Question 3: What meanings are formulated by the administrators of the cemetery in discussions of sustainability and change?

After getting a sense of what could count as sustainability present on the spot, I proceeded with following the indications for accommodating sustainability more closely. Through detailed discussions with the administrating personnel of the central cemetery, the point of my research interest consisted of a thorough investigation on how the cemetery's role in the urban built environment is shaped at the hand of imposing sustainability. I believe that at the base of finding out the cemetery's role, the meanings attributed to sustainability derived from the personal perceptions of administrators count heavily. This would reveal how sustainability in an urban cemetery is discussed and practiced, since these meanings could be straight connected to the way sustainability is translated and perceived by the decision makers. The cemetery administrators constitute an essential part of the cemetery's actor-network being directly involved into its socio-technical frame and directly responsible for its functionality, management, and status within the built environment. In order to have a clear picture of what meanings are translated and then set in place, I have conducted an interview-based research with the administrators, where matters regarding their sole understanding of promoting change and sustainability practices (e.g.

burial or gardening practices, infrastructure, tourism, culture, ecology, etc.) was duly noted and discussed. As well, I have reflected on the means in which general information regarding sustainability plans are communicated from the principal city authority (orig. Wiener Stadtwerke) and are appointed within the administration hierarchy. The discussions have also included their opinions of obduracy and what they consider necessary change in the future.

4. Theories and sensitizing concepts

For the theories chapter I am planning to follow Farías and Bender's book on Actor Network Theory for the urban studies. Farías and Bender are bringing an STS tool of research – ANT – and promote it for the task of analysing a large technological entity such as the city. Their effort is to be taken as an invitation for science and technology scholars for continuing to study the city and its urban dynamics. The collection of articles they refer to in the book aims at exemplifying the use of actor networks in analysing matters of social, economic, and technological innovation and change in the urban space.

Drawing on the book 'Urban Assemblages: How ANT changes urban studies' by Farías and Bender (2009), I will focus on applying actor network theory while studying the built environment of the cemetery and on the processes of socio-technical change that takes place there. With the help of actor network theory for urban studies, I will not only resume on the relations between actors, but I also wish to explore what material and social components are articulated by the actors together in shaping the built environment of the cemetery. By employing ANT, on one side, I will gain a deeper understanding of discourses involving heterogeneous human – non-human relations (e.g., cemetery administration and climate change, visitors' feeling closer to nature), and on the other, I will reflect on what is negotiated around adapting to new socio-technical, economic or ecological challenges within the city's built environment such as the cemetery. In order to follow the actors' discourses and negotiations, my plan is to start mapping the actor-relations by drawing up a framework where human and non-human actors appear according to their dominant character and active agency. Then, within the network of negotiations I will reflect on the way they are promoting change, but I will also look at how obduracy is shaping these negotiations and decisions.

In regard to the methodological framework, the resulting perspectives gathered from different organizational layers would help understand the level of inclusion within the cemetery life; for example, depending on their daily tasks, administrators and employees experience the cemetery in different ways. As well, the visitors are making sense of the cemetery's life in accordance with their empirical experience on the cemetery grounds.

4.1. Actor-network Theory and urban assemblages

Ignacio Farías and Thomas Bender (2009) address a new connection between the social and the urban, engaging in urban studies research with the help of actor-network theory tools. As they further explain, their volume 'Urban Assemblages' does not only propose to be an experiment for exploring the dynamics of city settings, but also to serve as "an experiment in which the collectives compounded, ANT and urban studies, are under scrutiny, being tested and eventually redefined." (Farías & Bender, 2009, p. 2)

As Farías interestingly claims, introducing the term of assemblage in urban studies brings on the benefit of reimagining the city - from an individual entity towards a multiplicity, from the study of a singular urban environment to the study of multiple urban assemblages:

> " the basic notion is that there is no city as a whole, but a multiplicity of processes assembling the city in different ways […] it involves accounting for all actual entities involved in such processes of construction, whether human or nonhuman, their interactions and transformations." (Farías and Bender, 2011, p. 369).

The notion of urban assemblages establishes a new form of studying the city, "as an object which is relentlessly being assembled at concrete sites of urban practice or, to put it differently as a multiplicity of processes of becoming affixing sociotechnical networks hybrid collectives and alternative topology." (Farías & Bender, 2011, p. 2).) According to this view, researchers can no longer regard cities as a whole and compound entity, but have to be seen in all their complexity, as heterogeneous, decentred, equivocal and 'difficult objects' (Farías & Bender, 2011, p. 2). Therefore, the assemblage of heterogeneous elements can mediate the practices of becoming social.

The following paraphrase given by Bender in the postscript chapter, is maybe the most relevant definition to what exactly assemblages refer to:

> "The metropolis...is made up of networks—human networks, infrastructural networks, architectural networks, security networks; the list could be almost infinite, and they are not confined by a circumferential boundary....Networks agglomerate into assemblages, perhaps a neighbourhood, or a crowd at a street festival, or a financial centre like Wall Street in New York City. The metropolis, then, is an assemblage of assemblages." (Bender, 2011, p. 316)

According to Farías and Bender, the term “assemblages” helps us to grasp the city as a multiple object, to convey a sense of its ‘multiple enactments’ between the material and socio-technical ensemble. The notion provides a conceptual framework for analysing heterogeneous actors, material and social aspects.

In that regard, the concept of assemblages serves as a creative methodological tool for the study of heterogeneous connections between objects, spaces, materials, machines, bodies, subjectivities, symbols, formulas and so on.

Farías and Bender make an interesting observation about the connection between urban assemblages and actor network theory. A considerate part for pursuing their investigations is resonating with STS’s mode of engaging with socio-technical complexities. Hence, Ignacio Farías brings to light fundamental arguments about ANT principles which can be naturally accommodated to studying the city. The first one refers to ‘a radical relationality’ which stands for technological, institutional, social and human elements mutually shaping each other. The second one suggests the ‘generalized symmetry’ of studying hybrid relations of human and non-human components, and the third proposes a renewed view on the social, as result of dynamic associations rather than a stabilized domain of reality.

As Farías and Bender noticed in “Reassembling the Social” (2005), Bruno Latour uses the verb ‘assembling’ to signify how the social comes together through associations of human and non-human elements.

In ‘Reassembling the Social’, Bruno Latour (2005) argues for the relevance of using ANT when analyzing the relationship between social and technological settings.

> “Human – non-human relations/agency explained objects - by the very nature of their connections with humans, quickly shift from being mediators to being intermediaries, counting for one or nothing, no matter how internally complicated they might be. This is why specific tricks have to be invented to make them talk, that is, to offer descriptions of themselves, to produce scripts of what they are making others—humans or non-humans—do” (Latour, 2005, p. 79).

As he stresses, the agency of non-humans is shaped and re-shaped by the intentions, meaning, symbols or language allotted by humans. Thomas Bender (2009) implies that the responsibility for action cannot be subjectively attributed to the human or non-human, but to the entity of networks which, as well, carry traces and proofs of past associations. Thus, both are part of a

dynamic, aggregated network where its factors and connections cannot be taken separately, and actor networks constantly create a new combination of urban entities.

Farías and Bender believe that, with the help of science and technology studies, a major step further towards the democratization of urban politics was achieved with the introduction of objects, natures and non-humans (Latour, 2005a; Hennion 2007; Marres, 2007; Stengers, 2010).

In the postscript chapter, Thomas Bender brings favourable arguments to both the theoretical and methodological capability of ANT to match the study of cities and urban life. He drives from ANT's main idea - heterogeneous networks of both human and non-humans, which helps to lift the boundary of socially separating city and natures. This furthers his claim that cities are a complex mix of nature, humans, and materials.

Bender is acclaiming ANT's potential to explain how heterogeneous networks of actors are stabilizing and destabilizing social aggregations[6]. The consistency of ANT for exploring urban settings comes from its assumptions of complexity and interaction, as fundamental elements to the study of cities. He is drawing his claims based on Latour's discussions of the absorption of human, material and non-human actors, levelling the significance and attributing collective responsibilities for non-humans as well as for humans. Bruno Latour acknowledges that human actors are different from non-human ones; assessing for intention is an essential part of that difference. ANT considers action as a result of dynamic agencies within the whole network, and thus disclaims the possibility of one grand entity in the network sole responsible for provoking action. In this regard, Bender finds that ANT's fundamental idea on levelling responsibility acts as a restraint to following ethics and politics in social analysis, as it calls for their discharge.

The direction of the presented case studies is to serve us with scholarly examples of employing ANT for studying the city. Through ANT lenses, the city becomes a heterogeneous entanglement of networks, or a bundle of networks for which researchers first have to examine the entanglement process itself in order to understand it. Also, the analysis performed by Anique Hommels about a highway in Maastricht, shows us if ANT could help us explore obdurate networks, which persist through time and space.

[6] Bender 2009, postscript: ANT as Latour describes it is fit for understanding and connecting actors which further form particular social orderings.

4.2. Obduracy and Actor-network Theory

An important perspective I would like to include for the study of the cemetery is the concept of obduracy in urban socio-technical change developed by Anique Hommels as a contributing article in the 'Urban Assemblages' book.

"Is ANT up to truly investigate the urban size?" This is the critical question addressed by Annique Hommels in her paper 'Studying obduracy in the city' (2005a), question addressed to the capacity of ANT to deal with collective agency that on long term, shape certain technological or infrastructural frameworks into becoming highly embedded in the town's large urban landscape. Hommels brings in the term of obduracy as an indispensable topic in the relation between STS and the urban studies. For this argument she points out a series of STS and urban history contributions where obduracy is often seen as the consequence of the stabilisation of the building's form or design, or in the case of infrastructure and networks obduracy becomes black-boxed (e.g., sewer systems in a city)[7]. Her main argument is that these contributions come very close to analysing obduracy, but then shift their focus on the 'malleability' of the artefact instead and leave obduracy as an already acknowledged phenomenon, unscrutinised. Therefore, she identifies a new challenge for incentive STS scholars: 'to achieve a balanced understanding of both obduracy and change in socio-technical developments.' (Hommels, 2005a, p. 330)

The author takes up this challenge herself and offers us a research model based on a case study from the Netherlands in which social and technological obduracies are illustrated.

Hommels' case study 'Studying obduracy in the city' comprises a historical study of the attempts to redesign a highway in the inner city of Maastricht, Netherlands. Annique Hommels reveals that, among financial and administrative failures to redesign it, the highway's actor-network consisted of adjacent apartment buildings and old but 'immobile' urban structures (e.g., citizen dependent paths).

In a separate contribution to the research of obduracy, Hommels does a comparative study based on three reconstruction case studies in the Netherlands[8], each of the studies being confronted with case specific forms of obduracy. From both the particularities and similarities of the three cases, Hommels draws a three-model concept of obduracy, based on fundamental concepts from

[7] Graham and Marvin's (2001) metabolic city concept is looking at infrastructures as large technological systems in a city, which become so embedded with time that they dwell among newer innovative infrastructures.

[8] Hommels 2005b – Unbuilding cities: Obduracy in Urban Sociotechnical Change, MIT Press

the science and technology studies – SCOT, ANT and Large Technical Systems. Thus, the built environment can be obdurate in the sense of dominant frames, embeddedness and persistent traditions.

The model of dominant frames mainly regards the establishment process for new technologies. This model has its foundation on the 'technological frames' concept developed within SCOT by Pinch and Bijker in 1984. It describes the situation in which various groups – e.g., planners, architects and users negotiate the design and use of a technology until it reaches a common meaning. This meaning gets transcribed into the technology and it stabilises it, creating a fixed frame. In time, the technology will facilitate its use to certain users while it will become obdurate for other users (whose need does not fit within the common frame).

The following model – embeddedness is based on ANT and the constructivist view (the mutual shaping and co-evolution of technology and society). According to the principles developed by Callon and Law[9], the technology's actor network is composed of entanglements between social, natural, economic and technical entities that together stabilise the technology, which in time will be shifting from flexibility towards obduracy. As Michel Callon claims, the efforts of changing a technology must account for the capacity of the entities involved in the actor network to resist transformation[10]. Hommels defines embeddedness as "the difficulty of changing elements of socio-technical ensembles that have become closely intertwined. Changing one element may have consequences for the whole ensemble" (Hommels, 2005b, 30). The embeddedness model differentiates itself through ANT's symmetry model in which human and non-human actants in a network must be analysed from the perspective of equal agency.

The persistent traditions model refers to the effect of earlier choices and decisions that still influence the development of the technology and can determine its resistance to change. This model does not focus on interaction and negotiation processes between various social groups, but it looks at the evolution trajectory of a technology in a cultural context. The development trajectory is analysed from the perspective of cultural aspects such as common shared values or traditions in an urban landscape, values that lead the nature of change or obduracy of a technology.

[9] Callon 1987 – Society in the making: The study of technology as a tool for sociological analysis
Law 1987 – Technology science and social engineering
[10] Idem 9

Taking upon the three models as a methodological guideline, I believe it is a good opportunity to reflect on the history of the central cemetery while addressing the question of how the cemetery adopts change, but it is limited by its historical artefacts, earlier decisions, expectations and input from social groups, or from the city council and so on, in order to achieve transition. I believe obduracy provides an insight on the things that the administration has to account for and work around to mediate between obduracy and development in order to consider future plans.

As a backside of researching the evolution of socio-technical change, the concept of obduracy represents the capacity of urban technologies/entities to hinder or act against later redesigns. My desire is to further point out that the Central Cemetery is a historical place which can entail obduracy in many of its present forms. The socio-technical character of the cemetery is visible even since the early stages of its establishment. It was planned beforehand to deal with space and public health challenges, in the same time following an innovative idea – the open cemetery. Furthermore, the city municipality inscribed certain social and cultural interests in the design of the open cemetery, shaping both its role and function towards a desirable frame.[11]

To the benefit of my research, this concept can be considered a new way of thinking about the cemetery, about its actors and relations within the built environment and about the direction of urban and socio-technical change. Anique Hommels encourages scholars to address the city from multiple perspectives, suggesting that it is not impossible to appoint new concepts in doing so.[12]

I believe that for the research analysis, obduracy is both a relevant and functional concept for exploring the condition of the cemetery's built environment, serving very well for a detailed analysis into processes of obdurate structures.

4.3. Urban assemblages and sustainability within the built environment

In regard to sustainability and the built environment, Farías and Bender believe that the 'dynamic co-evolution between the built environment and society' stands on emergent research studies about sustainability in complex urban settings (Farías &Bender, 2009, p.4)

From STS and the City on sustainable architecture is Anders Blok's paper on 'Urban Green Assemblages' (2013). His contribution is tackling strands of ecological sustainability for architecture in the urban landscape. His new theoretical approach is a development that stems from urban ecology for dealing with urban climate risks and sustainable urbanism, by appointing

[11] Argument retrieved from the fifth chapter of this thesis – Data collection and situational analysis.
[12] Hommels 2005a, p. 344.

actor-network theory. In doing that, he is deploying STS and assemblage urbanism as a mode to reflect on ongoing debates about sustainable urbanism and political ecology.

Blok is building his approach on the promises of gaining new insights with assemblage urbanism and ANT and appraises Farías and Bender's (2011) efforts of extending urban studies with the help of STS. Accordingly, the fundamental argument of viewing 'the city as a multiplicity of assemblages' (Farías and Bender, 2011) furthers an ecological perspective on cities, for assessing agency to humans together to material arrangements, nature and non-humans.

In formulating his novel theoretical statement, Blok is taking as example the development of Nordhavn (Copenhagen district), looking closely at the design practices which make it an urban green assemblage. Empirically, he aims at exploring how architects and engineers inscribe urban nature and ecology into building Nordhavn, and how the inscriptions are consequently, "contested in specific urban publics" (Blok, 2013, p.6).

Through employing ANT, Blok is following the line of negotiations (boundary work) between the urban sociotechnical elements (sustainability architecture) and eco-natural settings (climate adaptation). His interest for Nordhavn design process is pictured as a rather complex research case - by tracking the involved architects and engineers, he is primarily building up the structure of heterogeneous actors and their agency (i.e., material, human and non-human), while trying to uncover their networked relations which tend to inscribe the redesign towards 'green directions'. In this sense, he observes that, while nature is accommodated for serving human ends, architects plan to 'humanize vegetation for social ends' (Blok, 2013, p. 9) in order to create an attractive public space. According to the design frame, architects imagine the natural landscape to be gradually blended with the emergent city; thus implying, on one hand, keeping and somewhat conserving the wild landscape, while also bringing citizens closer to nature.

As such, the case of Nordhavn is rendered an urban green assemblage under various premises - its architecture inscriptions not only concentrate on dealing with climate change risks, but, in equal measure, they are preoccupied with multiple ecological concerns which green spaces, urban wildlife and biodiversity are facing nowadays.

Anders Blok case study investigation is mainly focused on sustainability in architectural inscriptions: ocean windmills, solar panel islands and geothermal energy to two-lane bicycle tracks, new metro extensions, green roofs, tight housing energy standards, climate adaptation flood protection, and much more. Beyond that, his analytic attention for proximity wildlife,

biodiversity and green spaces proves that sociotechnical discourses and ‘urban assemblages’ are not only about sustainability in architecture and the built environment, but in every-day local decisions. Unfortunately, it also does not contain a clear structure of what meanings are attributed when discussing ecological or sustainable development, that is why, I will be trying to fill in casting my own research investigations with the help of ANT and situational analysis.

Nevertheless, his study of the urban green assemblages is bringing a powerful theoretical and methodological framework for locally researching an entanglement of three complex elements, the built environment and socio-technical change in connection to how sustainable architecture is practiced in a given urban setting. Besides, it offers me new insights on following the actors and actions and their take on sustainability practices at the central cemetery.

The presented books and contributions included in the sections above, prove in a great part that ANT makes-up a powerful tool for studying urban socio-technical change and city assemblages. Although their case studies provided me with valued guidelines for addressing complexity and following entangled relations, I will choose instead to focus on my own study with the help of situational analysis and mapping, and to recur to actually building the actor-network in the subsequent methods chapter. My plan is to use ANT for identifying the actors and for doing socio-technical analysis, leaving the task of analysing the meanings of sustainability to situational analysis.

I believe that situational analysis is a valuable tool for the investigation of the discourses within the network of actors, considering that the ANT analysis will focus on the relations between the dominant human and non-human actors. After the analysis, I will employ situational mapping for the necessity of exploring the dynamics and meanings of sustainability, and on the role of the central cemetery depicted by the administrators, without levelling the action and responsibility equally between humans and non-humans, and without removing the political and ethical elements from the social analysis (Bender, 2011).

5. Data collection and situational analysis

With regard to the research question - how are sustainability and socio-technical change practiced at the cemetery, I began gathering data directly on site with personal observations and notes considering the aspects of sustainability promoted by the Smart City Vienna [13].

The study continues with interviewing three cemetery administrators on their opinion about sustainability and change at the Central Cemetery. Their views will be further structured into the mapping of the actor-network of the cemetery's-built environment. These particular phases of data collection will contribute to investigating the role of Central Cemetery in the city, will support the analysis on the meanings of sustainability present at the cemetery and will also reveal the possible direction of socio-technical change.

5.1. Data collection phase

The necessary research data was collected between August 2016 and November 2020. First, I started with field notes observations, continuing with conducting semi-structured interviews. The administrators working in different departments at the cemetery (general administration, gardening and greening, and funerals and commemoration) were interviewed on their understandings of sustainability and change at the Central Cemetery. The findings are based on the transcription and analysis of the interview materials, particularly looking at what meanings are articulated when sustainability is discussed. Their meanings will be further noted and compared with the referred by the Smart City Vienna and Smarter Together Initiative in the district of Simmering.

The employed analytic methods are drawn from Adele Clarke and Kathy Charmaz's work on doing Situational analysis based on the postmodern turn of Grounded Theory. I intend to concentrate on the network of relations between human and non-human actors, social, cultural, discursive and historical elements, based on the level of entanglement which arises from the analysed documents.

[13] The objectives for sustainable development promoted by the Smart City Vienna Project are entailed in the Framework Strategy document, pages 30-37. The document is retrievable from https://www.urbaninnovation.at/tools/uploads/SmartCityWienFrameworkStrategy.pdf

5.1.1. Writing field notes and personal observations

In August 2016 I started the study directly on the site by gathering notes according to my personal observation on which aspects of sustainability and change can be spotted at a first glance. The observation phase consisted of two visits at the Central Cemetery Vienna and the visits were made before starting with the actual interviews. The written observations are based on my own sense of understanding the cemetery landscape, human practices, internal rules or the built environment. Therefore, my task was to look for tangible or intangible elements which could add-up to the relation of sustainability, change and obduracy.

For extending the analytical work obtained from my field notes, I referred to Kathy Charmaz's Memo-writing for Grounded Theory chapter (2006). Memo writing is considered as a crucial method in grounded theory for allowing the researcher to analyse and reflect on his/her own data and codes in the incipient phases of the study. According to Charmaz, "memos catch your thoughts, capture the comparisons and connections you make, and crystallize questions and directions for you to pursue […] while memo-writing, new ideas and insights arise during the act of writing" (Charmaz, 2006, p. 72).

The notes were formulated on-site through freewriting, following Charmaz's proposed direction for writing field notes. The adopted style for writing the observations was that of accepting spontaneous thoughts when seeing or describing elements, what impression they imprint on myself and my feelings. Further on, memo writing helped me with clustering the collected data and deciding what the defining properties are, or what I should include as major topics for preparing the interview questions.

5.1.2. Doing qualitative semi-structured interviews

This phase started with conducting qualitative interviews with subjects involved in the administration of the Central Cemetery Vienna. Each participant is associated to a particular leading department; one of them is the head of the Viennese Cemetery Authority, the second one is responsible for the gardening and infrastructural services provided, and the last one is involved in the organization of funerals and commemoration events. The participants were selected in accordance to their professional status, meaning to be actively involved in the administration of the cemetery and willing to discuss sustainability and change as main topics. They were identified and contacted with the help of the Public Relations Department of the Viennese Cemetery

Authority, which very kindly returned me the contact details of these three participants. After following their approval for participation, I managed to set the dates for each interview and obtain the desired data.

The stages of preparing the interview data have undergone as followed:

- structure of the questions for each participant – personalized to fit with the department tasks (the questions were formulated based on my field notes).
- the questions were translated into German (two administrators preferred their native language for our discussions).
- doing the interview transcription of the audio sources – the collected audio data was transcribed firstly into German and then translated to English. A set of translations was necessary for reaching their final form.
- preparing the declarations of consent for participating in my research study.

After mutually agreeing on the interview dates, the interview sessions with the three administrators were conducted in the months of August and October 2016.

5.2. Situational analysis and Actor-network Theory

In this section I would like to concentrate on the usefulness of Clarke, Friese and Washburn's proposed methodology for empirical research, while adding my own observations resulting from studying the actor-network complexities of the cemetery's built environment.

On the bases of Grounded Theory, Clarke developed situational analysis as an upgraded, postmodern solution to studying heterogeneous, complex and rather messy social worlds. Her advice to the scholars of social sciences is that situational analysis helps cultivate interpretive understandings of one's research, while simultaneously subjecting its elements to scrutiny.

Clarke's situational analysis does not only address the complexity of the empirical world, but also acknowledges the messiness of conducting social research. An important advantage presented for situational analysis comes with the awareness of producing findings (or knowledge) which cannot be regarded as separate from the condition of its/their production, since every study takes form within the sphere of the situation and it is bound to the transformations which take place in the situation. Therefore, the situation at hand becomes the fundamental unit of analysis.

As the authors of the book state, situational analysis deeply draws on science and technology studies and each of the editors have a solid STS background. For developing situational analysis,

Adele Clarke herself claims that including perspectives and concepts developed within STS helped elucidate the method's issues such as theory dependence of what counts as data (Clarke et al, 2015, p.45).

Clarke claims that situational analysis accounts for one of STS fundamentals – actor-network theory – and the principle of non-human actants and their co-constitutive agency, along with the human actants. Accordingly, Clarke believes that the science and technology studies has provided a key stone on the relation between human and non-human, the fact that they are co-constitutive; together they constitute the world and also shape each other. As such, the co-construction processes can be studied by "using the situation as the locus of analysis, explicitly including all analytically pertinent nonhuman (including technical) elements along with the human in situational maps." (Clarke et al, 2015, p. 93). The role of non-humans is consequently crucial, through their specificities and requirements they resort at conditioning the interactions of a particular situation.

5.3. Doing data analysis using situational maps

The analytical and methodological framework of my study is based Adele Clarke's research proposal in addressing the complexities of social life with grounded theory's new approach – situational maps and analysis.

Clarke explains that the situational analysis framework has its fundamentals from Grounded Theory. Bound to this argument, she forms an informative definition of how grounded theory works for social research: "grounded theory of a particular phenomenon of concern is composed of the analytic codes and categories generated in the analysis that have been explicitly integrated to form a theory of the substantive area that is the focus of the research project." (Clarke, 2005, p.557). The first methodological step is to conduct theoretical sampling. The idea that most research relies first-hand on fieldwork data is stressed here, considering the necessity of analytic resources for generating interview/ethnographic data for representing and analysing social action.

For initiating the analysis of the actor-network at the cemetery, I would like to follow the situational analysis guidelines comprised in the book 'Situational Analysis in Practice: Mapping Research with Grounded Theory' (Clarke et al, 2015). In this book, the authors offer a set of practical examples and case studies for building the situational maps. In reference to the given guidelines for analysing the situation of inquiry, there are three kinds of maps to be drawn and followed through with analytic work and different types of memos. A situational map should comprise the

most important human, non-human, discursive, historical, symbolic, cultural political and other elements in the research situation and lead to the relational analysis of these elements. As such, a map should involve the major elements and a representation of their messy complexities later projected in the analysis and interpretation of their relations.

My intention is to investigate and represent the major elements that construct the role of the cemetery, to determine the nature of their actions and to closely analyse how they influence each other's role. From the proposed situational analysis types, for my case study I will choose to follow Clarke's guidelines offered for constructing and analysing relational maps. Clarke describes the relational analysis as a tool for analysing relationships among discourses listed on a messy map. In order to conduct relational analysis, first I need to create an initial analysis with building the abstract/messy map, for developing a general understanding of the discourses. Then, each term will be taken into focus to determine the relationships that exist among the depicted elements.

A distinctive supportive claim for doing relational maps indicates that "these relational maps help the analyst to decide which stories-which relations-to pursue. This is especially helpful in the early stages of research when we tend to feel a bit mystified about where to go and what to memo. A session could produce several relation analyses with the situational maps and several memos. Of course, such careful attention to the messy situational map will likely lead you to change that map and then you will need new photocopies and then…you are really analysing!" (Clarke et al, 2015, p.174).

5.4. The Situational analysis of the cemetery's actor-network

As previously stated in the conceptual section, my scope is to look beyond the main actors which come in direct or indirect contact with how sustainability is understood at the cemetery. In that regard, I wish to gather better perspectives on their agency as either human, material, technological, natural, or non-human character, and on how are they building up certain meanings or images of the cemetery. Therefore, they are not all bounded in an individual urban environment, but create a multiple enactments and images which can be 'contested in the public space' (Farías and Bender, 2009)

I believe that through addressing the concept of assemblages and multiplicity for my empirical case study, it implicitly brings new insights into perceiving the urban cemetery as part of a networked built environment; I would then be engaging STS and the City for what seems to be a complex socio-cultural and historically stabilized built environment in continuous transition,

responsive to mundane social and urban challenges. I fairly hope that the results of my research will help us grasp how the cemetery - a small and possibly obdurate part of the city of Vienna, is subsequently leaning towards a future of environmental concern, ecology, social change, and mobility. Following urban assemblages' conceptual framework, the data analysis I conducted, proves that the cemetery network is a dynamic one, dominated by heterogeneous actors and current socio-technical challenges (e.g., coping with climate change, energy efficiency, waste management, etc.)

For determining the relational actor-network map, a set of methodological questions had to be addressed:

1. Who and what are in this situation? What elements make a difference in this situation? Who is taking part directly or indirectly? How do they act or change in relation with sustainability practices (ex. the green spaces, gardening practices, electro mobility, workers, and visitors, etc.)?
2. Who is involved in the construction of sustainability? Is there a framework of promoting socio-technical change or of assessing obduracy?

According to actor-network theory tools for empirical research, the table below represents the list of actors involved in the situation, structured in line with their type of agency and functional role.

Table 1. Identifying actors

State Institutions	Human actors	Non-human actors	Spatial elements	Temporal elements	Discursive constructions of the actors
Wiener Stadtwerke (Viennese Works Authority) Cemeteries authority Vienna Burial and funerals department	Clients Tourists Citizens Workers Relatives of the deceased Visitors Administrators	Natural habitat (trees, plants, animals, birds) Graves Grave plants Electrical cars E-bikes Bus Grave waste	The sectioning of ZF: strict delimitations Waste management Tree maintenance Halle 1-atelier for cars Soil types and seasonal plantation	Church and old buildings Yearly Seasons Horse rides Architecture/ sculpture of the gates and church Age of Vienna's population	the lungs of Vienna, part of the green spaces Vienna, second biggest cemetery in Europe, international renown – belonging to Vienna, place for quiet and peace, because it is so big, no real environmental impact is visible. Natural habitat: cemetery is not only

Operation and Services Department Burial Museum Hall1-Atelier Bus company E-bike Station Crematorium MA 42 State gardening MA 15 – covering burial costs		Burial materials (urns, coffins, candles, garlands)	Parking space in front of cemetery gates		about burials, but people also come here to enjoy the connection with nature, to search peace and silence, to see animals in their natural habitat. Gardening: prone to yearly seasons change, plantation and soil types, tree maintenance.

5.5. Sequence coding and mapping of the collected interview data

> "Coding is the first step in moving beyond concrete statements in the data to making analytical interpretations." (Charmaz, 2006, p. 43).

The analytic and methodological framework is derived from Adele Clarke's situational analysis and her guidelines on how to carry out empirical analysis on a situated networked issue. Thus, the materials were coded using analytical memos, an abstract/messy map, and an ordered situational map. With these methodological tools made it possible to analyse different forms of empirical material as part of the same analysis. It also allowed me to approach humans and nonhumans together by mapping out the discursive relations between these in the situation of inquiry.

Starting with Grounded Theory, for this study I advert the methodology of data coding and categorizing for creating the relational structure. Thus, I proceeded to code incident to incident whilst creating an initial analysis based on structuring interesting topics based on their relevance with the research question (e.g., natural environment, technologies and infrastructure). Specific statements from each interview were analysed and categorized into clusters of meanings and relations to each other, with focus on the personal experiences (what and how was it

experienced). Bringing along my field notes, I am trying to compose the story that captures the important elements of the empirical condition at the Central Cemetery Vienna.

First, an attentive reading and scanning throughout the available material was necessary for identifying and understanding the main discourse strands and further on, deciding how to work with the collected data. In this sense, I got a proper insight on what the right coding pace should be, how to select the essence of a discussion, and how to decide what counts as relevant categories. For the initial coding phase, I settled for an incident-to-incident data selection; this means running a comparative study of incidents in order to identify properties of the "emerging concept" (Charmaz, 2006). By the reason that some parts of discourses concentrate on adjacent subjects (e.g., projects conducted at other cemeteries, even in other countries), in this case, a line-by-line coding would be too specific for including unrelated details. Resuming to my scope, I kept looking in the discourse passages for any form of description, discourse, argumentation, or consideration visibly or indirectly addressing sustainability, stability or social and technological change. As extracted from my observations, an aggregation of at least two of these motives could be witnessed on-site (emphasis on the natural environment and modern infrastructure). Therefore, researching them more closely would add significant value to how they are built-up in the cemetery's network of relations.

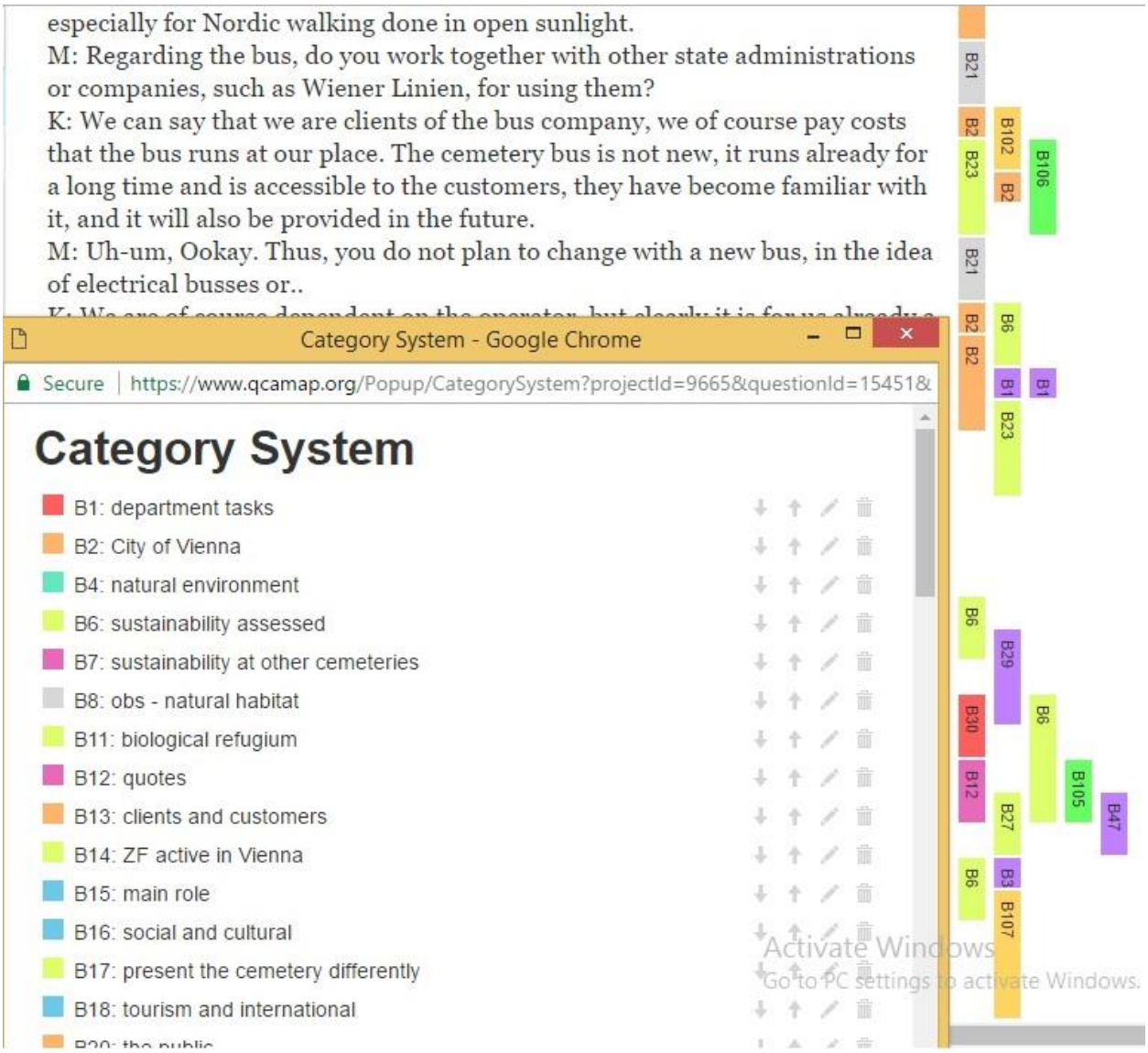
The initial coding phase commenced with using the QCAmap online software for analysing qualitative research data. The primary step was to prepare the collected interview data and my observations by eliminating special characters and nonverbal codes to obtain only plain text (under Unicode UTF-8). Having uploaded the converted material input, I started with interview coding, by taking each instance and marking passages which I could find related to my context of interest or highlighting respective content which reflects the lived experience or personal opinions of the administrators in relation to ongoing changes at the Central Cemetery.

Following Clarke's (2007) directions for constructing abstract situational maps, the answers to her structural questions (i.e., who and what matters) have therefore helped me to envision an essential framing of the situation at hand. Thus, the first round of coding revealed over 180 unstructured units, based on the discussion details presented or mentioned by each administrator. This first set was now subject to focused coding, meaning "using the most significant and/or frequent earlier codes to sift through the large amounts of data." (Charmaz, 2006, p. 57). In this regard, I have made a careful revision where the codes were brought to a more organized form –

merging similar ones into one label, eliminating the unrelated, selecting or prioritizing based on meaning, etc.

The excerpt below serves as example of how the data was translated from initial codes towards the focused codes. (Fig.3). The initial codes are represented in the upper-right part of the figure, where the text was directly coded by highlighting correspondent passages and resuming them to a code idea or topic. Then, the initial codes were transcribed in the ‘Category System’ section for reviewing and organizing them to focused codes.

Figure 3. The resulted codes achieved with QCA programme.



5.5.1. Building the messy map

Consequently, 149 specific units remained which further contributed to the construction of the messy map below. (see Fig. 4)

Figure 4. The messy map

All these labels are all extracted from the interview discussions with the administrators and my personal field notes observations. As one could easily see, the range of topics is highly complex – from biodiversity and glasshouses to infrastructure, tourism, photovoltaic panels and yearly concerts. In the view of the administrators, each of these topics is worth being brought-in when it comes to administrating the central cemetery of a big metropole such as Vienna. Also, my field

notes play an important part in witnessing the situation and network of relations from my own perspective, that of an observer and research analyst, thus they reflect how I make sense of the elements in the situation. Accordingly, a situational map should contain “all analytically pertinent human and nonhuman, material and symbolic/discursive elements of a particular situation as framed by those in it and by the analyst.” (Clarke, 2007, p. 561)

The generated codes with QCAmap computer program reflect a predominant image of each discourse or argumentation found in the collected data. Considering and weighting the gathered codes, the next step is tailoring definite categories in which the elaborated codes would make in the mapping framework.

My wish lays with the formulation of a transparent and unambiguous analytical process, where the codes extracted from each discourse were additionally linked to main themes such as nature, mobility, energy efficiency and so on., without including the details of the story/discourse.

5.5.2. Building the Ordered Map

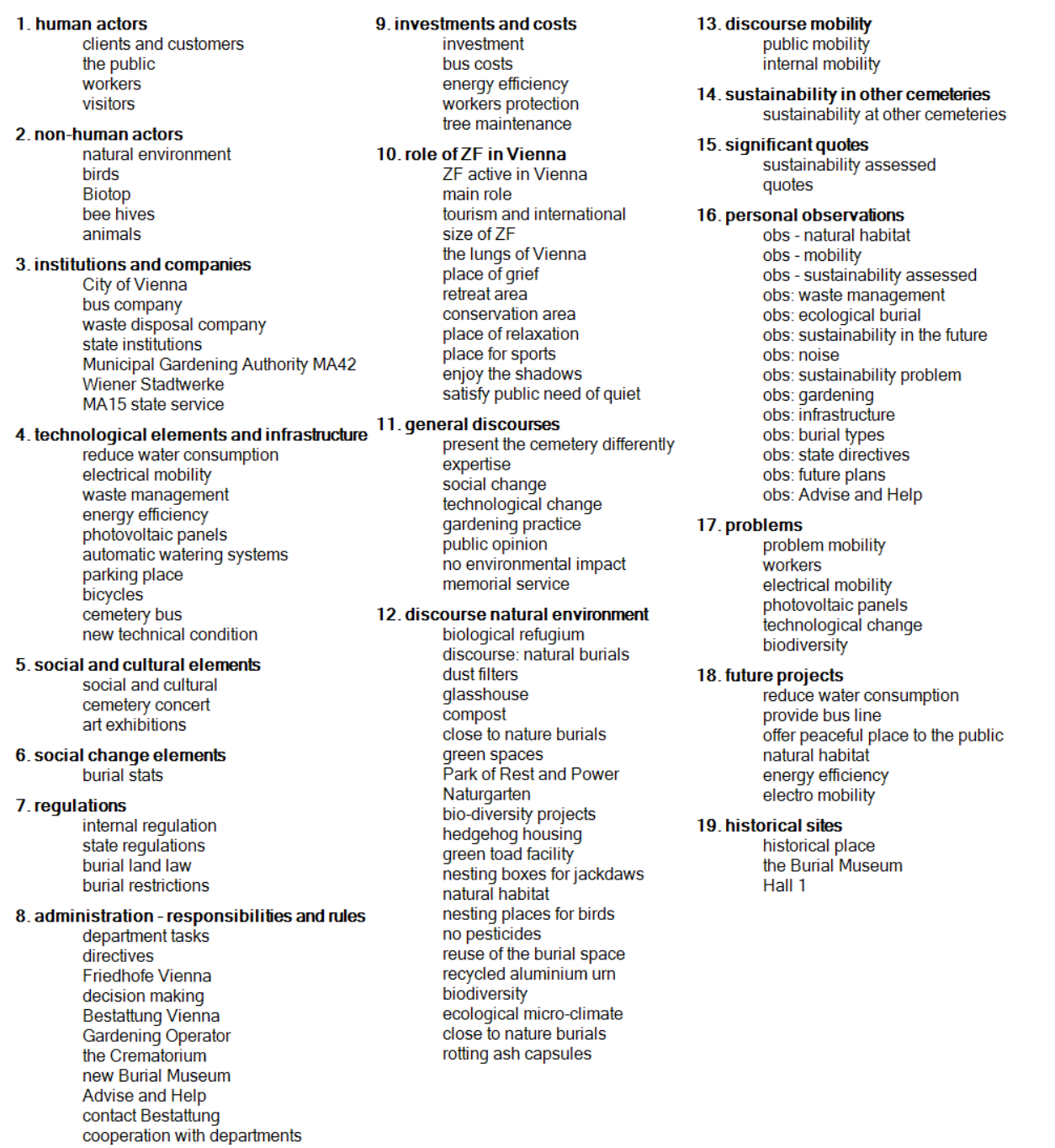
Further on, a careful revision of the codes was again needed for structuring and defining, upon context, the main categories and sub-categories. The results of coding and data categorization obtained with the analysis function of QCAmap program were applied in producing the ordered map.

Considering human and non-human elements, material and discursive components, an overview of all topics of interest discussed by the cemetery’s administrators is created within the ordered map.

Before assigning each element to its fitting formation, a last set of adjustments was conducted for preparing each category. The adjustment included renaming specific codes and rearranging the hierarchy of categories, as some connections between elements were not visible.

Based on my perception and interpretation of the data, I have named the categories according to a context I believe these elements should belong to. For example, the passages initially coded as ‘animals’ or ‘birds’ were adjusted to ‘natural habitat’ and re-labelled based on their significance in relation to other elements (e.g., biotope, biodiversity), in order to be added to the subsequent category (e.g., the natural environment).

Figure 5. The ordered map



Looking at Clarke's definition of the human elements strand, this includes individuals, groups, organizations and institutions all-in-one. Bound to the situation described in the interviews, I decided to separate the perception of the human actors into visible structures. I perceived the human elements as being individuals and groups (i.e. clients, visitors, workers), depending on the type of their involvement and relationship towards sustainability, socio-technical change and role

of the cemetery. As such, each of these actors have their inputs in different clusters of interest. For example, we can look at the agency of the gardening workers. For visitors, they can represent the effort of a clean natural cemetery, while for the clients they represent the means of a paid service for maintenance and gardening. Whilst for the administrators, they are an indispensable resource which reflects the quality of work done at the cemetery.

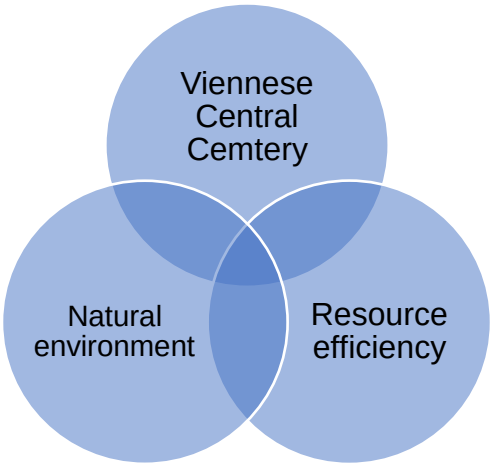
Bearing in mind the assumption developed by Helene Starks and Susan Trinidad (2007) to which analysts use writing to compose a story that captures the important elements of their lived experience, I further proceed with selecting the core ideas addressed in the context of the Central Cemetery and therefore adhere to selective coding, also suggested by Strauss and Corbin (1997). Through selective coding, the predominant discourse strands were combined in a meaningful and well-structured overview reflected in the ordered map above.

5.5.3. Creating the relational map

By using Clarke's (2007) guidelines for creating the relational map of the situation, this last representation should consist only of the relations that matter. Then, looking at the relations, the researcher should be able to work his/her "way back into all the major stories you want to tell about this situation." (Clarke, 2006, p. 109).

To this aim, I have reduced the investigation analysis to what I consider to be three predominant sustainability-linked topics, which arise from the previous structured analytical process.

Figure 6. The relational map



I named the first topic the Viennese Central Cemetery in order to include discussions of the social and cultural character of the cemetery, as well as reflections on its role and function in relation to the rest of the city. The natural environment cluster refers to initiatives and projects imposed by the administrators, which in their view, aim to protect the natural habitat. Then, the resource efficiency cluster addresses the efforts that the administrators impose to reduce natural resources consumption (watering system, electrical vehicles, photovoltaic panels, etc.).

The analysis of the interview data reveals that the discussions over one element of the cluster cannot exclude the connections to one or even both other topics. For example, the Woodland cemetery is an initiative able to address all three topics. On one hand, it offers a natural habitat for birds, animal and plants; on the second, it reduces the use of urns or requires only biodegradable ones and lastly, it manages to promote the close-to-nature and innovative character of the cemetery.

As it arises from the interviews, protecting the natural habitat seems to be a commonly shared value among the three administrators. Together with advancing resource efficiency, most of their efforts and imposed practices are gathered into this direction. As I could notice, when their discussions referred to the methods of reducing resource consumption, such as composting, waste recycling, biodegradable urns, electrical mobility and the photovoltaic panels for example, the administrators did not hesitate to mention how the natural environment benefits from these innovative technologies/systems available to them.

Increasing the participation of local citizens, visitors, tourists and sport enthusiasts is also essential in building up the character of the cemetery. For relatives and local citizens and often for tourists, the natural parks and forest signify secluded spaces for peace and contemplation. Reviving the cemetery's cultural heritage has a significant position on the administrative agenda. Tourists can enjoy carriage rides (characteristic to Vienna), go on guided tours, admire the Jugendstil architecture of the church and monuments, or visit the famous graves.

The wish of the general administrator is to be able to promote the Central Cemetery as a liveable natural space within all its complexities.

Comparing the resulted cluster to the frameworks of Smart City Vienna and Smarter Together, one can easily identify the similarities with the essential topics for achieving innovation and sustainability in the built environment. The administrators seem to work on a similar framework

for protecting and extending the natural habitat, for adopting e-mobility and boosting citizen inclusion, and for preserving the cultural heritage. In the upcoming chapter, I will focus on this correlation between the cluster topics more thoroughly.

6. Sustainability analysis and results

The interview data revealed that the administration regulates the necessary practices regarding the natural environment and natural resource conditions with consideration of the current energy investments, available infrastructure networks and other cultural and social aspects reflected on the visitors. Since the three topics are very well interconnected, I will proceed at separating each discussion topic for highlighting the related arguments and the actor networks in more detail.

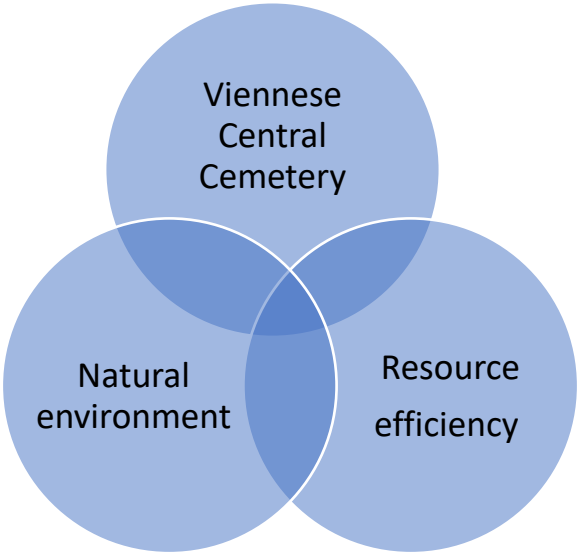


Diagram 1. The discussion topics resulted from the situational mapping.

6.1. Sustainability at the Viennese Central Cemetery

Based on the above mapping structure, I further intend to explain the fundamentals that build each cluster by analysing the actor-network relations which assembles them in this way. To achieve this, I will elaborate an interpretation of the produced mapping data to which I will add my personal field notes. Consequently, I will develop on their outcomes through the lenses of obduracy and urban assemblages in relation to how sustainability is practiced.

The next two sub-sections serve as a fundamental stage towards understanding the role of the Central Cemetery in the Viennese urban context. From both its history and its current standpoint, we can identify the aspects and elements which led and continue to lead the cemetery to processes of transition and change.

By looking at different contexts of the cemetery's character, on one hand, it helps us getting a sense of what the cemetery represented in the past and what certain aspects are still visible today. While on the other hand, it helps us understand the adaptation and negotiation processes it went through to fit in with the current socio-technical challenges.

In today's urban context, the Central Cemetery is included accordingly in the Smart City Vienna and Smarter together initiatives, as an engagement to actively build a sustainable urban space extended to all aspects of the city's built environment (Smart Cities and Communities Act 2017).

6.1.1. The history of the cemetery

The reason of retrieving the Central Cemetery's history is to identify the actors, associations, factors, and events that shaped the role and function of the cemetery today. I believe that the context of its establishment and given character in the past is important for understanding the cultural, social, and technological process which defined its character in the beginning.

The historian Tatiana Buklijas (2008) sustains that even from its planning, the Central Cemetery represented the idea of an unconventional cemetery. Its structure and role were regarded as the new solution for dealing with earlier social challenges. The City Council proposed the shift of small urban cemeteries to the outskirts, as it would create strategic space and maintain a lower risk of public illness.

Starting with 1760s, the Emperor Joseph II decreed that burials within the inner city of Vienna to be prohibited, on account of pestilence and groundwater contamination. Beginning with the second half of the 19th century, the concern of accommodating more bodies has reached the Municipal Council, which decided to build at own costs a new large interdenominational cemetery. At first, the Viennese locals did not agree to the idea of a large new cemetery, as they imagined the distance would post difficulties to transport their deceased relatives, or even to visit the graves.

The current position of the Central Cemetery (i.e., south-east of Vienna) was selected as suitable for various reasons: the high sand content of the soil favoured rapid rotting, the wind direction and steep slopes angle against the Danube could not affect the ground water. The access to the cemetery was to be supported with new infrastructural plans – setting up a horse-tramway line to carry the corpses, also ensuring public transportation with the existing railroad tracks at the south.

The cemetery's construction began in 1873 and was divided into various subsections, with the majority being Catholic sections, while the rest being of non-denominational character, eventually

including Protestant, Orthodox, Jewish and, later on, Muslim and Buddhist sections. After eight years of planning, the decentralized cemetery (orig. Zentralfriedhof) was opened in 1874 on All Saints' Day.

The Council's plan has raised ideological concerns among the church officials, bringing up conflicts of attitudes especially between the Catholic Church and the municipality, but also between local and migrant populations resulting from Vienna's demographic and socio-cultural diversification. (Corbett, 2016, p. 127).

In spite the Catholic Church's affront opposition to the interdenominational nature of the project, the Council continued to advocate for the necessity of the new cemetery, and the construction of the cemetery was, finally, commissioned to the German architects Mylius and Bluntschi. The Catholic Association has started a vast controversial claim addressed to the character of the cemetery for hosting various religions. They even claimed protests for allotting the Jewish community their own section. Hans Havelka (1985) originally narrates in his book that the Church was appalled by the Council's wish "to hastily bury Catholics with thieves, murderers, suicides and people without any professed religion." (Havelka, 1985, p. 18). Further on, Havelka noted from his investigation of the city's archives that, shortly before the official opening of the cemetery, the Catholic Cardinal, at the advice of the city mayor Cajetan Felder, finally decided to have a short dedication, and the cemetery actually became a Catholic graveyard with Protestant, Jewish, Russian-Orthodox, Greek-Orthodox and Islamic sections, connoted as the open-cemetery. At the official opening, there was not any incident recorded regarding the establishment (Havelka, 1985).

In order to make the transition towards the open-cemetery less controversial, the Municipal Council included the construction of honorary tombs, meant to host famous personalities such as politicians, compositors and doctors, which were exhumed from older cemeteries and moved to rest at the Central Cemetery. Beethoven's tomb is such an example, today being one of the most visited burial sites at the cemetery. Still, at that time, it was a unique event which attracted a lot of citizens and other curious people, especially that, on the same day, the horse tramway to the Central Cemetery was put into operation.

I would also like to shortly draw on the article 'Of other Spaces' (1986/orig. 1967) by Michel Foucault, where the author uses the example of cemeteries for introducing the concept of "heterotopia", defining unusual spaces which simultaneously play a physical and a symbolic role. Foucault's idea of heterotopia resonates with the processes of formation and contestation which the Central Cemetery experienced even from its establishment.

Foucault claims that, by applying this concept to cemeteries, their physical dimension refers to the delimitation in space and spatial boundaries, while symbolically, they represent a place where people connect to their human nature, where they profoundly question their "being, meaning and belonging in the world" (Foucault, 1986, p. 25). Foucault talks about the transition and changes of western cemeteries through the 18th and 19th centuries in the western European countries. Until the end of the eighteenth century, the cemetery was placed in the inner city, near the church or even inside it. This allowed a hierarchy of the tombs, in which the soul was believed to be sacred, while the relation with the bodily remains and the individual was lost. Beginning with the nineteenth century, cemeteries were relocated outside of the city outskirts. Due to severe illness outbreaks, death started to be associated illness, and the idea of having cemeteries near the church and houses made habitants feel that their closeness brings death. Foucault reveals that the 'sacralisation' of human remains started to fall behind with the decline of religion in contemporary times: "from the moment when people are no longer sure that they have a soul or that the body will regain life, it is perhaps necessary to give much more attention to the dead body, which is ultimately the only trace of our existence in the world and in language." (Foucault, 1984, p. 25).

The historian Tim Corbett did a comprehensive study of the Viennese Jewish community and how its identity was later established within the Central Cemetery. From his observations he formulated a set of interesting findings regarding the stabilization of the cemetery:

> "Citizens could convert to any religion and be buried in any cemetery they wished, but the vast majority of Vienna's Jews, religious or not, did not convert and chose to be buried in the Jewish sections of the Central Cemetery. The creation of the unitary cemetery therefore represented to a large degree a success story of the positive self-assertion of a united yet diverse Jewish community and its integration into Viennese society." (Corbett, 2016, p.129)

His observations were based on a wide document analysis of the city's archives regarding the unification of the Jewish community in Austria, including latest books retrieving past events (e.g. Silverman and Holmes, 2016). He is considering that the symbolic absence of a dividing wall between the Jewish and non-Jewish burial places at the Central Cemetery played a crucial role for actually achieving a "blurring of boundaries between different communities within Viennese society towards the end of the nineteenth century."(Corbett, 2016, p. 130).

Since 1917, due to a continuous growth of the Jewish community, the Jewish cemetery was extended on two sections, which today occupy about a quarter of the entire Central Cemetery. (see Fig. 6.1).

Figure 6.1. The Central Cemetery sections plan

Source: http://www.viennatouristguide.at/Friedhoefe/Zentralfriedhof/Plan/B_Rest/gruenX.jpg

Among the largest Catholic and Jewish cemeteries, the Central Cemetery hosts an Islamic cemetery where the tombs with are aligned to Mecca. There is, as well, a small Buddhist cemetery with a specific ‘stupa’ building and a circular grave: “the limestone, cylindrical foundation symbolizes the earth, the dome of the glass the water, the small altar above it the fire and the pyramid constructed of stainless steel the air.” (Meyer, 2017).

The interdenominational character proves on one hand, that the cemetery can be considered a symbol of tolerance, because it does not make any distinction between religions, confessions, political views, or origins. On the other hand, I believe that the effective establishment of the open cemetery could be attributed to the intertwinement of the cultural, social, and technological challenges posed in Vienna at that time. In this case, the cultural and social aspects were represented by the need of burying bodies at the city’s borders (because of illnesses and consequent water contamination). As well, the accommodation of diverse religious cults

(especially the Jewish section) can be directly related with the integration of the increasing Jewish community and of the other significant communities. The technological change relies on the use of the vast available space in the south-east of the city, on the soil-type and on the accessibility of an already existing transportation mean, which have contributed together to the character of the open cemetery. Therefore, we could regard the establishment of the cemetery commanded by the City Council's as a solution to the diverse nature of challenges (i.e. social, cultural, urban and technological) to which the city of Vienna was confronted almost 150 years ago.

Although we cannot speak of a concept of sustainability applied to the practices of the open cemetery at that time, we can yet find similarities with today's context in the processes of transition, negotiation and adaptation to the continuing socio-technical challenges posed by our current changing society.

6.1.2. Creating sustainable urban space

Following the cemetery's process of transition in the current context, I would like to develop on the challenges the Central Cemetery is facing today and on practices to accommodate sustainability and change in accordance with the city's common accepted solutions.

I would thus like to shortly investigate what does it mean to build sustainable urban space in Vienna? For answering this question, I am planning to determine the general framework followed by the city municipality and what does the framework for achieving sustainability entail, as well as what societal challenges are addressed.

The European Commission's Regional and Urban Development programme offers, among other topics, information and guidance to European cities looking for building sustainable urban space. The designated section for 'Cities and urban development' offers the possibility to apply for the best suited funding programmes, including nine funding platforms available from the European Commission (https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/funding-cities_en). A notable initiative developed in 2010 within the 'Cities and urban development' programme was the Smart Cities Marketplace. Following the high participation interest of many European metropoles, the initiative was concretized with the Smart cities and communities Act 2017. The Act represents the fundamental strategy for developing a common marketplace of innovation and policy in creating sustainable solutions to city-specific challenges such as energy, mobility and transport and internet and communication technologies. The policies are to be developed according to the city governance principle, based on the

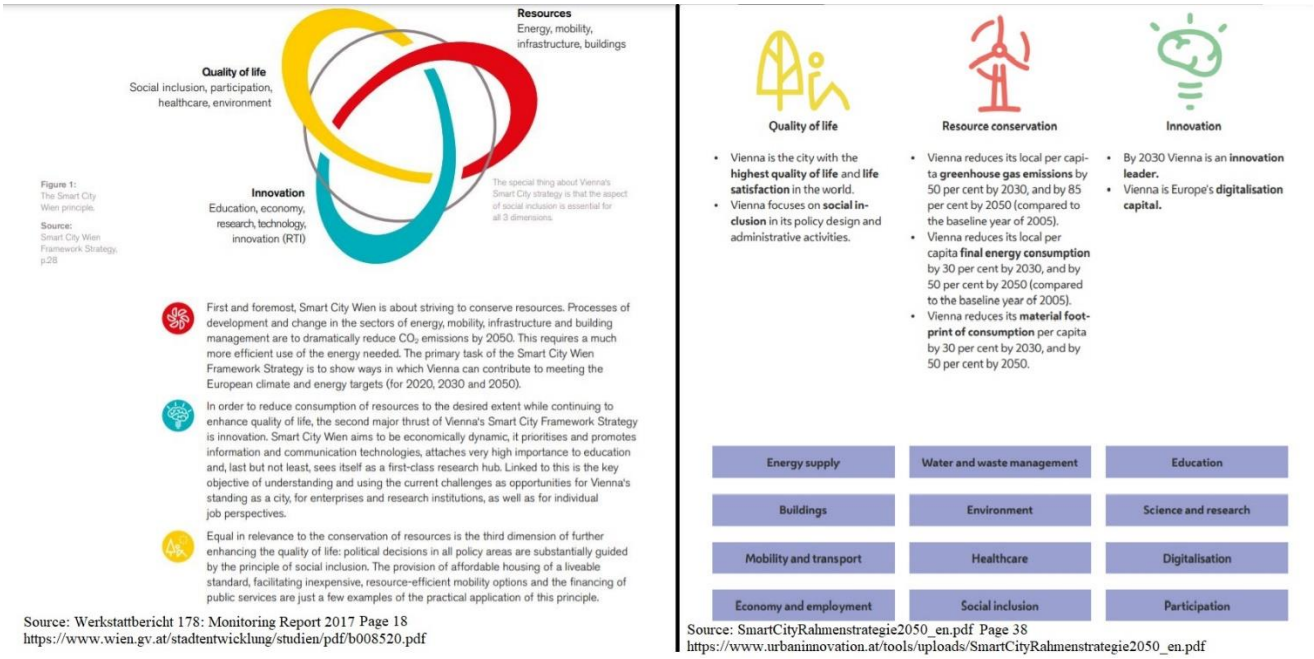
engagement of the public, industry, and other stakeholder groups (https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart cities_en#).

i) Smart City Wien

Since 2011, the city of Vienna is one of the Smart Cities Marketplace beneficiaries, which grants the possibility of developing technological solutions to improve the management and efficiency of the urban environment. From 2014 to 2019, the initiative was subject to problem assessment and monitoring phases of the first framework strategy draft. Currently, the Smart City Wien initiative is functioning according to the second Framework Strategy 2019-2050, setting practical guidelines for medium to long-term transformations of the city.

The figure below comprises two side-to-side excerpts, the left side being from the Monitoring Report elaborated in 2017 and the right side from the Framework Strategy drafted in 2019. The purpose of including this side-to-side image is to highlight the development of the objectives and priorities from the first framework to the second, and to present the current dimensions of each objective. The Framework Strategy 2019-2050 document includes detailed guidelines for imposing effective measures for each objective, and adds up projects of digitalisation and science research.

Fig.6.2. Smart City Wien, Objectives and Priorities of the Framework Strategy 2019-2050



Source: Werkstattbericht 178: Monitoring Report 2017 Page 18
https://www.wien.gv.at/stadtentwicklung/studien/pdf/b008520.pdf

Source: SmartCityRahmenstrategie2050_en.pdf Page 38
https://www.urbaninnovation.at/tools/uploads/SmartCityRahmenstrategie2050_en.pdf

Reflecting on the character of the depicted objectives for both frameworks, I believe that we can interestingly assert the intertwined character of the three dimensions – resources, quality of life and innovation. This could be a valuable argument in the context of the generated situational map, where the focus is falling on the networked character of the main sustainability challenges.

The actual framework strategy defines the Smart City Wien principles using the terms "interlinked and mutually reinforcing"[14], just as the situational cluster is a correlation between the three topics that define the Central Cemetery from the administration's point of view.

The main objectives to which Smart City Wien is preoccupied with, are the resource preservation, development of innovations/new technologies and a high and socially balanced quality of life. As we can observe, the similarities of the prioritized topics for Smart City Wien can be easily linked to the cluster's topics and the arguments that sustain them. Further on, I would like to create a link between the similarities of the Smart City Wien principles and the administrators' imposed objectives, as they could give us an important overview of how the municipal framework for urban development is translated and bears influence on the Central Cemetery's built environment.

Next, I will develop a couple of arguments on showing the similarities between the framework's priorities on municipal level and at the cemetery (policies vs. practice) which the administrators are following at the cemetery. The similarities of objectives can be sustained here with a few examples.

First, we can reflect on the resource preservation objective. The administrators consider the natural environment the most important resource, that is why they are constantly preoccupied with its protection and preservation of the green spaces. Reducing water consumption and creating a living space for animals, plants are therefore, common objectives.

Second, mobility is a complex topic of the framework. Still, the administrators have managed to impose projects for boosting ecologic transportation means (i.e. use of e-cars and public transportation) and organised events for encouraging walking, running, cycling, and the use of e-bikes at the cemetery.

Third, building refurbishment. The renovation and energy reducing refurbishment was in planning from the administration (in 2016). The administrative buildings and the cemetery church were included in the refurbishment plan.

[14] Retrieved from https://www.urbaninnovation.at/tools/uploads/SmartCityRahmenstrategie2050_en.pdf

Infrastructure is a last important common topic. Although a cemetery would seem to convey a certain stability in what concerns technological change, the administrators include numerous projects with attention to public transportation, operational vehicles, road lightning, watering, and greening systems.

Considering the tight link between the framework strategy and the administrators' objectives, I strongly believe that the Smart City Wien framework strategy bears a fair amount of effect on the objectives and practices the administrators currently impose at the Central Cemetery.

ii) Smarter Together

The Smart City Wien premise follows the EU common goal of creating sustainability and innovation in developing urban settings (Smart Cities and Communities Act 2017). Consequently, the initiative Smarter Together offers us the framework model of the dimensions of sustainability to be imposed within the built environment of various European cities.

The Smart City Marketplace platform founded Smarter Together as an urban renewal initiative meant to promote sustainable strategies for buildings, energy supply, environment, IT&C, mobility and transport, participation, and social inclusion (Smart Cities and Communities Act 2017). The initiative offers an innovation space for each participant of the city to develop, research and monitor progress in a confined urban landscape. The Smarter Together urban development initiative is one of the beneficiaries of the Horizon 2020 programme, the biggest funding platform for research and development of the European Commission.
In Vienna, the Smarter Together initiative (see Fig. 6.3) was applied to boost sustainable technical and social innovations in the urban district of Simmering.

Through the participation of its citizens, local companies and urban developers, the municipality introduced over 40 individual projects for this area[15]. The most important projects consider increasing energy efficiency, e-mobility, and citizen inclusion.
Since the Central Cemetery is located in the district of Simmering, two projects from the initiative's statement include the cemetery directly, still there are other projects which could address it indirectly.

[15] The Smarter together projects are retrievable from https://www.smartertogether.at/ueber-smarter-together/mission-statement/.

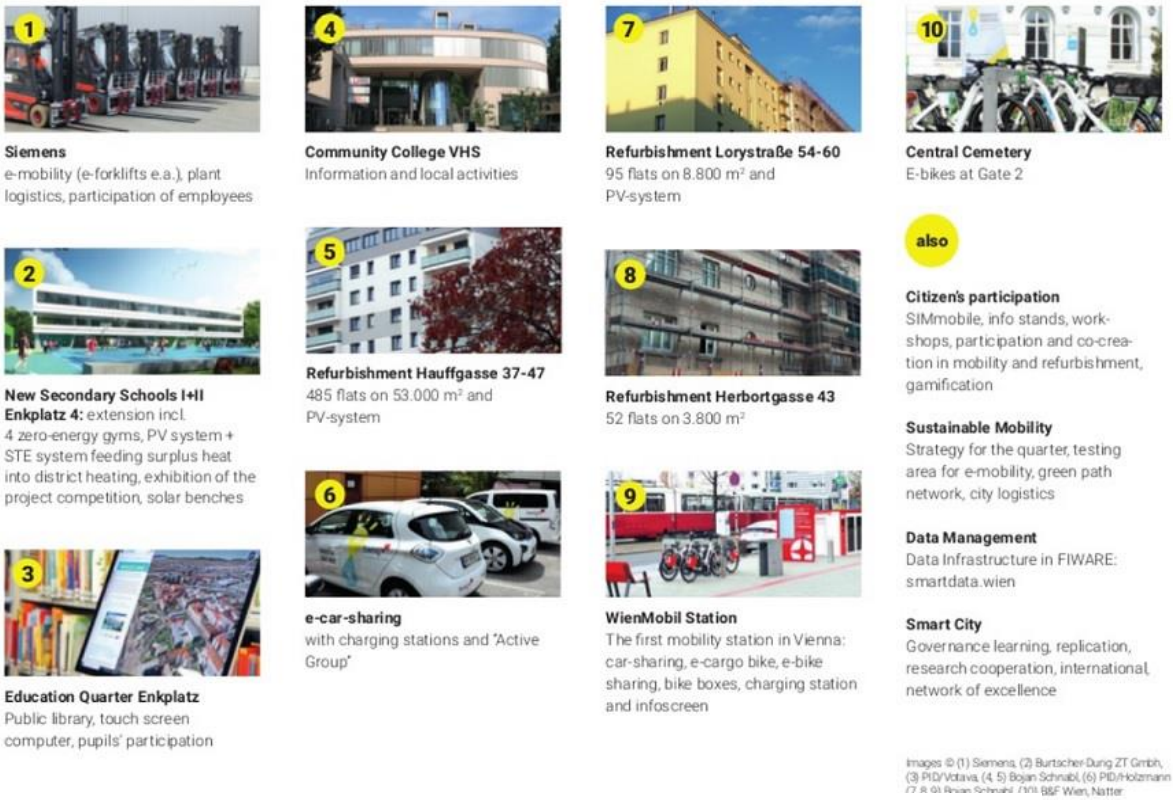
Figure 6.3. Smarter Together projects and plans in Simmering

Source: smartertogether_folder_EN_WEB.pdf, retrieved from https://www.smartertogether.at/mediathek/downloads-2/

From the presentation of the urban initiative, I could identify a set of elements and topics which aim at shaping the cemetery's character: developing e-mobility by opening the first free e-bike station in front of Gate 2 (Fig. 6.4), supporting citizen participation with the organisation of events for recreation and healthy lifestyle at the cemetery's site, and promoting the historical and cultural heritage of the cemetery. According to the initiative's advocates, the opening of the first free of charge e-bike station at the cemetery's main entrance was celebrated with the participation of many city's officials and of the local public. (Draveckà, 2019).

The electrical bicycles are intended for locals and tourists for riding through the cemetery and within the neighbourhood, using a mobile application. According to the platform, the e-bikes are representing at the same time a sustainable mobility mean, an urban and technological innovation, and a tool for boosting social inclusion and encouraging a healthy lifestyle.

Figure 6.4. Smarter Together. Projects in Simmering



Source: https://www.smartertogether.at/wp-content/uploads/2019/06/glossysummary_AT_EN_web.pdf

As a concluding note, I would argue that the Smart City Wien and Smarter Together initiatives represent both a conceptual and a practical reference for adopting sustainability practices in the urban space of Vienna. Their guidelines specify and apply also to the immovable built structures such as the Central Cemetery. The similarities between the prioritized objectives, the networked character of the same topics, as well as the testimonial of its historical value prove to us that the cemetery is of substantial importance within the Viennese urban landscape.

6.2. Sustainability practices at the Central Cemetery

From the discussions with the administrators, I am aiming at identifying the practices that are necessary to be imposed as solution to the current urban societal challenges. To understand the nature of these practices, I believe is relevant to reflect on the statutory standards and the administration's agenda on which the decisions are made. Following with the imposed practices, I will refer to the relational map represented at the beginning of the chapter (Diagram 1) and

proceed to analyse each cluster topic, as well as the relation between the topics and the practices that sustain them, according to the discussions carried out with the three administrators.

The following sub-chapters focus on discussions of actively imposed practices which are considered by the three administrators as being sustainable. As the general administrator claims, a part of these practices are standardized (e.g. no pesticides for gardening), being subjected to processes of adaptation to societal challenges, according to strategic frameworks determined by the City Council and the Viennese Service Authority (orig. Wiener Stadtwerke).

6.2.1. Cemetery's cultural and social significance

I will draw on interview discussions on the role of the Central Cemetery in Vienna, from a social and cultural standpoint. The cultural and social dimensions include discussions of what the administrators believe about the cemetery in relation to the surrounding built environment, to the tackled social challenges, and lastly, to the importance of its cultural and historical heritage.

From the interviews with the administrators on the relation between the cemetery and its surrounding built environment, we learn that the Central Cemetery is firstly understood in direct relation to the city, being seen as by the administrators as 'the lungs of Vienna' (Participant A). The cemetery's large forest area brings a significant contribution to the total of urban green spaces in Vienna. According to MA18 Urban Development and Planning Authority in Vienna, from the total areal of urban green spaces (including the cemetery) in 2020, the district in which the Central Cemetery is located has the highest total of all Viennese districts (https://www.wien.gv.at/statistik/lebensraum/tabellen/gruenflaechen-bez.html).

In keeping the cemetery's so called 'green space' role, the administration must assure and secure excellent operational practices. Therefore, we can claim that strong relations with other state institutions are crucial to the good functionality of the cemetery.

As a first example, the necessity of using the capacities of the State Gardening Authority (MA42) for gardening and tree maintenance is quite explanatory. Having the work force and the operational atelier present on the cemetery grounds always assures for prompt intervention and practice. Other essential contracts the cemetery holds are with the waste management company for disposing of non-recyclable waste, or the commitments for the cemetery bus, for the photovoltaic panels and for shift to electrical vehicles, all commissioned through the Viennese Service Authority (orig. Wiener Stadtwerke).

The social aspects discussed are often connected to aspects of resources and the natural environment. The cemetery offers its visitors the necessary space to commemorate their loved ones, but also offers an opportunity to enjoy a secluded natural space, or to practice leisure sports (jogging, Nordic walking, etc.), or just to get the feeling of closeness to nature and wild animals. In order to facilitate the access of their less mobile clients, the administrators agree on traversing with the personal car.

The cultural and historical value of the cemetery are often discussed from the prism of identity and tradition of Vienna itself. The general administrator states in our interview that tourism and the cemetery's international appreciation are two important themes that represent the cemetery since a very long time. Being the second largest cemetery in Europe, the Central Cemetery must maintain the fundamental attractions and objectives which define it.

Since Vienna is renowned for its touristic capabilities, then, the cemetery borrows the same preoccupation for tourists as the city it belongs to. As a touristic objective, the cemetery also borrowed the famous carriage rides with the traditional "Fiaker", the organization of museum exhibitions, the guided tours through the honor graves, and the Big Bus Vienna connection.

The administration is annually organizing an orchestra concert for locals, visitors and tourists, as well as a few public exhibitions. These events aim at promoting the historical and cultural heritage and wish to present the cemetery as a place where current societal changes are tackled, and citizen participation is positively encouraged.

Public opinion and feedback are very important for further development, as the administrators are interested in the quality of work they provide and are very involved in the nature of the feedback they receive from their clients and visitors.

6.2.2. The natural environment

The natural environment topic has appeared to prevail in the interview discussions about sustainability practices. Looking over the interview data, the case of the natural environment was perceived by the administrators as being a fundamental element to the concept of practicing sustainability at the Central Cemetery.

A set of interesting claims are deriving from the fact that cemeteries are part of the green spaces in Vienna. For the administrators, this features a constant effort to keep the Central Cemetery in

its most natural form. The following aspects serve as evidence of the engagement of the three departments to work together for maintaining current practices or creating initiatives in this sense.

One primary aspect is formulated around their commitments towards sustaining a living environment for different animal and bird species present in the cemetery's parks and gardens.

> "We run biodiversity projects especially in regard to sustainability" (participant A)

The biodiversity projects consist of a discussion around practical examples, some of which were already implemented: nesting boxes for jackdaws, green toad facilities in the natural garden, bee hives, hedgehog housing, and refuge for deer and hunted animals, dust filters in the trees, ecological micro-climate, etc. I believe that these engagements, along with their numerous employments already practiced within the natural habitat, biological conservation, animals refuge, place of retreat and relaxation, do define one of the positions that the Central Cemetery holds in the surrounding built environment.

The following memo reproduces how I personally perceived the connection between the cemetery as a burial space and a green space, during my first visit at the cemetery in August 2016.

> Personal memo A.
>
> *'Starting with the first view just from the entrance through the third gate (orig. Tor 3), I got the feeling of actually being in a park. The cemetery landscape is highly covered by robust trees and plenty green areas. Along the main alley on the right side, there is the Park of Rest and Strength. Here I may have spotted a situation of intended inaccessibility, as the right side of the park is covered by a recent plantation of young trees. The field around the trees is unlevelled and the grass unkempt, making visitor's access almost impossible.*
>
> *To the rear end of the cemetery section, where one may feel that the cemetery landscape now ends, there is the natural garden. Here is a natural wild area opening with a small pond, where I could spot wild ducks, deer, field rabbits, and beehives. The field is covered in trees, weeds, and tall grass, and seems to be the home of plenty wild animals and birds. The visitor's access through the field is limited to the pond area, where the administration placed a sitting bank for resting.'*

Note: The cartogram below (Fig. 6.5) entails the physical and structure of the cemetery, with specifications and numbering of burial sections and main attraction objectives. It is also a schematic representation of my incipient research stage for the scope of gathering field notes and

doing direct observations on spot. As the map indicates, the purple line signifies the route I followed during my visits. The red numbers specify the places I have found relevant to be included within the analysis.

Figure 6.5. The orientation plan at the Central Cemetery

Source: http://www.viennatouristguide.at/Friedhoefe/Zentralfriedhof/Plan/map.htm

1. Park of Rest and Strength
2. Natural garden
3. The woodland cemetery
4. Workshop Hall 3, administrative buildings and the gardening atelier
5. Karl Borromeo's church
6. The old crypts and old arches
7. Cemetery's main entrance, new arches and information desk. The main bus stop, e-bike station and carriage rides start.

The Park of Rest and Strength was created to offer a commemoration space to the remaining relatives. Here, visitors find a place for reaching inner peace, but also a place where one can connect with nature in a secluded green space.

The Natural garden is place of wilderness, hosting a rich natural habitat, with animals, birds, and various plants (deer, ducks and birds, hedgehogs, bees, etc.), also where they can grow beehives. The Natural garden is important to the administration for supporting the natural habitat for animals and, at the same time, for offering a unique recreation space to visitors and clients.

The woodland cemetery is a naturally preserved place for burying urns or dispense ashes, using biodegradable urns no matter of religious beliefs. The woodland cemetery is providing an unaltered connection to nature in the afterlife.

The Workshop at Hall 3 is the operational building for the gardening and technical services. This hall serves multiple ateliers, from soil, plants and composting department to the garage and workshop for operational vehicles.

Karl Borromeo's Church and the old crypts are part of the cultural and historical heritage the cemetery relies on. The Church, the arches and the crypts are often in undergoing restauration processes for preserving their form. The Church is also on the list for refurbishment, for reducing energy costs.

Cemetery's main entrance at Gate 2 is the fundamental junction of the cemetery. It serves as the basic orientation point to reaching each objective in the cemetery. The information services, the main administrator's office, as well as the bus station are situated here. It is the leading point to visiting the memorial graves and old arches.

In discussing the role of natural environment with the cemetery administration, a noticeable aspect was the importance of the natural habitat reflected on the image of the cemetery. The administrators' general aim is to maintain a long-term relationship with nature. With the establishment of well-developed ecological practices, the natural landscape and the animals within will be protected, and in return, nature will keep the habitat alive and will continue to offer its visitors a liveable recreational area.

As Participant A explains, nature and the function of the cemetery have a direct impact on each other. The cemetery hosts more than thirty thousand trees and it is home to diverse wild animal species. The tree maintenance service is considered as an essential practice for the general

administrator, because “it is keeping the whole ecosystem alive” (Participant A). The fact that the Natural garden is populated with wild animals such as deer, foxes, ducks, hedgehogs, and numerous birds and insects (bees), helps create an image of co-habituation between the natural environment and the humans. This association is treasured by the administrators, as it describes very well the character of the Central Cemetery. With the preservation of its natural environment, the cemetery can continue to enjoy its distinction for being the “lungs of Vienna”. (participant A)

To the benefit of their clients and visitors, the natural environment offers people a place to find inner peace, to connect with nature and to enjoy a secluded recreation area. The cemetery must keep one of its essential and traditional roles in offering a commemoration space to the remaining relatives. Such a space is, for example, the Park for Rest and Strength. The administrator believes that the park is important for the connection between city and nature, as well as for connecting the two spiritual and material worlds. Besides achieving this, it is also functioning as a free natural landscape for birds and small animals.

“People often come to the park because in Vienna they cannot find such place of peace anymore”. (Participant A).

Several valuable claims for protecting the natural environment are also made about the gardening practices. The use of chemical fertilizers is strictly regulated through the Gardening Authority (MA 42). As the cemetery operations department works closely with the Gardening Authority, natural fertilizers are the only type agreed for use. As well, for turf they often rely on natural growth, while on-site composting became a common practice in the recent years. Raking waste is collected for bio-composting and reused as natural fertilizer for the upcoming seasonal plantings.

“Also, composting is necessary in the sense of being sustainable.” (participant B).

To acknowledge the best gardening practices, external expertise is often necessary. In many cases, the gardening operators consult with expert bodies from the State Gardening Authority (orig. MA 42 Stadt Gärtnerei) for requiring detailed information about certain soil or fertilizer types.

Another note about the gardening services is that they are not performed within certain natural areas, as their wish is to prevent any perturbation on the surrounding natural environment. According to my field notes observations, a significant field area in the Natural garden and the Park of Rest and Strength is purposely neglected, while the woodland cemetery is kept in its most natural form.

Personal memo B.

'The woodland cemetery is a natural area intended for urn burials or unrestrained ash dispersal and it is covered by plenty of trees, grass and ivy. Only the main path of grass seems mowed, maybe to fasten the access through this woodland section. The ground is coated in a rich ivy layer, which does not look tended by the gardening services. The ivy carpet is unlevelled by the traces of each urn burial. A near-by shield shares information about the use of the woodland cemetery. Another interesting aspect would be to find out about the imposed rules regarding the urns and unrestricted ash dispersal.'

Participant C is the administrator responsible for following burial regulations and organising funeral events. From his perspective, the woodland cemetery does not only serve as an unrestricted burial space for urns, but it is simply a place to care for nature and the natural habitat. On the premises of the woodland cemetery, close-to-nature forms of burial (orig. "naturnah Bestattungen") are willingly supported and promoted by the funeral authority. A good example in this sense are the ecological urns, created out of biodegradable natural fabrics which in time are untraceable. A protocol and a strategy exist in regard to reclaiming the same burial space after a specific period of 'peace' was considered.

Also, looking at matters such as state directives and guidelines, the administrators warned about the strict policies regarding the pollution of the environment. In reference to the Land Law and according to participant C, disposing cremated ashes anywhere in the public landscape is forbidden (e.g., Danube, lakes, woods). In what concerns burial rules, damaging substances such as metal or heavily processed materials (i.e., rubber for shoes) are also not permitted on both ground burials and cremations.

From the interviews and the organigram (see Fig. 6.6), we know that the administration of the Municipal Cemeteries Administration (orig. Friedhöfe Wien) is subordinated to the Viennese Public Services (orig. Wiener Stadtwerke) and implicit, to the State of Vienna. Thus, the decisions towards supporting a liveable natural habitat and ecological refuge at the Central Cemetery are taken in high cooperation with the City Council of Vienna.

The head of administration of the cemetery (Participant A) falls under the responsibility of the Municipal Cemetery Administration (orig. Friedhöfe Wien). According to the organigram, the Municipal Cemetery Administration further on, falls under the Viennese Public Services quarters. Therefore, behind the image of a green, living environment, there are plenty of actors who sustain

policies and decisions in regard to ecology and nature, infrastructure, energy consumption and so on. According to Participant A, there are standards and frameworks that regulate their objectives only together with a strategic development of the entire city.

Figure. 6.6. Organigram of the Municipal Cemetery and Burials Administration.

Source: https://www.bfwien.at/documents/240555/1911321/Organigramm+bf+Beteiligungen_2020.pdf/1333cfb4-0e58-2eb7-3f75-6b70301a1b8d?t=1598515680909

Being subjected to commonly agreed objectives set by the city's municipality, the cemetery continues to experience transformations of its traditional character (i.e. historical culture, commemoration and burial space) towards a socio-technical entity able to answer to societal challenges with an unitary approach to development and change. This approach is closely supervised and brought to practice with the help of urban initiatives such as Smart City Wien or Smarter Together for building sustainable urban space.

6.2.3. Energy resources

The second main theme contains discussions on the topics of mobility, energy efficiency and infrastructure. From the interviews, these topics were understood as inevitable technological advances for accommodating sustainable development.

To begin with, the topic of mobility is divided into two discourse strands, the first being public mobility, respectively the public bus and bus line provided to visitors; and the second is the internal mobility, meaning the operational vehicles used for internal services. As the general administrator has stated, the idea of a public bus at the Central Cemetery is not new, the bus has been functioning for more than 10 years, and since that time it is still considered a reliable technological solution for assuring public access to the graves. Being a vital mobility resource, a fundamental preoccupation with the technical condition of the bus is constantly casted. "As you may have noticed, the bus is in a new technical condition […] but clearly, for us this is a subject that reflects our wish to not damage the environment." (participant A)

A positive prospect identified in the discourse of mobility is represented by its flexibility. The access with the personal car to the grave is permitted. The decision is based on an evident factor (size of the Central Cemetery), with the intention of providing more flexibility using other mobility alternatives. Furthermore, the administration is well aware of the status of its visitors (age, health condition, etc.). Expanding the map of the bus stops comes as a solution to covering those sections which normally can be reachable only by foot.

"for an area as vast as this […] it makes it necessary for our clients who do not have access to automobiles" (participant A).

Bicycles are used as both transportations mean for employees and visitors. For the cemetery workers, they prove to be a very efficient, low cost and non-polluting alternative, highly recommended by the administration.

From the analysed data, a debated theme bound to sustainability is electro-mobility. When asked about mobility, all participants brought up the efforts and advantages which come with the shift to electrical energy resources. The concept of adopting electrical mobility in the cemetery is perceived by the administrators as transition to modernity.

"At the cemetery we have over 90 electrical vehicles, with a good impact regarding sustainability." (participant A)

An interesting remark comes-up with the term 'change', which is often present in the discourse segments where electrical vehicles or electrical devices are discussed. Change is emphasized through investments in energy efficiency and technological advancement for mobility, present in the form of different initiatives: the recent transition to photovoltaic panels for road lightning, the

acquisition of almost a hundred electrical vehicles, and equipment and devices powered by rechargeable batteries.

“We are now switching to solar power, let’s see how it turns out with the project, whether the photovoltaic device is useful or not, we will still see, so there are always many little steps to take” (Participant B).

The administrators are preoccupied with reducing glasshouse emissions from burning candles and church lights. These emissions are still considered to be at a minimum level, as the cemetery functions mainly during the daylight. For the road lighting and church lighting source, they adjusted to smaller-sized solar panels.

“So, the glasshouses are anyways too little, but that is why we have also photovoltaic, where more energy is saved for ecological purposes” (Participant B)

In regard to waste management, this operation is organized towards an efficient recycling and reusability system. Based on my personal field notes, the waste is divided into biological excess, later turned into compost or into recycled waste. Collection points are strategically spread on every section in designated areas with separated bins. According to the operations administrator, special waste such as metal and plastics is further handled by a professional company specialized in waste disposal.

> Personal memo C.
>
> *‘Regarding waste management, I could notice that sections have a waste disposal place in sight, they are very frequent, positioned in each alley corner and appointed with two waste bins and a bio-waste square. The indication on the bins is structured on wax (from candles) and residual waste.’*

The gardening workshop is supplied based only on pre-orders, meant to avoid the production of unnecessary waste.

Water consumption is the most significant preoccupation about resource preservation, infrastructure and sustainability. As participant A states, it is also a typical topic in a cemetery, since large quantities of water are required for daily maintenance. Actions in this sense consist of strict regulations aiming at reducing unnecessary resource consumption. This is achieved through the efforts of the employees for implementing new automatic watering systems designed and adapted to each operation and type of plants.

“So this is something that we really do care about, and which is a certain theme for our future.” (Participant A)

Infrastructure figures an important aim for the administration and in the discussions is often linked to the surface of the cemetery and the fragmentation of the burial space into sections. The administration’s initiatives have the scope of increasing mobility for both clients and for the operational services, always having the environmental impact in mind. Their biggest projects are adopting and implementing photovoltaic panels, acquisitions of electrical cars and the shift to rechargeable batteries for technical devices. The general administrator’s attitude around this investment can be described through pride and positive hope. As it is a costly investment, he trusts that the benefits of having electrical cars and thus, avoiding pollution as much as possible, is regarded as a big step and effort to climate change. Besides, their technicians work in the repair shop to assure a good transition from fuel to electrical power, and to provide great operative functionality.

Personal memo D.

> *‘While wandering through the alleys, I assisted one worker performing his gardening duties, watering the grave plants using an automatic system with adjustable hose. The operational vehicle seemed to run on electricity. Many other co-workers were using small electrical vehicles for helping with the gardening process (i.e. carrying necessary tools, equipment, and devices). There are also bigger operational vehicles which, from what I could tell, were running on fuel.*
>
> *The cemetery offers a free bus line to its visitors, running on a circular route within the cemetery. At the cemetery’s entrance, there is also a parking lot for visitors, with clear stops for tourist busses. Another possibility seems that, visitors are allowed to drive with the personal car directly to the grave. It is not clear if the conditions are restricted to special exceptions or anyone is allowed inside by car.’*

As a concluding point, the administrators are taking into account several measures which support technological advancement for the benefit of protecting nature and the environment. As one administrator mentioned, the success of these practices depends also on other factors and relations, such as the adaptation of the natural habitat or the approval of visitors. The general administrator claims that the usefulness of accommodating modern solutions and technologies

will be proven within time. That is why even substantial projects, as for example the implementation of photovoltaic panels everywhere, are still in the experimental phase.

6.2.4. The relational character of the three topics

An entire discourse is formulated on the network of relations which build up how the cemetery features today. As we found out from participant A, cemeteries are part of the green spaces Vienna. Being Vienna's main cemetery and covering a vast territory, the Central Cemetery plays a crucial role in supporting its ecological function. In an indirect way, the administrators are aware of their position in adopting and maintaining an ecological attitude towards the natural habitat and the natural environment.

As we witnessed in the past sections, the multiplicity of the cemetery's character within the urban environment is well acknowledged by the administrators.

With the accommodation of sustainable and modern practices, the conventional function of the cemetery is shifting and getting blurred within the multi-faceted roles and meanings it gets inscribed with. As we have seen, the cemetery means more than a place for accommodating the bodies of the departed, for connecting with those passed, and a place for grief and consolation. From the interviews, we understand it as a natural habitat and refuge, a touristic objective, a place for cultural events, sports and social interaction and mostly, a place for accommodating modern technologies, where current societal challenges are tackled (see Fig. 6.7).

Figure 6.7. Coding exerpt from the ordered map. The role of the Central Cemetery (abbr. ZF)

The role of the natural habitat is explained though the administrators' efforts to impose ecological practices. The projects of sustaining over twenty-thousand trees and that of the Biotope, are sustaining the living environment and offering a safe home to animals, birds, also protecting the surrounding natural landscape.

The implementation of these projects does not only serve the natural habitat, but it also indirectly serves people and institutions alongside. People need a secluded place to relax and contemplate, while institutions ensure intangible and material benefits (maintenance and services, consultation over pesticides, projects for saving energy resources, dust filters, etc.)

The topics of resources and mobility are important for the administration. The adopted changes happen in accordance with the common strategy framework firstly applied at municipal level. For example, from the discussion of a possible change to electrical busses in the future, the first participant confirmed the strong relation to the state of Vienna for the process of decision making.

> "(About Vienna) whether there are buses which drive purely on electricity I do not know since I am not really a specialist. But if there is such a thing, it will certainly be adopted at some point." Participant A

The touristic role is a complex matter. Tourism and international name are a theme which represented the cemetery since its establishment. Being the second largest cemetery in Europe, the Central Cemetery must maintain the fundamental attractions and objectives which define it (i.e., famous compositors and personalities memorial graves).

Tourism is discussed from diverse standpoints, but mainly in direct relation to the touristic status of the city itself. If Vienna is renowned for its touristic capabilities, then, the cemetery borrows the same preoccupation for tourists as the city it belongs to. For example, the famous carriage rides with the "Fiaker", the museum exhibitions, along with the famous personality's sections, Big Bus Vienna connection, also the guided tours and pamphlets available at the Info point etc. The administration is organising an annual cemetery concert, and open-house day and also other public exhibitions, which aim at increasing public participation and meeting clients' requests.

Public opinion and feedback are very important to the further development, administrators are interested in the quality of work they provide and care for good replies from clients and visitors.

I believe that the administrators' efforts to create and impose sustainability practices can be understood as preoccupation firstly for the environment and climate change, but also in regard to

cultural importance and citizen participation. Their challenges begin with protecting the natural landscape and reducing resource consumption and spread towards creating easier access to visitors and making the cemetery more attractive to locals and visitors. For the administrators, the balance between natural environment, resource efficiency and preserving the historical heritage is the topic for the future.

6.3. Sustainability discussion and urban assemblages

The structure of this concluding section is based on a number of conceptual argumentations from urban assemblage literature, relating them specifically to the resulted research cluster (i.e. role of the Central Cemetery in Vienna, natural environment and energy resources). This step consists of creating a joint discussion, using the above analysis reflections from both the situational analysis and actor-network theory in order to reflect on the way the cemetery has gradually transitioned towards an active part of the Vienna's urban assemblage.

Therefore, I aim at assessing sustainability directly at the Central Cemetery through 'collective experimentation and learning', acknowledged from an ANT and STS perspective. Accordingly, the matter of assessing sustainability is bounded to the issue of how the administrators and other decision makers implement and maintain the ecological and socio-technical character of the cemetery. Questions like 'what elements do the administrators link directly to sustainability?' And 'how is the ecological condition connected within the heterogeneous network of actors and elements?' are making the structures of assembling and re-assembling the cemetery's urban life visible in this sense.

Anders Blok insists that "most urban ecologies – as shaped by obdurate socio-material infrastructures of electricity, water, housing, transportation and waste – tend to remain unnoticed backdrops to city life" (Blok, 2013, p.8). Additionally, he believes that extensive greenspaces are cultivating a certain place-identity, which make a city environmentally attractive due to the consciousness of the designers or, in this case, of the administrators.

> "[…] it will make the city district feel 'open, friendly and liveable'" (Blok, 2013, p.8).

As the Central Cemetery is also a part of green spaces in Vienna, the administrators have to make commitments towards protecting and maintaining the size of the green spaces. The fundamental places for imposing environmental sustainability are the Park for Rest and Strength and the Natural garden. The administrators' aim is to bring sustainability in natural open spaces

and to provide a natural living environment to animals, plants and birds. At the Natural garden, another important task for the administrators is to provide refuge to wild animals which are usually targeted by hunters (e.g., deer, wild ducks, wild boars, etc.)

"The Natural garden is nowadays the biological refuge for our hunted animals." (Participant A)

Among the recently applied projects, the administrator is pointing out the nesting houses for birds, the new facilities for the European green toad population, and the installation of beehives (bees are crucial to the reproduction of plants). The results of their efforts are positively described, additionally, these initiatives are planned to be applied long-term.

> "We hope the animals will move here, in part they have already moved; anyways, we will continue to make new Biotopes in this sense" Participant A.

The Central Cemetery is unique for the opportunities it presents for recreation and leisure. Here, one can connect with nature in an unaltered and remote place. To this extent, the administrators explain that the function of the cemetery does not resume to being a burial place but is more of a cemetery where "one can especially find himself in regard to the habitat, to the retreat area, to the conservation area, but also to a place of leisure." Participant A

Waste management and composting are part of the daily practices engaged for maintaining the natural space. The biological waste resulting from gardening is turned into bio-compost and used as natural fertilizer for plants, while the residual waste (e.g., candles) is recycled and handled professionally.

Public mobility, infrastructure, and transportation also important themes for the administrators. In offering alternative transportation means to the clients and visitors, the administrators need a good strategic planning and collaboration with the bus company. The running bus line must be easily accessible by anyone and must cover as many cemetery sections as possible. Convenient stops are also a topic. For the visitors, there is sufficient parking space outside the gates, aimed at limiting the public access with personal cars and at the same time to offering alternatives for the less mobile visitors/clients. The administrators accommodated a socio-ecological adaptation to the current situation by limiting the access to the large public, while encouraging less polluting alternatives, and in the same time allowing fewer flexible visitors to get around more distant sections.

As already argued, mobility plays an important role for the cemetery administration, as it consists of technological materials and resources. The administration is aware of their responsibility for adjusting the development strategies, often bearing in mind the complexity of introducing or changing a new technology within a stabilized network (i.e., obduracy reflected by older designs of infrastructure).

The bus line is considered as a good transportation alternative for visitors and clients. The effects of using public mobility are directly visible: is reducing carbon emissions, is cost efficient and the noise level is significantly reduced.

Regarding the electrical cars, the change from petrol-based carburant to electricity it was also a decision discussed at municipal level, especially with direct impact to increasing sustainability and to coping with climate change challenges.

> "And we also try whenever possible to exchange a gasoline operated device with an electrically rechargeable one." Participant A

Reducing water consumption supposes the adoption of new, conscious regulations in order to make awareness of unnecessary consumption and the necessity of efficient infrastructure (i.e. changing and maintaining pipes).

As well, administrators are encouraging doing sports at the cemetery, offering possibilities for resting (i.e. park banks) and hydration sources. Bicycle access for both the public and their workers are allowed and encouraged to get around the large areas). They do not pollute and offer minimum maintenance costs.

With the presentation and detailed analysis of the various shapes contained in the discussion section above, I wanted to show that the Central Cemetery is not only resumed to serving as a vast burial space and commemoration site. It entails a quite complex urban structure where heterogeneous humans, non-humans, nature, technologies, objects, and norms form a myriad of networks and relations which give the cemetery both a steady and adaptable character. It entails a large aggregation of elements, from cultural and architectural preservation to social responsibility, technical advancement, and respect for the natural life. I thus would like to claim that the of variety of objects and their agency give the Central Cemetery its multiplicity, showing it that it is deeply connected and embedded in the city's urban assemblage.

7. Conclusion and reflections

In the context of urban development, sustainability is used as a key principle for promoting social change, being considered an efficient solution for the current environmental and societal challenges. Collectively established sustainability frameworks, like Smart City Wien, are primarily targeting aspects of climate change, electrical mobility, resource efficiency, and citizen participation in decision making processes.

From the multitude of the city's dynamic structures where sustainability is applied, a detail that caught my attention is that the scene of the urban cemetery was not yet addressed. Therefore, I used the case of the Central Cemetery in Vienna as a research site for investigating how sustainability and change are practiced in the urban built environment.

7.1. Understanding sustainability and change at the Viennese Central Cemetery

The interviews planned with the cemetery administration aimed at exploring what meanings of sustainability and change are expressed by the administrators while discussing about accommodating sustainable practices and applying them on site.

The discussions indicate that the administrators are actively involved in accommodating the sustainability guidelines adopted at municipal level. According to the general administrator, some of the implemented sustainable practices are standardized through directives imposed by the City Council and by the Viennese Service Authority (orig. Wiener Stadtwerke). Then, several sustainable practices are developed and implemented together with the help of the operational administrator, depending on the situation at hand. Furthermore, the functionality of certain practices necessary for preserving the natural environment and for reaching resource efficiency, relies on a strong relation with associated public companies and city authorities.

The conducted situational mapping has revealed that, in our discussions, the administrators refer to sustainability while addressing three main topics – the socio-cultural significance of the Central Cemetery in Vienna, the natural environment and resource efficiency. The analysis of the interview data shows us that the administrators' understandings of sustainability primarily materialize with their efforts of protecting the natural habitat, of reducing resource consumption, of preserving the cultural heritage of the cemetery and of promoting its social significance.

The relational analysis emphasizes the interconnection between the main topics, as sustainability discussions over one topic also comprised implications to one or sometimes both related topics.

Within the topic of the cemetery's social and cultural significance, sustainability can be understood according to the character of the implemented practices. In discussing the role of the Central Cemetery as part of the green spaces, sustainability features through practices of maintaining and supporting the natural growth of the habitat. The sustainable practices benefitting the natural environment also have a positive impact in promoting the social role of the cemetery, as clients and visitors can enjoy a secluded natural space, as well as a space for leisure and sports. Additionally, the cemetery's connection to the identity and traditions of Vienna is emphasized through practices meant to preserve its heritage and advance it as a valuable touristic objective (e.g., international appreciation for being the second largest European urban cemetery).

In discussing the topic of the natural environment, the administrators refer to sustainability as being fundamental to their efforts of maintaining the cemetery's natural environment in its most natural form. Here, the understandings of sustainability are mostly defined from ecological perspectives, being used in practices promoting biodiversity: creating housing facilities for animals, providing refuge to wild animals, expanding the natural habitat with biotopes, and aiming at biological conservation. A part of the ecological practices is connected to the social significance of the cemetery (e.g., offering visitors a place of retreat and relaxation) and to the resource efficiency topic (e.g., reducing greenhouse emissions).

Under the topic of energy efficiency, the administrators understood sustainability from the perspective of accommodating both ecological and technological practices as a solution to environmental challenges. As the necessary ecological practices to be imposed, the administrators directed their efforts in facilitating composting, in efficient waste recycling and reusability, and in reducing water consumption through automatization systems and adaptability to plant or soil types.

The technological practices are described according to the recent actions and investments conducted: the gradual transfer to electrical mobility with the acquisition of 90 electrical operational vehicles, the modernization of road and church lightning with photovoltaic panels, and the shift to rechargeable batteries for technical devices. Besides the electrical vehicles, the general administrator is regarding the use of bicycles and of the cemetery bus as a favourable practice for improving mobility. The prospect of eventually shifting to an electrical bus is positively acknowledged. For the administration, the investments in innovative and sustainable technologies

for reducing the consumption of natural resources will remain a preoccupation in the future, as well.

The analysis conducted on the meanings of sustainability at the Central Cemetery returned valuable insights to the way sustainability features in practice and how it shapes the direction of social change in the urban built environment. From the interviews with the administrators, the lesson we learn here is that sustainability at the Central Cemetery consists of different angles, depending on the topic and its entanglement that it is applied to. As we have seen, the practices implemented to the benefit of one element are also shaping the way the other two topics are represented.

Furthermore, the situational analysis has highlighted an important aspect related to the way sustainability and socio-technical change are practiced in the urban built environment. It has emphasized the connection between the objectives and challenges the cemetery administration is targeting and the objectives determined within the Smart City Wien framework strategy. Therefore, we can acknowledge the similarities in how sustainability is imagined and accommodated in practices able to protect the natural environment and to boost the efficient use of natural resources. This connection helps us reflect on how certain decisions and strategies planned at municipal level are influencing both the applicability of sustainability and the direction of socio-technical change within the urban built environment. As the analysis revealed, the administrators express an additional understanding of sustainability, from the perspective of promoting the social and cultural role of the cemetery in relation to the rest of the city. Lastly, we can assess that the cemetery's role is being defined and shaped through sustainability practices applied at the intertwinements between the cemetery's natural environment, natural resources, and its socio-cultural significance.

7.2. Theoretical and methodological approaches to STS and the city

From a theoretical and a methodological point of view, studying the urban cemetery with actor-network and STS has benefited my investigation in the process of identifying the actors, understanding the relations between them, and exploring their agencies expressed in the urban built environment. Actor-network theory has offered a promising theoretical and methodological guideline to my research, beginning with mapping the interactions of both humans and non-humans and continuing with my examination of the agency dependencies between the actors, with looking at the practices that articulate and connect them and at how the negotiation processes take place in urban settings.

Using conceptual tools from the field of science and technology with urban studies, I developed a situational analysis for reflecting on the cemetery's actor-network relationships. The situational analysis developed with actor-network theory mapping has revealed the same preoccupations for achieving sustainable social change as the direction emphasized within the Smart City Wien framework: protecting the natural environment, reducing resource consumption, shifting to electrical mobility, and boosting citizen participation. All these entanglements between the actors and their agencies showed that the urban cemetery is deeply embedded in the surrounding built environment.

Additionally, for researching the urban cemetery in relation to the surrounding built environment, I have considered the concept of urban assemblages developed in the field of STS and the city. In the urban context, the city assemblage is seen as a process where all parts of the built environment are tightly networked to each other. The flexibility and transformation of one element impacts the relations to all other settings, thus reflecting dynamism and movement through the entire web of urban networks. Applying the assemblage concept to the relations that are taking place at the Central Cemetery, we can observe that its network of actors and situations are reflecting changes from and towards the surrounding built environment. As an example, we can consider the implications of what the cemetery represents in the city from different standpoints – for being a part of the green spaces in Vienna, for being the second largest urban cemetery in Europe, for imposing decisions coming from municipal level, and for its contracts with external institutions regarding expertise or infrastructure (e.g., cemetery bus, waste management, gardening, etc.).

As resulted, the cemetery is going through complex means of transition, the administration being preoccupied with accommodating various activities and practices that shape the role and identity of the cemetery. The socio-technical character of the cemetery is highlighted through the accommodation of available technological solutions in tackling environmental and social problems. The described processes vary from the ambition of protecting the natural habitat, preserving the natural resources, achieving electrical mobility, to imposing given standards, meeting clients' wishes, sustaining relations to other state institutions, and of supporting the cemetery's role associated with Vienna's tradition and identity. All these elements and the connection between them create the multiplicity of characters that the cemetery represents today and prove that its entity is deeply embedded in the built environment of Vienna.

I have regarded these theories from a positive standpoint for their ability and usefulness in serving broader research contexts within the social and urban studies. For my case study, they have offered a valuable methodological guideline for exploring and understanding the complexities of cemetery's role in the Viennese built environment. Nevertheless, when applied in practice, these methodologies could pose challenges related to the relevance of following urban setting which are not determined by complex human and non-human interactions. As an example, this would be the case of smaller urban cemeteries where their function and role are strictly determined by the administration.

There are two arguments I could identify as missing from my investigation. A first aspect is regarding a discussion over the problems of imposing sustainable practices at the cemetery, while the second is about acknowledging the obdurate character of material structures (e.g., tombs, crypts, the church, etc.). Looking at old urban cemeteries, we could assess their highly embeddedness and fixed character accumulated in time, which continues to shape the role of the cemetery in society today. Still, the administrators do not openly discuss in our interviews about issues of imposing sustainability or of encountered obduracy. The general administrator is considering the built structures as part of the cultural heritage, which is benefitting the cemetery's touristic character.

The all-comprising thought we can take from this study is that the urban cemetery's actor-network is tightly is connected to the city's built environment, and in the same time, the elements that construct the cemetery are constantly shaping and being shaped altogether within the urban assemblage.

7.3. Future research prospects

I believe that my study should be completed with a broader perspective on sustainability practices also from the stand of visitors, workers, clients, and related state institutions. A comprehensive study on how sustainability is perceived at the cemetery by all the involved actors could reveal novel understandings of sustainability.

I would like to highlight the importance of considering urban cemeteries as socio-technical entities active in the city's built environment, based on the idea that similar places, unexpectedly, can present complexity and interchangeability, while at the same time can be mobile and fixed, may entail drivers for social change and are able to bring on new possibilities for engaging and exploring the city with science and technology studies. Engaging with the mode of action offered by STS and actor-network theory, we can improve our understanding of the city's dynamic

processes, we can learn how the assemblages are practiced through case studies, we can examine the processes of sustainability and reflect on the implications of imposing it in diverse urban settings.

My wish is to encourage fellow scholars in engaging with the concepts of sustainability and socio-technical change and study how they feature within the city's built environment, while in the same time keeping in mind their capacity and limitations in addressing a city's ecological and social problems.

And finally, I believe that through researching and questioning the processes of creating and imposing sustainable practices, we could position ourselves closer to achieve a social science understanding of cemeteries.

8. References

Note: The translations from German language are either mine, or when stated, retrieved from other authors. Names of places are in German, as they appear in the official documents, or the original source, with their modern name or alternative name in English in the brackets.

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