

**MANAGING SUSTAINABILITY IN A COMPLEX  
URBAN DEVELOPMENT PROJECT - A  
STAKEHOLDER ENGAGEMENT APPROACH TO A  
WICKED PROBLEM**

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**ABSTRACT**

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Title Managing sustainability in a complex urban development project – A stakeholder engagement approach to a wicked problem	
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<p>The aim of this Master's Thesis study is to uncover how a stakeholder engagement approach might improve the overall sustainability management of complex urban development projects, and contribute to sustainability management research in the area of stakeholder engagement that calls for additional attention, particularly in the construction field. The urgent need for sustainability transition coupled with the on-going process of urbanization, suggests that both theoretical insight and effective practical action is needed to ensure that urban growth can be decoupled from detrimental environmental and societal effects.</p> <p>Urban development brings together a host of actors, and the stakeholder field of any given urban development project is wide and increasingly complex, leading to a need for collaboration among a host of heterogeneous actors. An answer to how stakeholder engagement can help with sustainability management in complex construction projects is sought in this study through a review of relevant literature and a two-part empirical data collection involving the internal stakeholders of the case project, Trigoni, and expert stakeholders in the field of sustainable urban development.</p> <p>The complexity inherent to sustainability is examined here through the wicked problems discourse. This approach is determined particularly suitable for the intersection between the linear problem-solving models traditionally – and successfully – applied in construction projects for general management purposes and the complexity and uncertainties that come with sustainability-incorporation. A conceptual framework structured around six identified categories of uncertainty is utilized in this study to explore the dichotomy between fragmentation and coherence and to discover how the wicked problem of sustainability-incorporation should be dealt with in the context of complex urban development projects. Based on this study it seems that stakeholder engagement, when carried out in an effective and goal-directed manner, is essential to harnessing collective intelligence and boosting coherence. Yet, it is not enough in itself to prevent fragmentation and should therefore be accompanied by an appropriate sustainability management framework that takes project life-cycle into account.</p>	
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<p>Tämän Pro Gradu tutkimuksen tavoite on selvittää, miten sidosryhmäyhteistyö voi auttaa kestävyyden johtamista kompleksisessa kaupunkikehityshankkeessa, sekä edistää sidosryhmäyhteistyöhön liittyvää tutkimusta, joka on saanut rakennusalaalla toistaiseksi liian vähän huomiota. Akuutti tarve entistä kestävämmälle kehitykselle yhdistettynä yhä jatkuvaan kaupungistumiseen osoittaa, että alalla tarvitaan lisää sekä teoreettista ymmärrystä että tehokkaita käytännön toimia, jotta urbaani kasvu voi jatkua ilman lisääntyviä ympäristöön ja yhteiskuntaan kohdistuvia haittavaikutuksia.</p> <p>Kaupunkikehitys tuo yhteen laajan kirjon toimijoita ja yksittäisen kaupunkikehityshankkeen sidosryhmäkenttä näyttäytyy entistä laajempaan ja kompleksisempaan. Näin ollen tarvitaan yhä enemmän yhteistyötä moninaisten toimijoiden kesken. Vastausta siihen, miten sidosryhmäyhteistyö voi auttaa kehittämään kestävyyden johtamista kompleksisessa kaupunkikehityshankkeessa on etsitty tässä tutkimuksessa kirjallisuuskatsauksen ja kaksivaiheisen empiirisen tiedonkeräysvaiheen avulla, jossa mukana oli niin sisäisiä sidosryhmiä case-projekti Trigonista kuin myös asiantuntijoita kestävän kaupunkikehityksen kentältä.</p> <p>Kestävyyteen liittyvää kompleksisuutta on tarkasteltu tässä tutkimuksessa pirullisten ongelmien diskurssin avulla. Tämä lähestymistapa osoittautui soveltuvaksi risteykseen, jossa kohtaavat rakennushankkeiden perinteiset ja tehokkaat lineaariset ongelmanratkaisumallit, sekä se kompleksisuus ja ne epävarmuudet, jotka kestävän kehityksen integroiminen tuo mukanaan. Tässä tutkimuksessa hyödynnettiin konseptuaalista viitekehystä, joka rakentui kuuden tunnistetun epävarmuuskategorian ympärille. Sen avulla tarkasteltiin pirullisille ongelmille ominaista dikotomiaa pirstaleisuuden ja koherenssin välillä. Näin pyrittiin selvittämään, miten kestävyyden integroimisen pirullista ongelmaa tulisi käsitellä kompleksisten kaupunkikehityshankkeiden kontekstissa. Tutkimuksen perusteella tehokas ja tavoitteellinen sidosryhmäyhteistyö on olennaista kollektiivisen älykkyyden valjastamisessa ja koherenssin rakentamisessa. Se ei kuitenkaan yksin riitä torjumaan pirstaloitumista, vaan tarvitsee tuekseen soveltuvan kestävyyden johtamisen viitekehysten, joka huomioi projektien elinkaaren.</p>	
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# 1 INTRODUCTION

## 1.1 Background

As concern for the environment continues to spread and deepen while the rate of urbanization shows no signs of abating, the pressure to decouple the growth of our cities from negative environmental and societal impacts is increasing continually. The construction industry, with its profound effects on the environment, economy, society, and culture, is gaining recognition as a central force in ensuring the sustainability of urban environments. In Finland alone, the built environment is responsible for about a third of all GHG-emissions caused by human activities (Confederation of Finnish Construction Industry, 2020), and buildings account for approximately 30% of all energy consumption (SYKE Climateguide, N.d.).

In the Finnish Innovation Fund SITRA's most recent megatrends analysis (2020), the urgent need for ecological reconstruction was given top priority as the key factor influencing our future, and it was presented as the backdrop against which all other trends should be examined. While the urgent need to implement more sustainable construction practices is widely accepted, the ways to achieve this and the division of responsibility among a host of actors remain points of debate. Urban development projects of today are often characterized by a multitude of actors, each with their own expectations, targets, and perceptions of sustainability. This means that over time the sustainability of a given development project is evaluated by a number of stakeholders, with different priorities, through varying sets of criteria. While all stakeholders might be committed to sustainability to some extent and intent on improving it, communication and cooperation between stakeholders are certainly needed to ensure that the common goal is achieved.

Stakeholder engagement has been associated with various motives and can serve multiple purposes in construction projects (Collinge, 2020). From a strategic management point of view, it has to do with gaining insight, reducing conflict, increasing a sense of ownership among the end-users of a given project, encouraging innovation, or even promoting spin-off partnerships. Simultaneously, from the point of view of ethics, meaningful stakeholder engagement can be perceived as a way of enhancing inclusivity in decision-making, and particularly local decision-making, promoting equity, and building social capital (Mathur et al., 2008). However, while the literature on stakeholder theory and stakeholder identification, in particular, is vast and diversified, stakeholder engagement remains an under-theorized area (see f.ex. Greenwood, 2007; Collinge, 2020).

The aim of this Master's Thesis study is to uncover how stakeholder engagement might improve the overall sustainability management of a complex urban development project and to make a contribution to sustainability

management research in the area of stakeholder engagement that calls for more attention. The complexity inherent to sustainability, particularly in the context of urban development, is examined through the 'wicked problem' discourse, the origins of which are rooted in planning theory. A pioneer in the field, Horst W. J. Rittel, coined the term in cooperation with Melvin Webber, and its popularity has grown steadily since their landmark article *Dilemmas in a General Theory of Planning* (1973). The role of stakeholders' perceptions, values, and interests is central to the wicked problems approach, which helps understand how issues – in this case sustainability-related ones – are scoped and prioritized, and how possible solutions are considered (Head, 2019).

Sustainability in construction and built environment exhibits several characteristics associated with so-called wicked problems (Goel, 2019). Therefore, urban development projects call for multisectoral collaboration between stakeholders, and it is my belief that appropriate stakeholder engagement may present solutions to the overall complexity (see f.ex. Gunsteren, 2011; Colledge 2017) and to the particular uncertainties faced in this field (Goel, 2019). A prominent dichotomy within the wicked problems discourse between 'fragmentation' and 'collective intelligence' is examined in this thesis through a case study. In the face of tackling the environmental, economic, societal, and cultural considerations of sustainability in the framework of a complex urban development project, the importance of understanding and dealing with a wide network of stakeholders – each with their unique, overlapping, or even conflicting expectations and goals – is paramount.

Regarding this study, the wicked problem discourse provides a set of instruments well suited for the intersection between the linear problem-solving models traditionally associated with construction projects and the complexity and uncertainties that come with sustainability. Beyond case and industry-specific managerial implications, this study contributes to an area of stakeholder research that has arguably been neglected and opens a line of discourse about the role of stakeholder engagement in managing sustainability for complex projects.

The motivation for this research stems from my experience of working with sustainability issues within the case project, Trigoni. As a salient issue, sustainability should be considered in project-based organizations beginning at the onset of a given project (Aarseth et al., 2017). In this study, the case project itself offers a unique opportunity to examine one of the most notable commercial urban development projects currently under planning in Finland. Moreover, my interdisciplinary academic background in regional development and corporate environmental management has allowed me to accumulate an understanding of sustainable urban development that I wish to deepen and has left me with a passion to decouple urban growth from detrimental environmental and societal effects.

## 1.2 Research task

The main research question in this study is framed as follows:

- *How can stakeholder engagement improve the sustainability management of a complex urban development project?*

An answer to this question is sought through a strategy involving a review of relevant literature encompassing the fields of stakeholder engagement, wicked problems, sustainability, and project management, and a two-part empirical data collection. This in turn is comprised of interviews with expert stakeholders and a workshop with internal stakeholders of the case project. In addition to the main research question, the following subordinate research questions have been identified and will be addressed in this study:

- *What causes fragmentation in complex urban development projects with regard to sustainability?*
- *What should be done to counteract fragmenting forces?*

A review of relevant literature is conducted to gain an understanding of the different strategies and tools available for coping with wicked problems and fragmentation, in particular, focusing on strategies well suited for sustainability management. Subsequent interviews with expert stakeholders, namely sustainability and urban development professionals, serve a dual purpose. First, the interviews themselves help manage the wicked dynamics at play since they can be seen as a form of consultation, a method that has been identified as a tool for coping with wickedness (see f.ex. Vartiainen et al. 2013). Second, the insight gained from these interviews helps in narrowing down the range of appropriate strategies and in choosing the most suitable tools for coping with wickedness in the context of the case project.

Finally, a workshop is organized with internal stakeholders. This too acts as an experiment of a specific method (world café) that was selected based on findings from the literature review and on the insight offered by interviewees in the first phase of data collection. Hence, the second phase of data collection is carried out to validate the findings derived from the first phase. Moreover, the data is utilized to further develop the sustainability management framework of the case project and to formulate a set of suitable strategies and tools for future use.

## 1.3 Thesis structure

Following the general introduction, this master's thesis continues onto the theoretical portion where a tentative conceptual framework is established through a review of relevant literature. Chapter 2 is structured so as to give a clear,

comprehensive overview of key concepts and theories identified as integral with regard to the aims of this study. After a summary of the theoretical framework, the data and methodology of this study are described in Chapter 3. Next, the case study is introduced in detail, after which the key findings are laid out, analyzed, and interpreted in Chapter 4. Finally, in Chapter 5 the key findings are summarized with reference to the research questions, and conclusions drawn from the findings are presented. Here, the limitations and trustworthiness of this study are addressed and suggestions for future research are given as well.

## 2 THEORETICAL FRAMEWORK

In his landmark paper entitled *Urban Planning and Sustainable Development*, Petter Næss (2001, p. 505) defines sustainable urban development as follows:

*“In order for the development of land use, patterns of built-up land and infrastructure in an area to be characterized as sustainable, it must secure that the inhabitants of the area can have their vital needs met in a way that can be sustained in the future, and is not in conflict with sustainable development at a global level.”*

This definition is derived from the well-known definition of sustainable development by the Brundtland Commission (The United Nations World Commission on Environment and Development), and it provides a starting point for formulating a working definition. Næss (2001) notes that it is possible to operationalize the overall goal of sustainability in many different ways. On a general level, we can perceive that sustainable cities are ones that are planned and designed so that sustainable development is operationalized or knowledge about sustainability and related technologies is applied practically (Bibri & Krogstie 2019). In these instances, the long-term objectives of urban sustainability are achieved through a strategic approach that balances environmental, social, and economic goals of sustainability.

The sustainability of the built environment can be conceptualized in different ways. Similarly, the sustainability of a given building project can be understood in more ways than one, even among scholars. Rovers and Klinckenberg (2008) begin their interpretation with the general notion that sustainable building involves the balanced use of resources, such as energy, materials, water, and land, on a global scale. Their reasoning for this approach is that the physical elements are the most tangible, and their key points about the limited availability of resources, the attention given to negative environmental impacts, and the number of strategies directed towards reducing resource use still hold true today. Rovers and Klinkenberg’s (2008) arguments support the somewhat traditional prioritization of environmental considerations of sustainable building as compared to other dimensions of sustainability. However, the hierarchy between the different dimensions of sustainability is perhaps less pronounced today than it was at the time when Rovers and Klinckenberg provided their views on the subject. Comfort, needs, desires, and healthy living conditions, which they list under ‘human elements’, are gaining more and more attention in today’s sustainable construction, although factors such as energy usage and carbon emission still retain a strong position in sustainable building discourse.

## 2.1 Sustainability-incorporation strategies in complex construction projects

On a global level, governments are becoming increasingly aware of the responsibilities they have to foster sustainable development. Subsequently, they are putting more pressure on other actors within their respective fields of influence, project-based companies included, to contribute to sustainable development through strategies and action plans (Aarseth et al., 2017). Sustainability-incorporation pressures have shed light on the shortcomings of current project management frameworks, which according to Aarseth et al. (2017) do not account for social and environmental issues effectively enough at present.

The increasing efforts put towards sustainability in the construction industry during the past couple of decades have been accompanied by improvements in the standards used for measuring sustainability and particularly the environmental impacts of individual buildings. Popular standards, such as BREEAM and LEED, focus heavily on improving important aspects of buildings, such as their energy efficiency. According to Aloise-Young and Young (2017), these standards have been identified as a contributing factor to the slowing per capita growth of energy consumption in the United States. However, most of these standards focus heavily on the physical elements of buildings and give little attention to human activity. By relying solely on these traditional approaches, we might risk neglecting to account for impacts linked to the occupancy phase of a building's life-cycle. Therefore, a strategy based solely on meeting standard criteria is unlikely to bring about a much needed, comprehensive sustainability transition.

Aloise-Young and Young (2017) point out that the clear majority of the energy usage in buildings relates to factors such as lighting, heat control, and plug loads – all linked with human occupancy and often under-represented within traditional standards. They posit that the fundamental problem of energy use boils down to the integrated system of both behavioral and physical components formed by the building and its occupants. In other words, energy use is ultimately determined through the interacting components within a complex system, and many popular sustainability management strategies fail to address this important facet.

The example of energy usage sheds light on the concept of complexity. A widely accepted notion regarding complexity is that it emerges in systems through the interconnectedness of a system's elements or components (Oswald, et al., 2018). According to Oswald et al. (2018), the feedback caused by this interconnectedness subsequently evokes non-linear interactions. Interconnectedness is linked with a high level of sensitivity for stimuli or interventions, meaning that small changes of stimuli or small interventions have the potential to cause larger changes in the entire complex system. Furthermore, Oswald et al. (2018) explain

that these properties add up to a situation where it is no longer possible to accurately identify cause-effect relationships.

Following this logic, complexity can be thought to exist in a project setting given that the following observations are made repeatedly: (1) a high degree of interconnectedness, (2) small changes with great impacts, and (3) volatile, non-comprehensible system behavior (Oswald, et al., 2018). In the context of urban development projects and the construction field in general, complexity is not always considered a defining issue. This is certainly the case with simpler construction projects where management has traditionally been able to focus heavily on avoiding overruns in time and money (van Gunsteren, 2011).

Van Gunsteren (2011) notes that project management practices in construction projects have in fact been so effective and successful in avoiding overruns, that attempts have been made to transfer these practices to other realms, such as industrial research and development (R&D). Such efforts have however been consistently unsuccessful, mainly due to uncertainty, complexity, and unpredictability related to the R&D environment. Urban planning professionals have drawn similar conclusions: the project management approach borrowed from simple construction projects does not fit well in the more complex setting of urban planning (van Gunsteren, 2011).

The so-called best practices for project management and their implications in simple construction projects (PI) differ greatly from ones that have been deemed suitable for more complex projects (PII). Starting with the initial setting of goals, it is suggested for PI projects that designs be frozen before commissioning and goals be set at the start and not changed before the completion of a given project. Contrarily for PII projects, designs and goals should be adjusted along the way, when circumstances change or insight improves. This also leads to adjustments regarding deadlines and a re-evaluation of objectives at regular intervals.

Van Gunsteren (2011) believes that it is not necessary to adopt PII best practices in so-called simple projects, which are not distinguished by uncertainty, unpredictability, or a multitude of stakeholders with different, even conflicting, interests. In fact, he claims that this could be undesirable, and advocates for subdividing complex projects into smaller, relatively straightforward sub-projects. This strategy however does not resonate well with the ideas put forth by scholars within the wicked problem framework (see chapter 2.5) and, given the pressure to incorporate sustainability in construction project management as well as the crosscutting nature of sustainable development, it might result in poorer results compared to a more holistic approach.

Even though sustainability literature is expanding steadily, sustainability in the context of projects remains a reasonably new research area (Aarseth et al., 2017). In the near future, we may have to consider, whether the pressure to integrate sustainability into a project management framework has made complexity a new standard in the construction industry, taking into account the emergence of targets that fall outside the previously dominant realms of budgets and schedules. Certainly, the ideas put forth by van Gunsteren (2011) concerning complex

projects resonate well with the additional requirements of sustainability posed on many urban development projects of the day.

Now that sustainability is a part of the strategies of most large construction companies and industry practices have been put under careful scrutiny in both national and international politics, it is difficult to discern a project that would fall indisputably into the PI category where all stakeholders would be satisfied with very little attention. Even if one were to disregard the complexity brought on by the pressure to incorporate sustainability management in urban development projects, the objective to develop and improve the urban environment presents a formidable challenge with a number of complex elements.

Stewart and Hocking (2019) observe that continuous improvement is a recurring theme within sustainability management literature. Among the most prominent frameworks, they recite the four-step iterative model called Plan-Do-Check-Act or PDCA, the Six Sigma technique, and Lean Thinking philosophy. It is worth pointing out that all of them are frequently utilized in complex construction projects for general management purposes, often to great effect. Stewart and Hocking (2019) stress that these approaches have strong advocacy but they also revisit the critique directed towards them. Critics have taken issue for example, with the narrow design of such models, suggesting that they fix existing processes without spurring disruptive technologies. According to Stewart and Hocking (2019), another camp of critics has concentrated on the way these models focus on the implementation of specific tools and processes without having a real, lasting impact on the mindsets of those who are involved with them.

It is important to note that from a sustainability management perspective the implications of these critical perspectives are significant. Integrating sustainability issues into a project management framework certainly calls for a shift in people's attitudes and disruptive techniques as well to a certain degree. If an approach falls short of its goal to promote organizational learning and becomes a simple process technique lacking a deep level of learning and thinking, which Stewart and Hocking (2019) suggest can happen, these strategies alone seem to be insufficient for a highly complex or wicked problem such as sustainability-incorporation.

## **2.2 Stakeholders' sustainability concerns in construction**

Barnett et al. (2018) believe that there are always some stakeholders to whom sustainability issues are actionable concerns. This is certainly true if for example the natural environment is recognized as a distinct stakeholder. However, an individual external stakeholder or a stakeholder group cannot be relied upon to uphold sustainability demands. In fact, some stakeholders may be found in the habit of choosing unsustainable options altogether. Even if salient stakeholders with sustainability concerns are present, gaps between emerging sustainability

problems and direct demands towards a given company can be forged by cognitive constraints according to Barnett et al.

In order to discover high-priority stakeholders with regard to sustainability issues, we need to consider relevant characteristics. Bal et al. (2013) suggest we pay attention to stakeholders' ability to impart knowledge, influence the decision-making processes and bring integrity or legitimacy into it. They also recognize the need to prioritize these stakeholders according to their decision-making power and economic contribution, their links with social and environmental impacts, their dependencies with regard to the organization and direct links to the project, as well as a general interest in the delivery of sustainable solutions. This approach is quite popular and certainly has its merits since it allows us to focus on the most material stakeholder concerns.

There is evidence to suggest that the number of key stakeholders that have got a high degree of salience with regard to sustainability is actually quite low in typical construction projects (see f.ex. Bal et al., 2013). When following the traditional methods of stakeholder prioritization, this may certainly help organizations in planning for effective stakeholder engagement. Then the objective for organizations planning for effective stakeholder engagement is to identify these few relevant stakeholders and direct resources accordingly in order to facilitate effective, mutually beneficial engagement with the stakeholders in question. Conversely, some scholars (see f.ex. Collinge, 2020) criticize mainstream stakeholder management literature for focusing too heavily on the attributes of organizations and stakeholders, including their influence, interest, and power, rather than exploring attributes related to the relationship between stakeholders and organizations.

Collinge (2020) also points out that theoretical understanding of stakeholder engagement remains somewhat immature in the construction field, and he further notes that scholars in this field focus largely on a macro view, with individual work packages of project management receiving very little attention despite them holding a significant role in the practice of project management. This is an important notion, considering that construction projects often come with a complex socio-culture due to them bringing multidisciplinary consultants together (Abidin & Shariffuddin, 2019). Moreover, projects where sustainability is given particular attention - so-called green projects - bring additional complexity in the form of design requirements due to a need to meet green rating criteria and associated regulation. Abidin & Shariffuddin (2019) acknowledge that this added complexity arising from challenging and innovative design is a challenge for architects, engineers, and cost control alike. They highlight the importance of architects' expertise and their early involvement in green projects but also name cost control as well as mechanical, electrical, civil, and structural engineers as key consultants in such situations.

In the mapping out of stakeholder groups, it is useful to distinguish between internal and external stakeholders. Internal stakeholders include two broadly defined groups according to Ward & Chapman (2008). First, there are project owners whose stakes relate to overall managerial responsibility, power,

and financial concerns. Second, there are those organizations, teams, and individuals who become internal stakeholders through a contractual relationship with the owners of the project. In the case of construction projects, this second group would include many of the aforementioned key consultants.

As is the case with many construction projects, the project owner is typically a consortium that retains the overall control of a project while delegating significant management and financial responsibility through contractual relationships (Ward & Chapman, 2008). With regard to sustainability in construction projects, external stakeholders include organizations and individuals who can attempt to influence the project through various means. According to Ward and Chapman (2008), prominent among them are local communities and governments, regulators and environmental groups as well as potential users and the Media.

### **2.3 Stakeholder management in project-based organizations**

Even apart from sustainability considerations, stakeholder management has its challenges. When managing stakeholders in construction projects our practices can be directed towards meeting the expectation of those who have an interest towards, impact upon, or power over a given project during its life-cycle and of those who are affected by the project's deliverables (Bal et al., 2013). However, while a given company is attempting to satisfy the necessities of its stakeholders, new conflicts may emerge within the wider stakeholder community between different groups and their clashing interests (Crowther & Seifi, 2016). Companies may attempt to solve the situation by establishing hierarchical levels between stakeholders, but Crowther & Seifi (2016) note that the stakeholder groups with the most power do not necessarily have the most socially responsible goals. Often the final hierarchy is therefore determined by other goals of a given company and, as observed by Crowther & Seifi, the few stakeholders capable of threatening the attainment of economic goals for example can easily take precedence over other important stakeholders.

Following a widely accepted definition, all individuals, parties, or groups who have something at stake in a project are covered by the 'project stakeholder' term (Oswald et al., 2018). Furthermore, the proactive identification of opportunities and threats posed by stakeholders and interactions among them is accepted by many, including Oswald et al. (2018), as the purpose of effective stakeholder management. Oswald et al. (2018) also suggest that effective stakeholder management shapes and utilizes identified opportunities to benefit a given project. Worsley (2017, p. x) however takes issue with this traditionally taught view in project management concerning stakeholders, which indicates that stakeholders be treated as passive objects of strategic stakeholder management. She argues that the language commonly used in this field supports a fallacious perception of stakeholders as

*-- just another type of resource that can be coordinated, monitored, and placed appropriately on the project 'field of play'.*

Drawing a link from theory to practice, Worsley (2017) suggests that this is the way many technical projects are run. However, while this approach is common, essentially it is merely a certain type of communication coordination and is determined by Worsley (2017) to be insufficient and inappropriate for more complex projects.

Worsley (2017) notes that stakeholders should not be considered merely as those people and groups that are interacted with to deliver a given project. Instead, the success of a project is dependent upon how well we take into account the individuals and groups that impact upon and may be influenced by the project in the near and longer-term. Other scholars evidently share this view: Wu (2011) points out that an emphasis on a more proactive approach and a preference for stakeholder engagement over stakeholder management are emerging in stakeholder literature. Stakeholder engagement highlights the interactions between an organization and its stakeholders, resulting in a relationship – or partnership – with each stakeholder (Wu, 2011).

Bahadorestani et al. (2020) underline this distinction by dividing stakeholder research into two distinct camps: the traditional *management of stakeholders* and the emerging *management for stakeholders*. The first one perceives stakeholders as a resource that creates value for projects, and the rights and values of a given project are of the highest importance. Contrarily, the emerging camp of management for stakeholders emphasizes the rights and values of stakeholders and gives them a top priority.

## **2.4 Stakeholder engagement for sustainability**

Recognizing and interacting with stakeholders – in other words stakeholder engagement – has been acknowledged by many as an integral component in sustainability efforts. Focusing on the sustainability of construction projects, Bal et al. (2013) believe that engagement of stakeholders should be considered a core element in all plans that are aligned with sustainable development. They also suggest that long-term success is more likely to be achieved in a project when the expectations of the stakeholders are taken into consideration and steps are taken to meet stakeholder needs. Mirroring these views, Mathur et al. (2008) describe how many different kinds of positive outcomes can be traced to appropriately designed stakeholder engagement processes. Such outcomes include, for example, social learning and the capture of different forms of knowledge. According to Mathur et al. (2008) a dialogue with context-specific stakeholders can be viewed as a form of pursuing sustainability.

Construction projects come with a level of complexity owing to a wide variety of stakeholders and the sustainability agenda introduces into the

construction environment a host of additional stakeholders who possess high salience (Bal et al., 2013). According to Bal et al. (2013) whose argument conforms to general stakeholder engagement theory, successful engagement of these stakeholders entails analyzing their characteristics and classifying them according to their differing levels of interest, power, and attitude towards a given project. Following this logic, it is possible to discern which stakeholders have the highest salience through stakeholder analysis and bring them into the decision-making process.

Integrating the input of both internal and external stakeholders through engagement is not only linked to overall project success but according to Bahadorestani et al. (2020), it is also aligned with sustainable development goals on a more general level. However, the persistent assumption in stakeholder literature that stakeholder engagement is in and of itself always a responsible practice aligned with corporate responsibility (CR), is challenged by some scholars (see f.ex. Greenwood, 2007 and Collinge, 2020). Greenwood (2007) particularly takes issue with the traditional view that simplistic 'more is better' logic captures the complex relationship between CR and stakeholder engagement. He posits that stakeholder engagement is essentially a morally neutral activity, and as such, it should be viewed as related to, yet separate from, CR.

Greenwood (2007) notes that stakeholder engagement is present in several areas of organizational activity and is not confined to the domain of socially responsible activities of an organization. The distinction between moral stakeholder engagement and strategic stakeholder engagement is central to the model of stakeholder engagement formulated by Greenwood (2007) (see Figure 1).

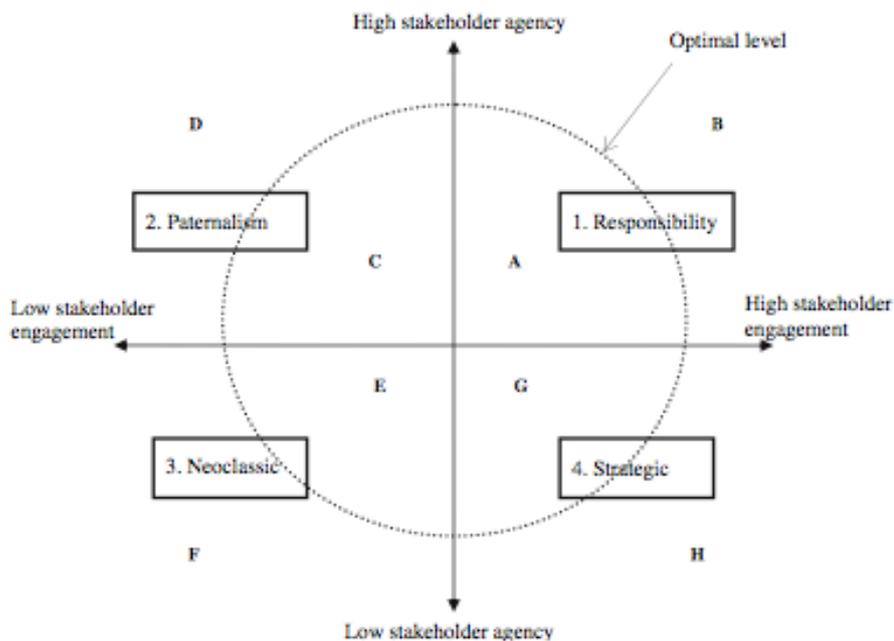


Figure 1 Greenwood's (2007) model of stakeholder engagement

This model represents the different approaches to stakeholder engagement with varying degrees of engagement and stakeholder agency. Stakeholder engagement is outlined by Greenwood (2007) as a process that entails consultation communication and dialogue as well as exchanges. When these activities occur frequently or the activities in themselves are of high quality, engagement is determined to be high, whereas low engagement entails the opposite. Stakeholder agency on the other hand represents the responsible treatment of stakeholders. Here, the level of agency depends upon the number and variety of stakeholder groups whose interests are considered by a given company.

The letter A within this model stands for 'responsibility', indicating a desirable state of comprehensive stakeholder engagement with an ideal level of engagement with an optimal number of stakeholders. Letter B on the other hand refers to a state of an excessive level of engagement with a suboptimal number of stakeholders, including illegitimate ones. This is labeled 'Anti-capitalism' by Greenwood (2007) since this approach will compromise the purpose of a company.

Building on Greenwood's (2007) model and applying it to the field of construction through a case study, Collinge (2020) notes that a drift towards the second (Paternalism) or third (Neoclassic) quadrant endangers corporate social responsibility (CSR) credentials of a given organization. In the context of construction projects, morally negative engagement is described by Collinge (2020) as an immoral practice where engagement is used as a deceptive control mechanism and presented falsely as a part of CR. Conversely, stakeholder engagement that results in a mutually beneficial relationship and enables cooperation is deemed by Collinge (2020) to be morally positive.

An ethical strategist perspective would be ideal for construction companies to assume while they are engaged in a project since it would allow the company to take into account both practical and conceptual stakeholder concerns in the project (Collinge, 2020). Effective stakeholder engagement has much to offer: according to Stewart and Hocking (2019), it allows an organization to uphold its social and environmental obligations while having positive impacts on profitability. Furthermore, it helps organizations to build resilience for the future. Stewart and Hocking (2019) note that an appropriate sustainable business framework is essential for effective engagement.

## 2.5 Wicked problems discourse

Organizations can be viewed as complex adaptive systems and the complications occurring within these systems as wicked problems. Vartiainen et al. (2013) explain that such organizations are complex, interactive, and they operate in a non-linear manner. Simultaneously, they are capable of adapting, learning, and developing. Vartiainen et al. (2013) argue that by examining such organizations and

the problems within them, we can obtain valuable insight into the workings of the world and learn more about organizational behavior.

Barnett et al. (2018) observe a tendency in sustainability management research to combine the environmental issues faced by a given organization under the umbrella of a single problem, for example, pollution, waste, or climate change. They argue that the complexity of sustainability is ignored by this approach and a systematic understanding regarding the interconnectedness of sustainability, organizational goals, and stakeholders is often lacking. The wicked problems discourse provides an alternate approach that delves directly into these issues.

The concept of wickedness first took hold in public policy planning and has since been applied successfully in various fields, from IT to public health. It is also beginning to gain footing in sustainability research and some (see f.ex. Yearworth, 2016) even characterize sustainability as a 'super-wicked' problem. Through an extensive review of literature on sustainability and wicked problems, Seager et al. (2012) determine that a fundamental conceptual link between sustainability and the typical characteristics of wicked problems can be attributed to Bryan G. Norton (2005). Norton (2005) has argued that sustainability problems typically exhibit all ten characteristics or 'rules' used originally by Rittel and Webber (1973: 161-166) to distinguish wicked problems, as shown in Table 1.

1. "There is no definitive formulation of a wicked problem"
2. "Wicked problems have no stopping rule"
3. "Solutions to wicked problems are not true-or-false, but good-or-bad"
4. "There is no immediate and no ultimate test of a solution to a wicked problem"
5. "Every solution to a wicked problem is a "one-shot operation"; because there is no opportunity to learn by trial-and-error, every attempt counts significantly"
6. "Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan"
7. "Every wicked problem is essentially unique"
8. "Every wicked problem can be considered to be a symptom of another problem"
9. "The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution"
10. "The planner has no right to be wrong".

Table 1 The list of characteristics that distinguish wicked problems.

The points introduced in Table 1 have been widely accepted as the standard of wickedness, yet many prefer to utilize a more recent, simplified set of six characteristics introduced by Jeff Conklin (2006: 8-9): (1) You don't understand the problem until you have developed a solution, (2) Wicked problems have no stopping rule, (3) Solutions to wicked problems are not right or wrong, (4) Every wicked problem is essentially unique and novel, (5) Every solution to a wicked problem is a "one-shot operation", and (6) Wicked problems have no given alternative solutions. Conklin (2006) notes that it is not necessary for a problem to possess all six characteristics in order to be characterized as wicked.

In his own words, Conklin (2006) attempted to simplify the concept without losing its essence, and arguably he has succeeded in doing so because his definition has since been widely utilized in wicked problem literature. Conklin (2006) argues that nowadays most projects exhibit a considerable wicked element. In fact, wicked elements are so widespread that people associated with such projects often accept the accompanying chaos and futility as inevitable. Conklin (2006) underlines the fact that a failure to recognize the wicked dynamics at play results in the application of ineffective methods and tools in the attempts to solve

a problem. Dentoni et al. (2018) are in agreement with Conklin in identifying the key implication of this dynamic with regard to stakeholders. This main argument introduced by Conklin (2006) and referenced by Dentoni et al. (2018) posits that it is not possible for any given stakeholder to independently respond to wicked problems in an effective manner. Thus, actions taken without a sense of collectiveness and cooperation are unlikely to be effective.

(1) Knowledge uncertainty	There is no definitive formulation of a wicked problem Every wicked problem is essentially unique Every wicked problem can be considered to be a symptom or a consequence of another problem Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions
(2) Value conflict	The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution The decision-makers have "no right to be wrong" Solutions to wicked problems are not true-or-false, but better-or-worse
(3) Dynamic complexity	Wicked problems have no stopping rule There is no immediate and no ultimate test of a solution to a wicked problem Every solution to a wicked problem is a "one-shot operation"

Table 2 Dentoni et al.'s (2018) three key categories related to wicked problems.

Dentoni et al. (2018) have reformulated the features (or dimensions) that distinguish wicked problems and further reduced them to three key categories (see table 2). The first one of these categories, knowledge uncertainty, is related to the formulation of a wicked problem and the incomplete information setting within which stakeholders have to make decisions in order to find potential solutions. The second group, value conflict, refers to the number of stakeholders affected by wicked problems and the variety of characteristics possessed by those stakeholders, including their differing views, interests, and values. These attributes can be diverging, opposing, or even clashing. The third and last group, dynamic complexity, has to do with the non-linear process of solving wicked problems.

It should be noted that not all sustainability-related issues are necessarily considered wicked when observed individually. Barnett et al. (2018) postulate that some sustainability problems, at least ones that can be traced to a specific source such as water pollution, can be solved simply by reducing activities with correlating negative impacts. They suggest that the 'tame' nature of such problems indicates that a solution can be conceived simply through the expertise of engineers or scientists. Recalling Jeff Conklin's (2006) notion that a problem doesn't need to exhibit each key characteristic in order to be considered wicked, the argument of Barnett et al. (2018) seems overly simplified. Even a seemingly tame problem like the reduction of water pollution comes with a number of

technical and monetary considerations in any given operation, not to mention the need to consider the temporal and spatial scope of such a problem or all the potential stakeholders' views on the matter in question.

Contrary to the views of Barnett et al. (2018), some researchers including Dijk et al. (2017), posit that sustainability issues manifest consistently as political or organizational problems, and solutions to such problems are not found through standard routines and instruments. This is perhaps indicative of a fundamental difference in the way sustainability issues are viewed by different people, which further underlines the need to carefully consider the socially constructed nature of such issues. As opposed to tame problems, problems with a wicked nature have an ambiguous, uncertain setting and they can evoke strongly conflicting views among stakeholders. Conflicting views occur with reference to both the origin and the solution to the wicked problem at hand, making them difficult, occasionally even impossible, to solve (Dentoni et al., 2018).

According to Colledge (2017), the creation of sustainable cities and the place-making involved constitutes a complex process. She notes that such processes can give rise to systemic, unintended development paths. Among these undesirable paths are poverty, social inequalities, and degradation of the environment, and Colledge (2017) recognizes all of these as persistent wicked problems prevalent in urban societies. She goes on to apply complex adaptive systems theory, and more specifically socio-technical and socio-ecological systems thinking, in the search for solutions to the challenge of urban sustainability.

Colledge's (2017) study concludes that while complex systems theories are capable of shedding light on the ways cities evolve, dimensions involved in the process as well as the ways by which development paths emerge, they are not able to explain fully why urban challenges and unsustainable practices are produced by the actions and involvement of individual people. This brings forth the crucial role of human agency in shaping urban sustainability. Moreover, it highlights the importance of understanding the myriad of worldviews, and frames of references that different actors, and even individuals, bring to the table, while also concretizing the consequences of this added complexity on sustainability efforts.

## 2.6 Fragmentation and coherence

Vartiainen et al (2013) examine wicked problems through the concept of fragmentation and its opposite counterpart, collective intelligence (sometimes labeled coherence). Their stance is that fragmentation reflects the complexity of organizational settings and processes, while collective intelligence has the potential to reduce it. In practice, collective intelligence entails all the creativity and knowledge that a group can harness and utilize when dealing with a wicked problem. This has to do with voicing different opinions and viewpoints, which are then developed further together, finally forming collective intelligence.

Vartiainen et al. (2013) note that collective intelligence arises naturally when individuals within the group have a shared understanding regarding the nature and scope of the problem at hand.

Conversely, fragmentation – the opposite of coherence and unity – occurs when people interpret the nature of the problem differently from one another, and fragmentation naturally reduces collective intelligence and coherence in the process of problem-solving. It ensues in conditions where the people involved feel separate rather than united, and where information and knowledge related to a problem become scattered (Conklin, 2006). According to Vartiainen et al. (2013), fragmentation is a typical state connected to complex phenomena, and it can be used to characterize organizational change.

Given that fragmentation can be understood as a situation where individuals are not united but see themselves more as separate, knowledge and information becomes scattered or even chaotic as a result (Conklin 2006). Conklin (2006) uses an example familiar to many: a situation where all stakeholders in a project firmly believe that their interpretation of the problem is correct. This example supports his observation that sometimes fragmentation is hidden in the sense that stakeholders do not realize how incompatible their perspectives, understandings, and intentions are. In such cases, stakeholders operate under the assumption that their understanding of a given problem is complete and shared by all others. Considering the sustainability of a complex project, hidden fragmentation is perhaps more harmful given that identifying the sources of general complexity, wickedness, and specific uncertainties is the first step in the path towards a solution.

According to Conklin (2006), there are two major forces that complicate most projects by causing fragmentation: problem wickedness and social complexity. These forces make collaboration difficult or impossible, and they challenge collective intelligence. Conklin (2006) sees social complexity as a distinct force, apart from wicked dynamics, and it has to do with the number and diversity of actors involved in a given project. Both of these forces cause fragmentation and social complexity, in particular, can cause great difficulties with effective communication.

Mirroring Conklin's (2006) views on social complexity, Oswald et al. (2018) describe how stakeholders, in and of themselves, can act as a source of complexity due to their varying personalities, interests, and spheres of influence. Individual stakeholders' qualities such as motives, or belief systems need to be taken into account, as do the underlying organizations with their processes, structures, and cultural elements because these can all further increase complexity (Oswald et al., 2018).

Conklin (2006) also introduces a third fragmenting force, technical complexity, which he describes as the most well-recognized force given that it has been observed to raise the risk of project failure. Essentially, it has to do with the number of different technologies related to a given project and with the vast amount of possible interactions between such technologies. However, Conklin (2006) prefers to focus more on the aforementioned problem wickedness and

social complexity because technical complexity has long since gained a strong presence in academic literature and there is an abundance of available tools and methods to deal with it. Moreover, technical complexity alone is not necessarily indicative of a wicked problem and according to Conklin (2006), some tame problems may, in fact, be technically very complex.

Problem wickedness has been identified as one of the major fragmenting forces. Though an introduction to wicked dynamics was given in the previous chapter (2.5) a few key points should be recounted here. First, wickedness is linked to the interconnectedness of different factors within a pluralistic context, which according to Dijk et al. (2017) means that attempts to solve wicked problems merit different types of expertise. Second, any attempt to tame a wicked problem can exacerbate it or lead to a situation where the problem simply morphs slightly (Colledge, 2017). Finally, there is a consensus among scholars that the foremost step in dealing with such problems is recognizing its wicked nature (Conklin, 2006).

## 2.7 Methods for coping with wicked dynamics

Once the wickedness of a given problem has been recognized, attention turns towards available methods and tools for coping with it. Unlike with technical complexity, the amount of research on dealing with wickedness is somewhat limited. Many scholars have recognized the need to boost coherence and collective intelligence, yet the actual methods and tools by which it can be achieved have not been explored thoroughly. Vartiainen et al. (2013) have however researched some existing methods and established a couple of new ones as well. They divide these methods into four broad categories, the first of which is *Methods for recognizing complexity*, such as dialogue mapping, which has also been advocated by Jeff Conklin. The second category *Methods for managing change*, includes methods such as networking or Appreciative Inquiry (AI), while the third category, *Participatory methods*, encompasses methods from a citizens' jury to participatory budgeting. The last category, *Supportive methods for management*, includes for example consultation and mentoring.

The second category, participatory methods, is particularly interesting in the context of this study. Among these methods, Vartiainen et al. (2013) name citizens' jury (kansalaisraati), organizational jury, deliberative polling, World Café -method, and participatory budgeting. They introduce organizational jury as a novel deliberative democracy-based method used for coping with wicked problems through deliberative conversations among internal and external stakeholders. It is a modified version of the better-known citizens' jury designed for a hectic organizational environment, but it still requires a sufficient amount of time and human resources for deliberations.

The World Café -method on the other hand is presented as a cost-efficient participatory method of high quality. It can be used to deepen a group's

understanding of an issue and to build consensus, when a more thorough, time-consuming method, such as a citizens' jury is not applicable. The participants of a World Café converse in small groups and move from one table to another at intervals. Traditionally, one person stays behind to act as a host for the next group and to recap the earlier conversation. With each new group building upon the ideas of the previous group, the conversations are enriched throughout the exercise and collective intelligence is harnessed (Vartianen et al., 2013).

## 2.8 Uncertainties in SCBE

Goel (2019) has assessed sustainability in the context of construction and its product the built environment through the wicked problem framework. By undertaking a qualitative text analysis of existing literature in the field, he has formulated the concept of SCBE (Sustainability in Construction and Built Environment) supported by six categories of uncertainties. His study indicates that the recognized uncertainties in SCBE comply with the wicked problem criteria introduced by Rittel and Webber (1973), allowing for SCBE to be categorized as a wicked problem. The concepts formulated by Goel (2019) bring the wicked problem discourse directly within the field of urban development, and they provide a sound basis for this study.

Goel (2019) identifies six distinct categories of uncertainties underlying the concept of sustainability in construction and the built environment. The first, temporal uncertainty, poses the question of how far into the future the planners of the built environment should look to ensure its sustainability. The second category, spatial uncertainty, has to do with how widely the spatial impact of the construction industry and built environment should be considered. The third, stakeholder uncertainty, is framed by the question of which stakeholders' interests should be considered.

The last three categories pose the following questions: what is the responsibility of sustainable construction industry and built environment towards the society (societal uncertainty), how many different dimensions (economic, environmental, social) are included within the concept of sustainability in construction and built environment (dimensional uncertainty), and lastly, how can the sustainability of construction industry and built environment be assessed (assessment uncertainty). These uncertainties amount to the highly complex setting identified by Goel (2019) as the wicked problem of sustainability in construction and built environment (SCBE).

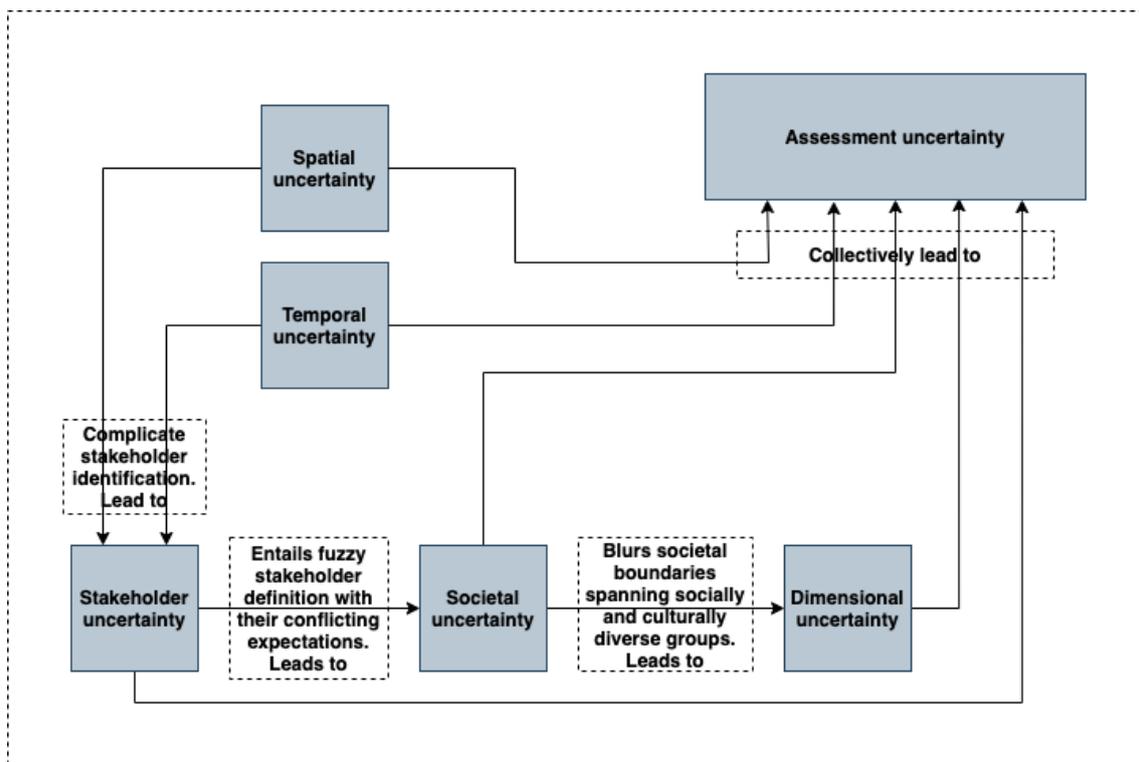


Figure 2 Concept map of the interconnected uncertainties related to sustainability in construction and built environment (Modified by the author from Goel, 2019).

Figure 2 presents a concept map of the six categories of uncertainties and their interconnectedness. Stakeholder uncertainty occupies an interesting position in Goel's (2019) concept map: he theorizes that stakeholder uncertainty is fueled by spatial and temporal uncertainties, and the resulting fuzzy stakeholder definition, in turn, leads to societal uncertainty and further on to dimensional uncertainty. Goel (2019) posits that all of these categories of uncertainty result in what he calls the socially constructed nature of SCBE, collectively contributing to assessment uncertainty in the absence of objective assessment criteria. The instrumental position of stakeholder uncertainty resonates with the previously recounted observations of Conklin (2006) and Oswald et al. (2018): they all emphasize the pronounced role of stakeholders, their characteristics, and interactions as a source of complexity.

The task of mapping out stakeholders to be considered in the framework of SCBE is recognized by Goel (2019) as a formidable challenge, and he emphasizes that this task gets increasingly complex particularly due to the international expansion of supply chains of construction projects. According to Goel (2019), stakeholder identification is always questionable as a result of the uncertainties related to establishing temporal and spatial boundaries for the sustainability of construction projects. Hence, when a definitive identification remains elusive, the social obligations of the industry towards both stakeholders and society as a whole are riddled with uncertainty.

With regard to assessment uncertainty, Goel (2019) criticizes some of the existing methods of sustainability assessments. He finds that many assessment systems are incapable of dealing with uncertainties related to sustainable construction and the built environment. Moreover, he points out that such systems exhibit a general lack of a comprehensive approach. Finally, Goel (2019) argues that the assessment of SCBE is made particularly difficult by its value-laden and socially constructed nature. This would suggest a need for a holistic method of sustainability assessment.

## 2.9 Formulating a conceptual framework

The stakeholder engagement approach assumed in this study as well as a limited focus on complex urban development project setting help in positioning this study within the wider field of wicked problem research. It is evident from the review of literature that the wicked problem of sustainability in the context of complex urban development projects cannot be dealt with without the involvement of multiple stakeholders. However, questions remain concerning the roots of fragmentation in the selected context and the ideal ways of fostering coherence among stakeholders.

As stated, it is clear that wicked problems require collaboration among a host of actors due to their socially constructed nature. From the point of view of a project-based construction company operating within the field of urban development and dealing with the wicked problem of sustainability incorporation, this solidifies the need to understand stakeholder networks. Project success with regard to sustainability seems to be linked with the ability to recognize and prioritize stakeholder concerns and to facilitate effective stakeholder engagement. While the main focus here is on improving sustainability management, the positive impacts on profitability and resilience identified in prior research are also worth noting.

The concepts of fragmentation and coherence are integral to wicked problems. While the concept of fragmentation is often conceptualized in terms of social and technical complexity as well as wicked dynamics, its counterpart coherence remains more ambiguous. This study attempts to fill a part of the identified gap by examining what can be done to counteract fragmenting forces. It is conceivable that coherence goes hand in hand with effective stakeholder engagement, but additional information and insight are required to determine what constitutes effective engagement and what kinds of strategies should be utilized to complement it in order to achieve the desired state of coherence.

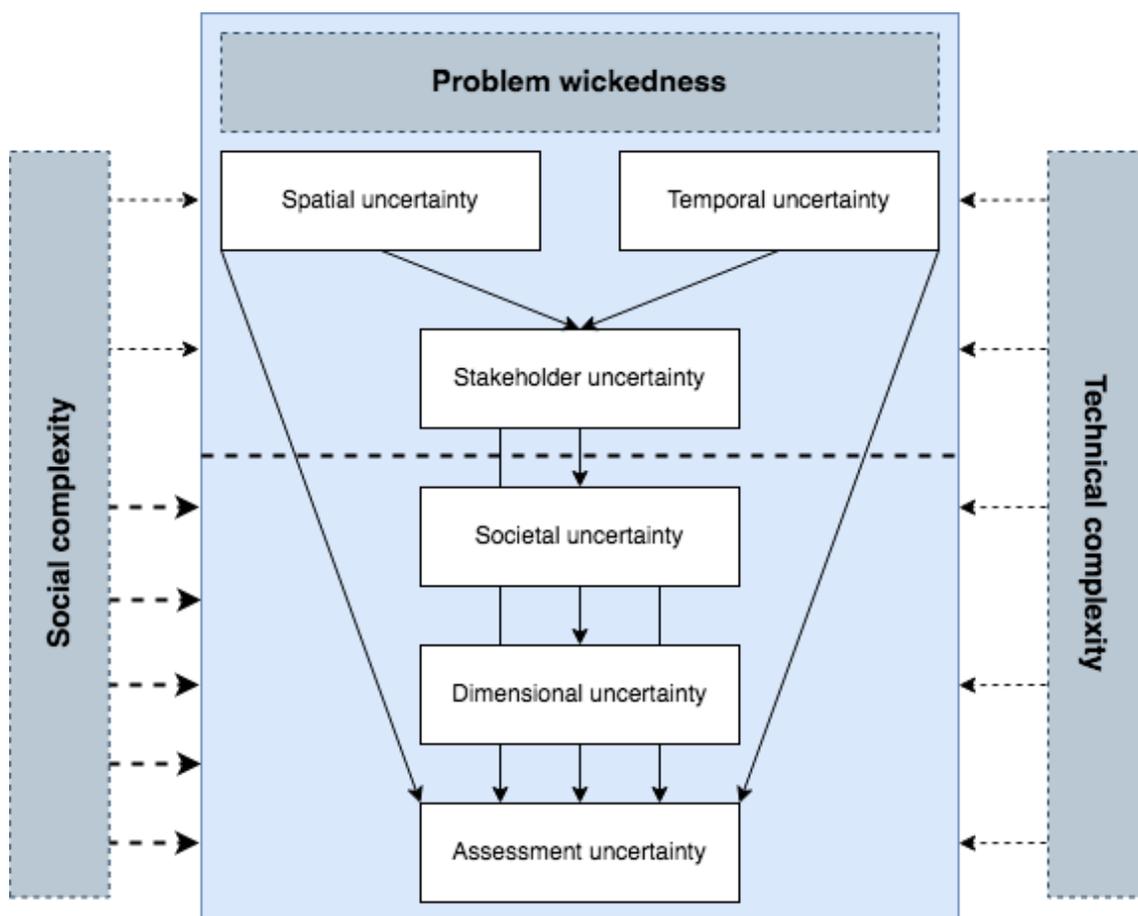


Figure 3 Wicked dynamics affecting sustainability in complex urban development projects.

A conceptual framework structured around Goel's (2019) six categories of uncertainty is utilized in this study to explore the dichotomy between fragmentation and coherence. These interlinked uncertainties were chosen as a starting point for the data collection because they were deemed particularly suitable for examining problem wickedness within the realm of urban development, and the wicked dynamics affecting sustainability in a complex urban development project setting as illustrated in Figure 3.

This figure also highlights the central role of stakeholder uncertainty: in order to deal with this particular uncertainty, we need to have an understanding of both temporal and spatial considerations related to SCBE, and an understanding of the network of stakeholders is required in order to address the 'downstream' uncertainties related to societal and dimensional uncertainties. Assessment uncertainty differs from the others in that all the other ones are directly related to it, indicating that in order to achieve a holistic perspective on sustainability assessment we first need to deal with all other uncertainties.

This study proposes that there is a notable distinction between what might be labeled 'upstream uncertainties' and 'downstream uncertainties' in the context of complex urban development projects, and this distinction affects the way

these uncertainties ought to be addressed. The first three categories among the interconnected uncertainties related to sustainability in construction and the built environment have to do with the core of a given project, meaning that the competence to address temporal and spatial uncertainties, as well as the capability to identify relevant stakeholders, should lie within the project team.

Contrarily, the remaining 'downstream uncertainties' cannot be addressed without engaging with other actors, namely the relevant stakeholders identified when addressing stakeholder uncertainty. This distinction is indicated by the dashed line between stakeholder uncertainty and societal uncertainty in Figure 3. It marks the phase in which external stakeholders are added to the mix, which also amplifies social complexity, as shown in the figure. Given that the focus of this case study is on the development phase of a complex urban development project, many key stakeholders with regard to sustainability still remain unknown at this junction. Therefore, it seems appropriate to focus on addressing the first three 'upstream' uncertainty categories in the context of the case project, Trigoni, with the aid of the project's internal stakeholders. The 'downstream' uncertainties are explored through the data gathered from interviews with expert stakeholders.

### 3 DATA AND METHODOLOGY

This chapter provides an outline of the methodology utilized in this study, beginning with a description of the overall research design. This description includes a detailed account of the data collection process carried out during the study, which is then followed by a section devoted to a detailed account of the chosen methods of data analysis.

#### 3.1 Research approach and data collection

This qualitative study explores the complexity of sustainability-incorporation in complex urban development projects through an approach that includes a review of relevant literature and a two-part empirical section that is based on a case study. The empirical data for this study was gathered through interviews and a World Café workshop in a single case study context. Interviews were conducted with prominent expert stakeholders specific to the case study context. The organizations represented by the individual interviewees were recognized as particularly interesting with regard to the design phase of a complex urban development project. Interviewees were sought based on their involvement with sustainability and urban development as well as relevance to the case study context. Most interviews were conducted as one-on-one interviews. The only exception was Helsinki Region Environmental Services (HSY) from which two expert stakeholders were available for an interview. Each of them represented different sections of the organization in question and were able to offer diverse insight from their respective points of view.

The search for interviewees began in December of 2019, and all interviewees were given a general description of the study including the major themes present in the interview questions and background information about the main concepts. The interviews were all conducted in January of 2020 at the interviewees' convenience at their respective offices. The length of interviews ranged from 35 to 55 minutes and permission to record the conversations was obtained from all participants. These meetings began with a short description of the project in question and a recap of the main themes and concepts of the research.

Subsequently, interviewees were asked questions in three general categories. First, they were presented with general questions about their respective organizations and their own roles within said organizations, as well as more specific questions regarding sustainability management and stakeholder management in their organizations. Second, they were introduced to the six categories of uncertainties and their insights were gathered with regard to each of the six questions originally posed by Goel (2019). Last, the interviewees were consulted on how similar or different views other stakeholders involved with urban

development may have to the uncertainty questions, how important it is that those answers be similar to a degree, and in the case that they differ greatly, what could or should be done to approach a consensus among relevant stakeholders.

Organization:	Role of interviewee:	Description of organization	Date of interview:
City of Helsinki	Project Director, Development of Pasila	An administrative unit at the local level and project host for the case project Trigoni.	10.1.2020
Helsinki Region Environmental Services (HSY)	Climate Specialist	A provider of municipal water supply, waste management services, and environmental information for the Helsinki metropolitan area.	16.1.2020
	Project Manager		
Finnish Green Building Council (FIGBC)	Senior Sustainability Specialist	A non-profit association supporting and boosting sustainable development in the construction sector, and a part of the international Green Building Council network.	21.1.2020
YIT Oyj	Sustainability Manager	The largest Finnish construction company, and the project owner in the case project Trigoni.	22.1.2020
Helsinki Region Transport (HSL)	Director of Transport and Research Department	An inter-municipal authority responsible for the public transportation network of nine municipalities within the Helsinki metropolitan area.	27.1.2020
Helen Ltd	Corporate Responsibility Manager	One of the largest energy groups in Finland, owned by the City of Helsinki.	28.1.2020

Table 3 The Interviewees' respective organizations, roles, and dates of interviews.

The second data collection method, a World Café type workshop, was directed at gathering the insight of internal stakeholders of the case project, Trigoni. According to Eriksson and Kovalainen (2008), the uniqueness of a case is a key issue of research interest rather than a problem. Following this logic, the appropriateness of the case study approach in this study is justified by the exceptional scope and location of the construction project under analysis: the Trigoni project, a hybrid high-rise block, consists of a pedestal structure and several tower buildings, one of which would be the tallest residential building in Finland thus far. It is located in the very heart of Helsinki, in Central Pasila, with exceptional travel connections both on both local and national scales.

The workshop was organized as a part of a weekly cooperative Big Room meeting (12.3.2020) held at the project office. These meetings are attended by contractual internal stakeholders, namely representatives of all major organizations

involved in the design phase of the project, including architects, designers, and consultants with a wide range of specializations. Most project owners also attend these meetings, including representatives of top management, middle management, and workers. Project owners and contractual internal stakeholders alike were present in the World Café exercise, and no division was made between the two groups. The World Café method was chosen for the workshop based on the interview data and the recommendations of Vartiainen et al. (2013), who recognize it as an appropriate method for dealing with wicked problems since it helps in harnessing collective intelligence. Moreover, it was deemed suitable for a Big Room meeting where time is somewhat limited and the body of attendees is numerous and heterogeneous.

The objective of this exercise was to gather detailed answers specifically regarding temporal, spatial, and stakeholder uncertainties. As described in Chapter 2.9, these uncertainties can be addressed by the project team without engaging external stakeholders. Furthermore, the project team ought to possess a high enough level of understanding about the temporal and spatial impacts of the project to address these issues. It is posited here that the remaining three uncertainties require the involvement of additional stakeholders alongside project owners and contractual internal stakeholders. Societal uncertainty can only be addressed after relevant stakeholders have been identified and consequently, dimensional uncertainty can be addressed after the responsibility of SCBE towards the society has been determined. Assessment uncertainty differs somewhat, given that it is affected by all other uncertainties, indicating that any answers formulated without an understanding of the previous categories of uncertainty would be incomplete.

Despite the fact that the interests of this study were heavily focused on the first three categories of uncertainty, the final amount of uncertainty questions presented during the World Café workshop was determined by the number of participants at that day's Big Room meeting. This was done in order to optimize group sizes and ensure that there was no need for participants to wait around for their turn. The eventual number of categories presented was five, and while the results of only three categories are discussed in this study, this allowed participants to get a better sense of the theoretical framework and emerge themselves in the topic. Societal uncertainty was left out for two reasons; the number of attendees and subsequent dividing into groups was more effective with five questions and groups, and the societal uncertainty question was observed to be the most difficult one to analyze with a very limited amount of time. Answering this question is heavily dependent upon the identification of stakeholders, which makes it difficult to address this category as a stand-alone question.

The exercise began with a presentation of the key points of this study, its aims, main themes, and concepts. Then attendees were presented with the uncertainty questions and asked to write answers to five of the questions. Attendees were encouraged to write on the sticky notes an answer 'off the top of their heads' or to write their first thoughts. Prior to the exercise, five individuals (all project owners) were recruited as moderators and each was given responsibility for

supporting the groups as they moved from one question to another. All five moderators were assigned a whiteboard, each of which represented one of the five uncertainties. After all of the attendees had brought their respective sticky notes to each board, they were divided into five groups. Subsequently, each group was directed to occupy one of the five boards, and, with the help of that board's moderator, they began going through the many sticky note answers on that particular board and formulating their group's answer.

The time allotted for each group was about 6 minutes and towards the end of that time, the groups were encouraged to formulate their own answer to the uncertainty question that they were discussing based on the sticky note answers and guiding questions presented by their moderator. The moderators wrote that answer down on a larger sticky note while the groups switched to the next board. Subsequently, moderators were asked to present the board to a new group and recap the conversation and the final answer of the first group and then continue the discussion with the new group. This part of the exercise also took about 6 minutes, it was concluded in a similar way as the first part and repeated once more. As the fourth group arrived at each board, moderators recounted the earlier conversations and presented the answers on their boards. With the aid of all the sticky note answers and the three previous groups' answers, they again carried on the conversation. This last part was given more time and after about 7 minutes, the groups were asked to give their final answer to the moderators.

Finally, attendees took their seats, and moderators in their turn presented all the answers they had gotten for their respective boards and described the four-part conversation that had taken place. These presentations were recorded and, along with the filled-out boards and observations made during the exercise, they provided the second body of data for this research.

### **3.2 Data analysis**

A theory-led thematic analysis was chosen in order to best fulfill the aims of this study. A theory-led analysis makes use of existing theory, but the analysis itself is not solely based on identified theories. As Tuomi & Sarajärvi (2018) explain, the units of analysis arise from the data while existing theoretical knowledge provides assistance for the selection process. While the influence of prior knowledge is evident in a theory-led analysis, the objective is not to test existing theories but rather to open up new lines of thought.

This means that a theory-led approach allows for the analysis to first focus heavily on the data itself and later on to bring elements from the existing theoretical knowledge-base to guide the analysis process. Tuomi & Sarajärvi (2018) note that the objective is to combine existing theoretical models and novel insight arising from the data set. In this study, the specific theoretical lens of wicked problem discourse is brought to a case study context. As a result, the analysis carried out here is influenced by existing models presented in the theoretical

framework and summarized in Chapter 2.9. Yet, the analysis also combines novel observations that are made based on the data set, which are then utilized to augment existing models and to open up new avenues of inquiry.

The data obtained through interviews and the World Café -workshop was processed separately, allowing for juxtaposition and discrete interpretation. This was deemed appropriate, given that the workshop was used as a second data collection method in order to validate some of the key findings from the first data collection phase and observations from the theoretical framework. The interview data was subjected to a thematic analysis. As Lapadat (2012) explains it, thematic analysis is not tied to any given research method but is utilized in varying fields and across disciplines. Therefore, it appears to be an appropriate approach for this cross-disciplinary case study.

One key feature that separates a thematic analysis from a content analysis is the way in which the analysis is organized and presented (Tuomi & Sarajärvi, 2018). While a content analysis utilizes tables for describing categories and sub-categories, a thematic analysis begins with the recognition of guiding ideas around which a thematic mind-map is built. Tuomi and Sarajärvi (2018) also describe the process of thematic development where these maps are used to bore down on the meaningful aspects of the data. Here, the maps will get progressively more concise as the key findings start to emerge.

On a related note, thematic analysis should not be viewed as a distinct research method but rather as an analytic approach and a strategy for synthesizing according to Lapadat (2012). She argues that as such thematic analysis consists of the identification of themes or patterns that have particular meaning and the subsequent coding and classifying of information based on the identified themes. As a result, the thematic structures arising from the data can be interpreted by looking for similarities, patterns, or interdependencies. According to Lapadat, it is also possible to find theoretical constructs and explanatory principles through thematic analysis.

If we look at thematic analysis as a process of sensemaking, it can be utilized to reduce the amount of research data while retaining the original context (Lapadat, 2012). Moreover, it allows for the researcher to immerse themselves in the data and to focus on interpretations through organization and summarization. Similar to the coding process of content analysis, coding is also carried out during thematic analysis in order to discover recurring themes as well as more general topics or relationships between them (Lapadat, 2012).

During the initial coding, the focus is upon separating parts of the data set and labeling – that is to say coding – these parts so as to allow for them to be examined, reorganized, and interpreted as the analysis progresses. Ayres (2012) also adds that coding categories typically change during the analysis process as they are subjected to re-evaluation in the search for alternative interpretations. She states that codes may be derived from the review of literature – as is the case with some of the codes in this study – or even from a researcher's own professional experience. Furthermore, thematic coding is an essential strategy for segmenting and categorizing data in a thematic analysis. However, Ayres (2012) also

points out that in the case of a thematic analysis, the process of analyzing and managing data does not occur in a linear manner. While the process moves from coding towards the generation and refining of eventual themes, they should not be viewed as separate steps taking place one after the other.

Given the somewhat fluid nature of this process, Ayres (2012) notes that difficulties often ensue when trying to identify a specific point where thematic coding shifts to thematic analysis. The relevance of each identified theme is evaluated with reference to the chosen research questions and to the data set as a whole throughout the process of analysis. This, according to Ayres (2012), keeps the continuously developing analysis integrated. The goal of thematic coding is naturally to facilitate the development and mapping of themes. Lapadat (2012) also describes this process that usually begins with establishing codes for passages of data that have certain similarities and continues on through categorization towards theory-building. On the same note, Ayres (2012) argues that the segmentation and reconstruction of data associated with this process allow the researcher to grasp the important concepts arising from the data.

Ayres (2012) argues that the theory-building process often begins with an initial list of known or expected themes. Furthermore, the utilization of semi-structured interviews as a primary data collection method means that certain themes can be expected to arise from data, simply because they have been introduced in the interviews by the researcher. Similarly, Lapadat (2012) states that themes can be identified based on existing theoretical models that are of particular interest to the researcher.

In this study, the coding and analysis processes overlapped, as is typical for thematic analysis. The coding began with a thorough examination of all of the transcribed data, and potential codes began to emerge almost immediately. Initially, these codes were numerous and heterogenous but as the data was examined and re-examined many times, it was relatively easy to start combining similar codes and formulating categories.

After settling on around 20 potential themes, a cross-examination of existing theoretical models took place. This made it easier to synthesize the data and it also helped focus on the meaningful aspects of the data with reference to the chosen research questions. Having established the guiding ideas around which thematic mind-maps could be constructed, a process of producing progressively more concise maps began. The resulting thematic mind-map is depicted in Figure 4 and it features a total of 10 themes arranged around the guiding ideas: fragmenting forces, ineffective strategies, and coherence. These three theory-derived categories were utilized during the thematic analysis process as a frame of reference.

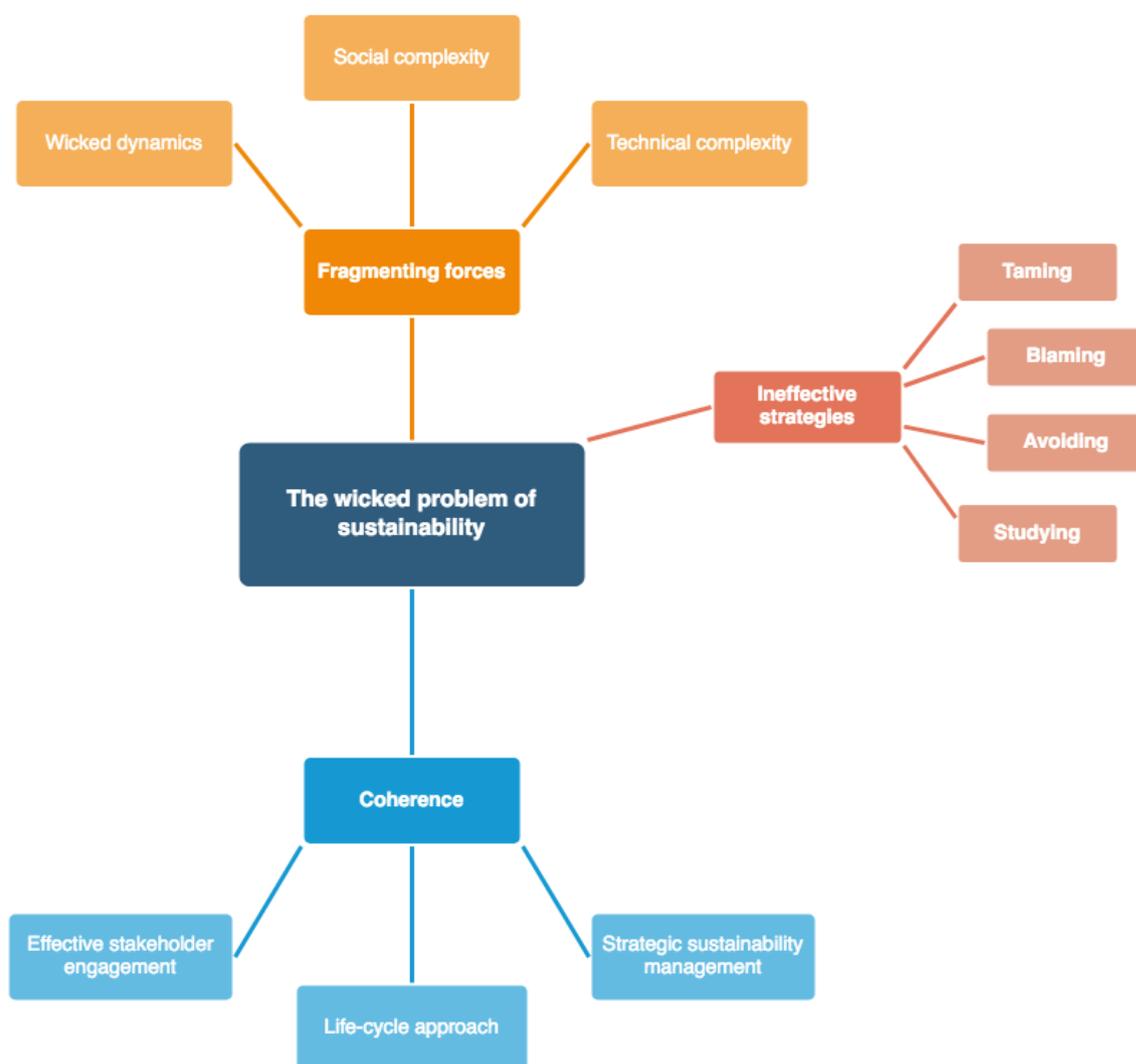


Figure 4 The resulting thematic mind-map

Initially, there was a total of eight themes just within the Coherence category but as the coding process went on and the data was analyzed further, it became evident that many of the themes were at least partly overlapping. Finally, three broad themes related to coherence were formed after some adjustments to the coding frame. This was to be expected, given that coherence remained more ambiguous as compared to fragmentation after the review of literature. The thematic codes pertaining to fragmenting forces identified within the data set fell easily under the three themes (wicked dynamics, social complexity, and technical complexity) that were found to be prominent within the wicked problems discourse.

Ineffective strategies on the other hand presented more challenges as they were not part of the initial coding frame and only emerged as it became evident that while interviewees described useful, beneficial strategies, they also kept referring to strategies that they had found counterproductive, detrimental, or simply ineffective in their experience. Additionally, the themes of Studying and

Avoiding were originally combined together, and only after reconsideration, a distinction was made between the two due to the fundamental difference behind these strategies. Studying was observed to be a common strategy that prevails owing to the discomfort felt by many in the face of complex problems and the preference to find out as much as possible before choosing a course of action. Conversely, Avoiding refers to a strategy involving deliberate inactivity, which is particularly problematic when we consider the urgent need to address sustainability issues in the context of urban development.

To conclude, the end result of thematic analysis is a description of the underlying patterns and relationships identified within the data set (Ayres, 2012). According to Ayres (2012), the result is not just a list of themes and related descriptions, but a collection of relevant concepts and processes that have been identified. It should also include the depiction of patterns related to the identified concepts and processes. The findings of this study, including the identified network of themes and the ways in which they are connected, are described in detail in the following section.

## 4 RESEARCH FINDINGS AND DISCUSSION

Key findings from the previously described thematic analysis of interview data and World Café data are presented in this chapter. The findings are organized with reference to the research questions, beginning with fragmenting forces (Chapter 4.2) and continuing with findings related to coping with those forces – namely coherence (Chapter 4.3). Regarding the fragmenting forces, findings related to social and technical complexity arose primarily from the interview data while problem wickedness was addressed in both the interviews and in the World Café exercise. Data related to coherence on the other hand was mainly acquired through the interviews and subsequently utilized in the World Café workshop exercise. Key findings arising from the workshop are presented in chapter 4.4. Before delving into these findings, the case project is first introduced in more detail in order to provide a concrete context for them.

### 4.1 Introduction to the case project

The area of Pasila, Helsinki is undergoing a significant transformation, and its largest development projects, including a high-rise tower area, Ratapihakorttelit –development, and Mall of Tripla, the largest mall in the Nordic countries, are situated in Central-Pasila (Uutta Helsinkiä, 2019a). The city of Helsinki envisions Central-Pasila as a second center for the entire city that is going to unite Pasila's Western and Eastern halves and provide services for a large target area. YIT, Finland's largest construction company, was elected as the winner of the Helsinki High-rise international design-build competition. Subsequently, the development of Trigoni, a hybrid block consisting of several tower buildings and a pedestal structure, began. According to the competition proposal, Trigoni will eventually comprise of multiple tower buildings shaped as equilateral triangles and it will become a recognizable landmark of the city of Helsinki. The contract for the first stage of the project was signed and the purchase of the land area was completed in February of 2019 between YIT, the city of Helsinki, and Senate Properties.

Altogether, the tower area consists of nine tower buildings spread over three lots. The core of the Trigoni proposition is the pedestal structure and five towers in the West Area. According to the initial plans, the tallest of these towers will be around 180 meters tall, hosting a hotel, a panoramic attraction, and restaurants as well as apartments. The second tower will be around 140 meters tall and it will include office spaces and apartments. There will be commercial space, brick-and-mortar businesses, and parking spaces within the pedestal structure. It is estimated that this first area will create 500 apartments, 300 hotel rooms and employ around 1000 people. YIT and Helsinki are collaborating on the city plan

together for the entire West Area with the Trigoni competition proposal as a basis (Uutta Helsinkiä, 2019b).



Figure 5 The core of the Trigoni -proposition consists of a pedestal structure and several tower buildings (Picture: YIT, 2020)

The Trigoni project is in many ways particularly complex and therefore compatible with the core premise of this thesis and suitable as a point of analysis. The Finnish construction business still lacks experience with tower buildings, and given that one of the Trigoni towers will be the tallest residential building in Finland, we are operating in uncharted territory. What is more, the shape of the tower buildings, namely equilateral triangle, remains a relatively novel one, even on a global scale. This combined with the objective to build a multi-functional hybrid block, a range of design principles set during the Helsinki High-rise competition, as well as strict safety and quality regulations characteristic to such project all amount to a highly complex setting.

The project in question exemplifies the multilayered and many-faceted nature of urban development. The project organization brings together a host of actors alongside the main contractor. These include but are not limited to several architectural organizations, engineering organizations from various fields such as HVAC, electrical and structural engineering, and a number of consultants with a wide range of specialties, for example, fire safety or commercial design. Objectives related to sustainability are set by the Helsinki High-rise international design-build competition, not to mention by YIT and the project team itself, as well as the City of Helsinki. If we consider the development of Central-Pasila as a whole and the entire life-cycle of the Trigoni development, a host of additional actors are added to this equation. Exceptional travel connection by public transport, the availability of services within walking distance, and high building density provide a good starting point. Yet, the safety and design standards related to tall buildings are linked with high material-intensity and energy-intensity during the construction phase.

## 4.2 Fragmenting forces

Problem wickedness, together with social and technical complexity, contributes to a condition called fragmentation, which according to Conklin (2006) has significant impacts on individuals as well as organizations. He proposes that this type of chronic organizational pain is often taken for granted, meaning that it is viewed as a normal, inevitable state. This is counterproductive in order to tackle fragmentation it needs to be recognized and understood. Conklin (2006) suggests that the difficulties in recognizing fragmentation begin with the fact that it is so deeply rooted in both the culture of project work and in the everyday practices associated with projects.

While interviewing the many expert stakeholders that agreed to take part in this study, it became evident that fragmentation is very much an integral part of sustainability-related work and urban development in general. Examples of what may be considered fragmenting forces came up in all interviews and the ways in which they were viewed and described by interviewees varied considerably. As is usual, fragmentation is viewed in some cases as a normal, inevitable state, and related forces are merely mentioned as a side note. Conversely, some interviewees brought up a particular fragmenting force as a point of analysis and had clearly recognized its significance in shaping the sustainable urban development field of play.

### 4.2.1 Social complexity

The multitude of actors in sustainable urban development came up frequently in the interview data. Several interviewees had taken part in some sort of stakeholder analysis in their respective organizations and could attest to a wide

network of stakeholders within the field. Many of the interviewees occupied roles where they frequently participate in collaborative work with representatives of other organizations, and there were different experiences as to how smooth the collaboration typically is when it comes to sustainability issues.

Alongside the multitude of actors, interviewees also spoke of the power struggle between the different actors, usually organizations, wherein they assume distinct roles depending on the issue and situation at hand. These roles may be hierarchical and they may change as time goes on. Organizations tend to act according to their own strategic objectives and the degree to which they can bend from their original stance often varies depending on what is at stake.

On the other hand, many interviewees also suggested that individual points of view might play an even greater role in these interactions as compared to views held by the organizations represented by these people. Interviewees recounted conflicts related to both of these themes: occasionally organizations are so set in their views that consensus becomes very difficult to find, while other times difficulties in collaboration can be brought on by clashing personal chemistries. It seems that often individuals are unable to assume the voice of their respective organizations and instead will approach issues from the premise of their personal experience and worldview.

This was evident also in the way that some interviewees wanted to clarify their own answers by stating that they were unable to answer a certain question from the organization's viewpoint and preferred to give their own opinion or that of their team within the wider organization. This could also indicate that many organizations have not established their official stance with regard to a given sustainability issue or that employees feel more comfortable with addressing sustainability issues from the point of view of their own day-to-day work. A majority of experiences shared by interviewees were clearly linked to the power struggle between organizations, with differences in organizational cultures appearing most often in the data as a source of conflict and differences in personal chemistries being cited in only two cases. According to the interviewees' experience, problems can occur even in situations where different actors clearly share a common goal, and the main problems come with establishing a fruitful environment for collaboration.

Social complexity is not limited to collaboration between organizations but arises also within the context of a single organization. Many interviewees alluded to a condition that might be labeled as 'organizational complexity'. Here, it is often difficult to discern what is unavoidable and 'normal' from what is treatable with appropriate tools and strategies. The interview data suggest that in very large and multifaceted organizations it is a difficult task even for sustainability specialists to address holistic, organization-wide sustainability issues. Furthermore, the structures in such organizations are often so complex that knowledge does not travel between departments and units. Subsequently, sustainability is not treated as a wicked problem as it ought to be, but instead, it is broken down into smaller sub-problems. This disconnect means that even if successful sustainability efforts are made in different sectors of a given organization,

nobody knows the true impact of the organization as a whole, making it that much more difficult to manage.

When considering the construction industry particularly, interviewees brought up the complexity of the value chain and the difficulties in ensuring that all parts of that chain are committed to sustainability. Moreover, construction companies are often based on the ideals of project management where individual projects can be run so individually that they essentially become 'companies within a company', creating a difficult environment from the point of view of sharing knowledge and managing company-wide sustainability impacts.

Among the many actors involved with the sustainability of urban development, governing entities such as cities, municipalities, national government, and regional administrative divisions hold a critical role in the eyes of the interviewees. The public sector as a whole, along with elected politicians and public officials as its representatives, possess a lot of power and control over the development of our urban environments. Interviewees noted that this defines the operational environment to a certain degree and it is also reflected in the work of other organizations, namely NGOs and private businesses.

There was however some disagreement among interviewees regarding the power of governing entities and the implications of such power on the sustainability efforts of other actors in the field. While many agreed that these institutions can heavily steer the direction and pace of sustainability transition with regard to urban development, some interviewees were hesitant to put emphasis on their role in spurring sustainability transition within the field. Many interviewees pointed out that The City of Helsinki, as an example of a regional administrative entity, occupies a central role with regard to the sustainability of a given urban development project. Some interviewees also mentioned the Finnish government with reference to the role of society versus individual choice. The decisions made by individual actors play a great part in all sustainability matters but, given that governing entities steer and regulate sustainability for example through taxation and channeling of funds, sustainability is not solely a matter of individual choice.

One interviewee pointed out that this power imbalance indicates a need for systemic changes in the pursuit of comprehensive sustainability transition. However, this viewpoint does not eliminate the responsibility of private businesses to incorporate sustainability into their own operations. Many interviewees retained that private businesses should strive for much more than the bare minimum needed to meet laws and regulations set by governments and regional authorities. By raising the bar on sustainability, private businesses can improve the entire domain of urban development and gain a competitive edge in the eyes of end-users or the governing entities that often act as project hosts. In the latter case, these pioneering businesses are likely to appear to a project host as more appealing cooperation partners for future projects.

### 4.2.2 Technical complexity

By nature, this study did not focus heavily on technical complexity, given that it is not as closely related to stakeholder engagement as social complexity and problem wickedness. This emphasis also affected the interviews in that the interviewees were not directly asked questions related to technical complexity. However, the data included some mentions of technical issues that can be categorized under fragmenting forces. These technical issues are mainly linked to the timeframe of a given project and to the technical advances that may occur during the life-cycle of that project. As new technologies emerge, organizations are faced with challenges in deciding how to deploy them effectively without harmfully disrupting their operations or organizational culture.

The data revealed that many interviewees were concerned about the time span of projects with regard to sustainability. Setting sustainability targets for the years or an even decade to come is highly problematic because they should be sufficiently ambitious without becoming unattainable and discouraging. The technologies that we may have to work with in the future could well prove to be more effective than what we can imagine at present. This is particularly challenging for governing bodies in urban development given that they should be able to steer and regulate the actions of many types of organizations.

Several interviewees brought up the topic of CO<sub>2</sub>-emissions, particularly with regard to technological advances. Moreover, interviewees were of the opinion that carbon footprint ought to be a part of urban development projects from the very start, given that many aspects that have an impact upon it (including project site and type) are usually locked before technical planning can commence and any type of CO<sub>2</sub> calculations usually take place. This would suggest a need to ensure sufficient expertise on carbon emissions at a relatively early stage of a given project.

Another aspect related to technical complexity, and more specifically to the timespan of projects, that the interviewees agreed upon has to do with the longevity of sustainability commitments because they do not always endure throughout a project's life-cycle. While certain commitments may be written down and even included within different contracts during the planning and execution phases of a given construction project, they sometimes tend to fade away to the background as time goes on and especially after the project progresses to its occupancy phase. Owing to the usual shift of ownership and disbanding of the project organizations, a long-term monitoring process is often lacking.

### 4.2.3 Problem wickedness

Problem wickedness is one of the main sources of fragmentation. Conklin (2003) points out that wickedness causes fragments not only in practical project work but also with regard to direction and mission, and he recognizes the ability to agree upon a problem definition as a prerequisite for finding solutions. Project wickedness in the context of sustainability and urban development was

discussed in the interviews through the lens of Goel's (2019) six categories of uncertainty.

The three dimensions that distinguish wicked problems formulated by Dentoni et al. (2018) are also useful in analyzing these findings. The first one, *knowledge uncertainty*, was identified in the data particularly frequently with reference to the ambiguity surrounding sustainability issues in general. The interview data revealed that defining sustainability in the context of urban development or construction is by no means an easy task, even for sustainability professionals. Sustainability work is, in essence, strategic management, where the ability to see the 'bigger picture' is essential. One interviewee pointed out that even the finest details lose their meaning if we cannot evaluate their significance within the wider context of sustainable urban development.

Many of the interviewees were of the opinion that the understanding of sustainability principles across different organizations is fairly similar in the field of urban development. However, views on how sustainability should be operationalized can vary significantly according to the interviewees. Moreover, different individuals or organizations do not always see eye-to-eye on who is responsible for a given sustainability issue. In light of the formerly described wicked problem criteria, knowledge uncertainty dictates that wicked problems cannot be formulated definitively, and each problem is essentially unique. With regard to this complexity, interviewees agreed upon a need to engage with other actors in the field in an open discussion regarding sustainability terminology and targets.

Another one of Dentoni et al.'s (2018) dimensions, *dynamic complexity*, was also discernable in the data. This dimension entails challenges with the formulation of potential solutions for wicked problems of which the interview data gave evidence. What might be labeled as the interdisciplinary nature inherent to urban development was seen as a significant challenge by many interviewees. Given that the selected definition of sustainability determines how it is resolved, the number of actors representing different disciplines involved in urban development certainly complicates matters, especially if cooperation is insufficient. Local decision-makers, urban planners, architects, and developers often bring their own perceptions of how sustainability ought to be operationalized. This is explained, at least in part, simply by the different scales and focuses of their respective occupations, and some interviewees attested that conflicts can occur even when these professionals are involved directly with the same urban development project.

Considering the notion that the solutions to a wicked problem cannot be tested prior to application and that each solution is essentially a one-shot operation, it is certainly important to negotiate a solution that satisfies as many stakeholders as possible. Interviewees pointed out that urban planners play an important role in ensuring that sustainability issues are addressed and evaluated. In some cases, the impacts of a large development project need to be considered on a national scale, which brings forth problems related to existing decision-making processes. One interviewee particularly stressed the point that organizations

evaluating the sustainability of a given development project may recognize large-scale impacts but they do not necessarily have the decision-making power to address them. Here, a lack of direct access to adequate decision-making mechanisms exemplifies the imperative role of multisectoral collaboration and open communication.

As Dentoni et al. (2018) put it, decision-makers do not have a right to be wrong in the face of wicked problems, which indicates that any attempt to solve the problem should be carefully planned. However, many such problems come with a sense of urgency, and often any solution attempt will be better than procrastinating or avoiding the wicked problem for too long. When we talk about sustainability and particularly about climate change, the challenges with timing become evident and the *value conflict* characteristic to wicked problems becomes apparent. While many interviewees mentioned the need to act quickly and speed up the sustainability transition in urban development, some interviewees also elaborated on the problems associated with this urgency. We need to achieve significant improvements in the production of carbon emissions quickly, while simultaneously planning for sustainability in the long run, which poses a great managerial challenge for all parties associated with urban development.

### 4.3 Coherence

Conklin (2006) retains that coherence is the antidote for fragmentation. He explains that coherence manifests as shared understanding – or commitment – in an organizational setting where cooperation is essential. Coherence does not eradicate social complexity; rather it means that people have the ability to forge shared understanding in spite of complex elements and underlying differences in their thinking. While many of the themes identified here are clearly linked to effective stakeholder engagement, the interview data also supported the idea that additional strategies are needed to complement effective engagement. These themes not pertaining to engagement were classified under the life-cycle approach (Chapter 4.3.2) and strategic sustainability management (Chapter 4.3.3). Several contributions to coherence, and more specifically to methods for boosting collective intelligence, emerged from the data collected through interviews. All interviewees brought up aspects related to coherence, and some aspects were mentioned particularly frequently while other aspects were discussed in detail only by one or two individuals and merely brushed upon by others. This can be expected in semi-structured interviews, which allow for variation regarding the progress of conversation. However, it was possible to discern clear themes within the data related to the guiding idea of coherence, and these findings are discussed next.

### 4.3.1 Effective stakeholder engagement

As Jeff Conklin (2006) points out, a central challenge in dealing with wicked problems comes with choosing an appropriate strategy to cope with it, while avoiding ineffective strategies such as blaming others for the problem or easy technical fixes that will prove to be merely temporary. Instead, we should turn towards the social domain and according to Conklin (2006), we ought to focus on building capacity for effective collaboration in the face of wicked problems. Naturally, trust is essential here, and the interview data suggests that trust is in fact one of the most important issues related to establishing coherence.

Interviewees frequently referred to trust among collaborating actors as a key aspect in the operationalization of sustainability. There seemed to be a consensus among interviewees that trust is formed through successful interactions between actors where individuals and organizations are receptive toward each other and ready to negotiate in good faith. Trust was recognized as an essential prerequisite for collaboration, and collaboration in turn was seen by many interviewees as a precondition for successful sustainability efforts altogether.

Interviewees were relatively confident that the partners they usually work with in the field of urban development have a sufficient understanding of their respective social responsibility and adequate resources to take the different dimensions of sustainability into consideration in their operations. This confidence forms a good foundation for building trust, but the challenges come with recognizing how best to harness collective intelligence. The practical ways of establishing trust were also discussed in the interviews, and interviewees seemed to agree that trust cannot be built without effective communication. One interviewee pointed out that the amount of trust among actors dictates the degree of openness in communication, and only through communication do we learn from one another. Furthermore, trust makes partnering individuals and organizations more receptive towards one another.

When dealing with a complex problem it is unlikely that the end result will be successful if different actors work in isolation, each focusing solely on their own specific tasks and contributing to fragmentation. Collaborative measures are needed throughout the process to produce an atmosphere of trust, and naturally, that trust needs to be earned by actors through their concrete actions. Interviewees associated the lack of trust with situations where parties are suspicious of each other's motives, obligations are neglected, or promises are not kept. Interviewees suggested that it might be easier to trust other actors if an agreement on sustainability indicators is reached early on. The measuring and verifying of sustainability efforts provides concrete proof that all sides are committed to common goals. This may lessen a sense of uncertainty and reduce the likelihood that parties will resort to blaming each other for suboptimal results.

The interviews provided a large body of data related to strategies of coping with fragmentation. In addition to the general strategies described in this chapter, interviewees also recounted a number of more specific tools directed to boosting collective intelligence. These tools are closely linked to stakeholder

engagement, given that the objective of harnessing collective intelligence is initially all about the interactions among a host of stakeholders. The range of methods and specific instruments introduced by interviewees forms a sort of 'toolkit' that could be utilized in stakeholder engagement for collective intelligence. However, a few interviewees voiced the opinion that the specific methods in themselves are less important than the expressed commitment to cooperation and the shared goal of harmonization related to sustainability efforts. Without these, we may end up in a chaotic situation with wasted time and resources as well as missed opportunities simply due to a lack of communication

Interviewees suggested many tools or methods that they themselves had found successful and efficient in the past when dealing with complex problems in cooperation with other actors. Different types of interactive workshops were among the most frequently recounted methods, and many interviewees saw them as an integral part of collaborative sustainability efforts. The data reveals that the key benefit of such workshops is shared understanding and even if a given exercise does not provide clear solutions, it will often leave participants with a clearer view of underlying issues.

Interviewees expressed the view that workshops ought to be tailored to fit the objectives. While sometimes it may be enough to gather the right people around the same table for a free exchange of ideas, often a more structured approach is necessitated. The interviews shed light on the importance of facilitating effective forums for stakeholder engagement, particularly in situations where conflicts are expected to emerge. Many interviewees had participated in and facilitated workshops that brought together actors with conflicting interests. Many of the key points for success in such a situation recounted by interviewees had to do with allowing each participant to voice their concerns openly, formulating a set of preconditions based on these concerns, and directing the attention of participants towards possible solutions within the recognized preconditions or boundaries.

Among the set of tools described by interviewees were also formal and informal networks established for the purpose of knowledge exchange in the field of sustainable urban development. Interviewees saw many benefits in networking among sustainability professionals given the fast pace of development characteristic to the field. Many interviewees had themselves directly benefited from a free exchange of ideas among colleagues across organizational boundaries and argued that it has the potential to save resources and build social capital. Active participation for example in seminars or field-related online platforms may well help navigate the ever-developing field of sustainability. Examples of a more formal networking tool brought up in the interviews were different kinds of advisor programs that facilitate professional mentoring.

The data further suggest a specific need for cooperation between urban planners and construction companies, preferably at an early stage where the possibility to influence the progression of a given project remains good. This in turn relates to 'early recognition', an important aspect of building coherence revealed by the data. According to the interview data, recognizing important

sustainability priorities, related stakeholders and key moments for collaboration early on could greatly increase the chances of finding a successful solution to the wicked problem of sustainability in urban development. With regard to particularly complex urban development projects, some interviewees pointed out that regional administrative units acting as project hosts can have a significant impact on the outcome of a given project if sustainability is taken into account early on, and ambitious, appropriate prerequisites are set for the execution of the project. This ensures that sustainability is considered at an early stage by contractors and other organizations involved in the project's execution.

The operationalization of sustainability principles across organizations should, according to the interview data, be carried out utilizing collaborative methods, such as workshops. The object here is to build collective intelligence and to ensure that the project participants are able to meet the sustainability prerequisites set for the project. Without such efforts, the end result might not reflect the original target level. Based on the interviews, such an outcome is not uncommon in the field of urban development despite the notion that it can be avoided through collaborative actions.

Perhaps unsurprisingly, given its prominence in the public discussion surrounding the sustainability of urban environments, interviewees brought up greenhouse gas emissions quite frequently. GHG emissions are often given the highest priority in sustainability work, and rightfully so given that the built environment is responsible for a third of emissions in Finland alone, as estimated by the Confederation of Finnish Construction Industry (2020). With regard to so-called 'early recognition', several interviewees used carbon emissions as an example when talking about the need to consider the impacts of a given project as early as possible. Only by considering the carbon footprint of a given development at its onset can we ensure that our efforts truly guide the progress of a given project.

#### **4.3.2 Life-cycle approach**

The interviewees elaborated on the ambiguous nature of sustainability: people can have different perceptions as to what constitutes a sustainable urban development project, but there seems to be a consensus among experts in the field that a life-cycle approach is essential to achieving sustainability. Interviewees also recognized notable challenges related to the practicalities of operationalizing sustainability in the built environment, and many of these challenges were linked to the problem of integrating sustainability work into the day-to-day operations of a given project over its life-cycle. Interviewees were of the opinion that without efforts put into the integration process, sustainability often remains on the sidelines and fails to materialize. If sustainability is treated as separate from the core operations of an organization or a project, sustainability work becomes mainly cosmetic and, in the worst case, sustainability efforts can slip towards the detrimental realm of greenwashing.

Integrating sustainability into the daily operations in construction is however a formidable challenge. Interviewees were of the opinion that sustainability matters, while they may be present in the planning or design phase of urban development projects, are too often neglected in the execution simply because there are so many other issues to deal with and a tight timeframe. Interviewees suggested that particular attention should be paid to allotting enough time and resources for sustainability management and coordination throughout a given complex project. According to the interview data, a lack of effective coordination can prevent sustainability considerations from becoming part of daily routines.

In the interviewees' experience success in sustainability efforts was often linked to cases where the ideals of sustainable development were embedded into the routine work in their respective organizations. Many interviewees mentioned the importance of integrating sustainability criteria into supply chain management in the construction sector. With regard to complex urban development projects, interviewees suggested that the task of integrating sustainability principles or specific targets into the day-to-day operations should be taken on as early as possible. By making sustainability efforts a part of the routine operations there is less risk for losing track of true sustainability impacts as the project goes on.

Based on the interview data, it seems that alongside successful integration, continuous improvement is integral to counteracting fragmenting forces in the long run when it comes to the wicked problem of sustainability in urban development. As wicked problem scholars have theorized, implementing any given solution to the wicked sustainability problem does not eradicate it altogether. Rather, a solution attempt may reveal new aspects linked to the original problem and help us understand it better. This opens up the possibility to strive for continuous improvement through a succession of solution attempts.

Interviewees pointed out that the importance put on sustainability reporting further supports the need for continuous improvement. Many of the organizations represented by the interviewees had recently introduced new sustainability indicators into their respective sustainability reporting frameworks. On the one hand, it is certainly important to improve the overall frameworks as knowledge increases, and based on the interviews, many organizations re-evaluate their sustainability frameworks on a yearly basis. However, it is also crucial to retain a certain degree of continuity in order to gain a firm understanding of sustainability impacts in the longer term. Only then is it possible to measure and validate whether things are truly improving continuously. A few interviewees saw it as a problem that many organizations are modifying the way their sustainability performance is measured at a very quick pace, making it difficult to evaluate true progress over time.

It is easy to see that considering the sustainability of a complex urban development project in the long-term over its entire life-cycle is an optimal approach. However, this entails that in order to truly transform the industry, we would need to engage the entire value chain and have all parts of it committed to sustainability. This in turn suggests that we would need to achieve a true correlation between sustainability and profitability. The interview data suggest that

such a correlation is possible but dependent upon a number of variables. Some interviewees observed that the demand for sustainability in the built environment is strengthening but it does not yet translate effectively to customers' willingness to pay more for increased sustainability.

### 4.3.3 Strategic sustainability management

Having discussed the importance of continuous improvement in the previous chapter, it is worth noting that interviewees also brought up another related viewpoint that may at first glance appear to be in conflict with the principles of continuous improvement. However, this viewpoint of settling for 'good enough' is actually not eliminated in a process that strives for continuous improvement. Rather, it provides a tool for concluding one step of a process and makes it easier to move on toward finding new solutions. By daring to settle for a solution that does not seem perfect but good enough, it may be possible to avoid the risk of wasting time on unproductive guesswork and move on to verify how well a given solution works.

Settling for a 'good enough' solution and taking a chance to move forward with it, setting priorities, and applying innovative solutions in a project setting are all related directly to strategic sustainability management and have less to do with stakeholder engagement. Naturally, all of these steps may be linked to interactive decision-making processes and fruitful interactions among internal stakeholders but choosing to apply such strategies consistently and deliberately in the face of sustainability issues is a concern for project management.

Concerning the strategic decision to settle for good enough, one interviewee had utilized a so-called 80%-rule, indicating that it is enough if 80 percent of what you are doing are the correct things and 80 percent of those things are done correctly. Similar thinking can also be applied to cooperation: if we can never completely agree upon the issues surrounding sustainability or how it should be operationalized, we could strive for around 80% in the volume of how much of our understanding is shared. If we can accept that we may not be able to reach a completely harmonized understanding and instead strive for a state which can be deemed good enough by different parties, we might be more willing to move forward towards solution attempts. It should be noted that this viewpoint resonates well with wicked dynamics that suggest there are numerous possible solutions for wicked problems and that solution attempts provide new information about the original problem. This in turn may help with the process of continuous improvement.

The same logic applies when we consider sustainability assessment through standards. As described in Chapter 2.1, standards often lack a holistic perspective and fail to account for the interconnectedness of different elements within a complex system. Yet we do need to assess and measure sustainability, particularly in terms of environmental impacts. The interviews provided an interesting viewpoint pertaining to this very issue: while many sustainability assessment methods remain relatively immature and incomplete, there are benefits

to adopting methods that are currently available and widely used since they provide us with comparable data.

The interviews also touched upon another issue related to strategic sustainability management, namely innovativeness. Based on the data it is apparent that for example, construction companies involved with complex urban development projects are in a position to boost the entire industry by assuming a fore-runner role. That is, by challenging themselves and striving towards sustainable results. Direct stakeholder demands can certainly motivate private businesses to implement increasingly sustainable practices, whether those demands come from end-users or from governing entities operating as project hosts. Moreover, at a time when sustainability is very much in the spotlight, companies that invest in it may well gain a competitive edge over their rivals.

Interviewees noted that the challenges with innovativeness often relate to communication. While a given construction company may actually be at the forefront when it comes to implementing novel, sustainable solutions, communicating this to external stakeholders may be problematic. One interviewee pointed out the difficulty in conveying the benefits of innovative solutions in a project setting when there is not enough data to confirm that such solutions will prove to be successful in the long run. Communicating this to external stakeholders would require a high degree of openness about the uncertainties related to innovative solutions, and while this is aligned with corporate responsibility, it may also seem risky from a marketing point of view.

Prominent among the strategies related to sustainability management described by interviewees was the need for prioritization. Interviewees had found it particularly useful in the struggle against forces of fragmentation. Some interviewees pointed out that the operations of their respective organizations necessitate highly complex frameworks for sustainability assessment. Having recognized a broad spectrum of sustainability impacts, these organizations were forced to prioritize in order to allocate their resources efficiently.

While it is useful to gather data on various sustainability aspects, some degree of prioritization is merited in such situations. Without ranking the importance of different aspects, it becomes extremely difficult to draw conclusions or to focus efforts on improving areas that will yield either the most positive impacts or lessen the most negative ones in an organizational or a project context. The interview data suggest that there is a need for prioritization on many levels, starting with political decision-making. National politics play an important role in directing the sustainability efforts of municipalities, private businesses, and other organizations. In the case of urban development in Finland, strategies and decisions made by the Finnish Ministry of the Environment have a great effect on which aspects of sustainability are given top priority in the practice of urban development.

The data further suggests that the municipal level in Finland holds an incremental role in shaping the list of priorities in the field of sustainable urban development. Finnish cities and municipalities have quickly adopted the targets of carbon neutrality that have trickled from international politics into national

agendas. Moreover, many cities have declared more ambitious targets than those set at the national level. These targets then become concrete in the practice of urban development. Interviewees recognized challenges in ensuring that the grand visions of urban planners are translated into feasible and profitable urban development projects.

#### 4.4 Ineffective strategies

Upon revisiting the interview data during the thematic analysis, it became clear that interviewees provided information, not only on effective strategies for coping with wicked problems but also on the strategies that had proved to be ineffective in their experience. These strategies include attempts to *tame* a wicked problem, the acts of *blaming* wickedness on other actors and *avoiding* a wicked problem altogether, as well as a tendency to passively *study* a wicked problem without acting upon it. Ineffective strategies are often applied simply because we fail to recognize wicked dynamics or because we do not grasp what their presence implies (Conklin, 2006). The aforementioned strategies might not be merely ineffective but they could actually prove to be counterproductive and end up exacerbating the original wicked problem.

While interviewees did not refer directly to the ‘taming’ of wicked problems, the data contained many mentions of issues clearly linked to it. As described in the theory section of this study, wicked problems differ from tame ones, and attempts to tame them will lead to unfavorable results. The problems with taming brought up by interviewees were mainly related to the difficulty in recognizing wickedness. Too often individuals and organizations make the assumption that their interpretation of a given problem is correct and shared by others. Conklin (2003) calls this approach *locking down the problem definition*. Other examples arising from the data included the repetition of a previously successful solution on new problems without considering the novel situation. It may be a common strategy to choose a certain solution simply because it has worked before but in the face of wicked problems, we cannot expect this to yield good results given that every wicked problem is essentially unique by definition (Rittel & Webber, 1973).

Besides taming, interviewees also touched upon the strategies of placing blame on others and avoiding a wicked problem altogether. A tendency to blame a problem on other actors may be caused by an inability to recognize the interconnectedness of elements within a complex system, which makes it very difficult to predict or even identify cause-effect relationships. Moreover, placing blame correlates strongly with fragmentation, meaning that it is not only ineffective but can also exacerbate original issues. Avoidance on the other hand may not be as detrimental as placing blame but ignoring a wicked problem, such as sustainability, does not remove it nor does it help in any way.

The fourth theme under the umbrella of ineffective strategies, studying, might appear less detrimental but given its prevalence, it should be given attention. Studying a wicked problem may often be the first strategy applied, after all, it seems a natural course of action to find out as much as we can in the face of highly complex issues. However, the characteristics of wicked problems ensure that very little can be learned about them through passive observation. In order to find out more, we will need to take action and attempt to solve the problem at hand, even though studying it further might seem appealing. Several interviewees were of the opinion that slow progress, while understandable, is problematic given the urgency related to sustainability issues.

#### **4.5 Results of the World Café workshop**

Dealing with fragmenting forces – namely problem wickedness, technical and social complexity – is identified in this paper as a central concern in the sustainability management of complex urban development projects. While it may be impossible to eradicate these forces, coherence is undoubtedly the antidote. Coherence may not spring by itself in a complex project setting but more likely it needs to be generated and cultivated in collaboration with other stakeholders. The challenge often comes down to finding appropriate answers to questions such as, who are relevant stakeholders, what kinds of motives they have, and how their various motives and interests correlate with each other, but also to estimating how stakeholders influence and are influenced by the project in different phases of its life-cycle (Ward & Chapman, 2008).

The World Café exercise that was organized for the purposes of this study was attended by both project owners (employees of YIT) and contractual internal stakeholders. It is worth noting that while social complexity is certainly present in a situation that brings together individuals from so many different organizations and specialties, there is also coherence among this group. As Conklin (2003) puts it, coherence indicates an understanding of – and alignment with – project goals and a shared vision of how those goals can be reached. Cooperative methods, such as the weekly Big Room meetings, that are applied in the day-to-day operations of the Trigoni project are undoubtedly beneficial with regard to coherence. However, the added wicked dynamics brought on by the topic of sustainability merit specific tools and strategies.

As described in detail in Chapter 3.1, participants were asked to give quick answers to the uncertainty questions on sticky notes at the beginning of the World Café exercise and to stick them on the respective whiteboards. The participants were then divided into five groups. Next, participants assumed their places by the whiteboards and began formulating group answers with the help of one of the five moderators. Each group had a large collection of sticky note answers to help them along at the first whiteboard. As they moved on to the next whiteboard, they also had the answer formulated by the previous group as a

basis for their on-going conversation and for formulating a new answer. By the fourth whiteboard, each group was given a general description of the discussions that had taken place as well as three previous answers. They were then asked to formulate the final answer for the fourth whiteboard that they had arrived at.

In the end, each moderator was left with a collection of sticky note answers, the answers of four different groups, each of them building upon the answers of previous groups as well as an account of the four-part conversation that had taken place at their station. As moderators recounted the main points of these conversations and described the progress that took place during the exercise it became evident that the World Café had been successful in fostering coherence. The relatively heterogeneous collections of sticky note answers that represented the initial ideas and views of all individual participants provided a starting point for the collectively negotiated answers given by each group. Those answers had then been refined as groups moved on to their second, third and fourth station, culminating in the final answers that were remarkably well thought out and thoroughly analyzed.

It should be noted that participants were observed to have difficulties and a certain degree of discomfort at the beginning of the exercise as they were asked to give their initial, individual sticky note answers without much time to consider the questions. However, as the groups were formed and started moving from one whiteboard to another, the discussion was very lively, and the general mood seemed enthusiastic. Towards the end of the exercise, several participants expressed wishes that the conversation could go on after groups were asked to move on to the next station. Key findings of the World Café workshop are presented in Table 4. This table includes a collection of initial sticky note answers provided by individual participants to each uncertainty question, the four group answers, and key points from the four-part conversations that took place at each of the whiteboards assigned to the three 'upstream' uncertainty categories.

<b>Uncertainty category and corresponding question:</b>	<b>Spatial uncertainty</b> <i>How widely the spatial impact of the construction industry and built environment should be considered?</i>	<b>Temporal uncertainty</b> <i>How far into the future the planners of the built environment should look to ensure its sustainability?</i>	<b>Stakeholder uncertainty</b> <i>Which stakeholders' interests should be considered?</i>
<b>Frequent answers from individual participants:</b>	Immediate surroundings /neighborhood, Pasila, Helsinki/Helsinki metropolitan area, Finland	10 years, 25-30 years into the occupancy phase, 50 years, 100 years, the entire project life-cycle	Project team, investors, end-users/clients, the City of Helsinki, residents of Pasila and Helsinki area, sub-contractors, suppliers, Ministry of the Environment, 'the most powerful stakeholders', 'all stakeholders'
<b>1st group answer:</b>	The first group argued that the spatial impacts on the city of Helsinki are most important due to the project's central location in the urban fabric.	According to the first group, a distinction should be made between the fixed portion of the project (including solid structures and large masses), and the transformable portion (the structures and spaces that can be easily modified during the project life-cycle. The fixed	The first group noted that the most frequent individual sticky note answer was related to end-users. Therefore, they accepted end-users (including visitors, residents, tenants, and operators) as the most important and challenging stakeholder group. The first group also noted that

		portion should be designed and built to last the entire life-cycle and the transformable portion so that it can be easily updated. The sustainability of these two portions should be addressed accordingly.	public authorities should be counted among the most influential stakeholders with regard to sustainability.
<b>2nd group answer:</b>	The second group reasoned that the Pasila area and immediate surroundings should be given top priority, but some issues should be considered on a wider spatial scale, even globally.	The second group agreed with the first group answer but added that sustainability issues should be considered on a case-by-case basis: some issues need to be evaluated from a long-term perspective while others are more fleeting.	The second group recognized investors as a particularly important stakeholder group considering their influence and interests in project outcomes. The second group also contrasted home-buyers with investors.
<b>3rd group answer:</b>	The third group was of the opinion that the global scale is too broad and ambitious, but the national scale should be considered, given that the project is very prominent and has gotten national media attention.	The third group expanded on the 1st group's answer, noting that we need to examine the transformable aspects of the project on a deeper lever. This can be done by considering which aspects cater to the end-users' stable basic needs, and which are more contemporary.	The third group focused on the occupancy phase and noted that the success of sustainable solutions is dependent upon how well they are received by end-users. Usability and maintainability were determined crucial and the role of sub-contractors was also recognized in ensuring a good outcome.
<b>4th group answer:</b>	The final group posited that local impacts (Pasila and Helsinki) should be considered a top priority, but knock-on effects should be evaluated on a national scale and triumphs should be communicated globally.	The fourth and final group also accepted the distinction between a fixed and a transformable portion as a basis for their answer. They discussed its implications on decisions that will be made in the near future, suggesting that this distinction should also be considered in sustainability assessment.	The last group wanted to highlight the role of public authorities in shaping the sustainability of the construction industry, from global politics to local decision-making. The final order of important stakeholders identified in this exercise was laid out as follows: 1. end-users, 2. public authorities, 3. investors
<b>Key points from the conversations:</b>	The last group clearly considered each previous answer carefully when formulating their final answer. The debate on whether global impacts ought to be considered is particularly interesting and divisive. The global scale did not appear frequently in the individual sticky note answers.	The ideas that emerged during the first group's conversation prevailed throughout the exercise, and all of the groups seemed to agree with that first answer to a certain extent. The initial answers from individual participants contained a high degree of variation.	The frequent answers from individual participants included many well-identified stakeholder groups but also answers such as 'all stakeholders' and 'powerful stakeholders' were common. This may well indicate that stakeholder identification is a difficult task without further analysis and discussion.

Table 4 Key findings from the World Café workshop

There is a strong pressure to implement sustainable solutions in a relatively narrow timeframe, as well as a need to evaluate the effectiveness of said solutions over a long-term period. Subsequently, this dilemma presents an urgent and formidable challenge for company managers, project managers, and public authorities alike. Goel (2019) notes that the long-term approach required in these situations does not go hand in hand with the project-based approach characteristic of

the construction industry. After all, projects are inherently 'temporary endeavors' as observed by Goel (2019, p. 5), indicating that the much-needed forward-looking thinking is often lacking in project management. This challenge is mirrored in the World Café finding concerning temporal uncertainty: conversations were very much focused on the design and building phases, and a large portion of the initial answers by individual participants suggested that looking 10-30 years into the future would suffice. Moreover, one of the groups suggested that the temporal uncertainty of sustainability issues should always be addressed on a case-by-case basis.

The interviews also provided information on the recognized need to distinguish between implementing sustainable solutions in the short-term and evaluating the impacts of sustainability efforts in the long-term. One interviewee pointed out that sometimes we should also look back in time instead of just forward, in order to get a better perspective on the trajectory of how certain issues are developing. Regarding stakeholder uncertainty, the World Café findings were complemented by the interview data: the identified stakeholders were rather similar between the two bodies of data with the exception of a few important groups. While the workshop participants constructed a useful repertory of stakeholders and were also able to prioritize them, there was no mention of the environment as a stakeholder or any environmental organizations or other NGOs. Conversely, they were frequently discussed in the interviews, indicating that the project organization might benefit from taking them into account. When it came to spatial uncertainty, the interview data also offered quite a wide range of varying viewpoints: the smallest scale addressed was the lot of a given urban development project and the largest scale was global. An interesting point brought up was that we should limit the principal area of interest enough to make it manageable, even though the field of influence of any given project can be much larger in actuality.

## 5 CONCLUSIONS

The key findings are summarized in this section with reference to the research questions. Additionally, some managerial implications are discussed and recommendations are given based on the observations made previously. Finally, the limitations related to this study are addressed and some suggestions for future research are presented.

### 5.1 Addressing the research questions

Answers to the selected research questions were pursued through a review of relevant literature, a two-part empirical data collection, and subsequent thematic analysis. The review of relevant literature related to sustainability, complex urban development projects, stakeholders, and wicked problems provided a foundation for the conceptual framework introduced in Figure 3 (p. 29). This framework guided the ensuing data collection phase and aided with the thematic analysis of the interview data. It also helped focus the processing of World Café workshop data on the so-called ‘upstream’ uncertainties that were recognized to be particularly interesting in the design phase of a complex urban development where many external stakeholders remain unidentified.

- *How can stakeholder engagement improve the sustainability management of a complex urban development project?*

The main research question in this study is related to the benefits of stakeholder engagement in the face of a wicked problem. As established previously, sustainability-incorporation in a complex urban development project setting bears the hallmarks of a wicked problem. Like many others who have contributed to the wicked problems discourse, Barnett et al. (2018) have also discerned that wicked sustainability problems are linked to disagreement or uncertainty regarding their scale, scope, and time frame. They note that effective strategies for coping with such problems call for collaboration among a host of stakeholders, and this inevitably affects the way in which such issues should be dealt with. According to the interview data, this collaboration should begin at an early stage: if sustainability-related priority issues, stakeholders, and key moments are recognized early, the preconditions for future cooperation are much more favorable. The way to reach a consensus regarding for example the sustainability issues that should be given priority in a complex project setting is through engagement among actors involved in the earliest phases of a given project.

In order for stakeholder engagement to be considered effective, it needs to fulfill certain criteria. More is not necessarily better from the point of view of corporate responsibility when it comes to engaging with stakeholders. Instead, construction companies ought to assume an ethical strategist perspective in order

to account for both practical and conceptual stakeholder concerns in an effective manner (Collinge, 2020). On a fundamental level, stakeholder engagement has more potential to improve sustainability management when and if it is aligned with the principles of sustainable development. This means that engagement should be viewed as an extension of a new type of *management for stakeholders*, as described by Baharodestani et al. (2020). Stakeholders should not be viewed as a mere resource to be controlled, but rather as parties in a two-way relationship and as potential partners with whom the wicked problem of sustainability can be dealt with together.

Establishing an ideal level of engagement with the ideal number of stakeholders is naturally a great challenge, but the interview data help with identifying some key steps along the way. First and foremost, engagement should be directed towards building trust among actors: it is not merely about comparing viewpoints and seeking a compromise by any means necessary, but a way of laying the groundwork for fruitful collaboration by creating an atmosphere of trust. Furthermore, effective stakeholder engagement entails appropriate tools. The interviews shed light on a variety of applicable tools, with networking and the facilitation of diverse collaborative workshops prominent among them. One such tool, the World Café workshop, was applied in the context of the case project. This exercise yielded very useful case-specific information, but it also showed how coherence can be fostered and collective intelligence harnessed through collaboration among stakeholders.

In brief, stakeholder engagement can improve sustainability management in a complex urban development project setting when it is carried out effectively and when it is complemented by an appropriate sustainable business framework, as noted also by Stewart and Hocking (2019). Such a framework is comprised of strategies that support the assumed stakeholder engagement approach. Building on the findings of this study, some appropriate strategies are related particularly to the life-cycle perspective: while construction projects can be seen as temporary endeavors, sustainability-incorporation will remain incomplete if management does not consider the occupancy and end-of-life phases of a given project. The findings further suggest that integrating sustainability considerations into the day-to-day operations and routines of a project help uphold the sustainability agenda throughout a project's life-cycle and striving for continuous improvement aids in dealing with the dynamic complexity inherent to wicked problems.

- *What causes fragmentation in complex urban development projects with regard to sustainability?*
- *What should be done to counteract fragmenting forces?*

The two subordinate research questions that concern the sources of fragmentation and the ways of counteracting them were addressed in detail in Chapters 4.2 and 4.3. A good understanding of what causes uncertainty and fragmentation as well as the ability to choose appropriate management strategies are of vital importance for effective project management in the face of wicked problems (Ward

& Chapman, 2008). In addition to effective engagement and an approach to project management that takes the entire life-cycle into account, a number of supporting perspectives related to strategic sustainability management were identified during the thematic analysis of interview data. It was recognized that innovativeness does much to support the sustainability agenda in a complex project setting. Additionally, the abilities to prioritize and to settle for a 'good enough' solution were also determined to be of great importance for project sustainability management.

If coherence is to be understood as a state in which there is no dissonance regarding key terms and concepts among stakeholders, it seems unlikely to be reached without deliberate action. In discovering ways to counteract fragmenting forces in a complex urban development project setting some ineffective strategies were unearthed as well. Taming is perhaps the most frequently misused strategy when it comes to wicked problems. Attempts to tame a wicked problem indicate that the wickedness of it is not recognized, and strategies that should be applied to defragment the problem are neglected as a result. Alongside taming, a good indicator of fragmentation is blame. Conklin (2003) points out that fragmentation in itself may be too abstract to be easily observed in a project context. Instead of recognizing systemic challenges in a complex project, actors may view the prevailing chaotic situation as a result of someone else's failures.

When considering the design phase of a complex urban development project, internal stakeholders might well possess a high degree of coherence, given that they share an understanding of the project background and most key issues (Conklin, 2003). As described previously, collaborative methods are utilized broadly within the case project Trigoni during its design phase, indicating that internal stakeholders likely share a commitment to project objectives and have a uniform view as to how success will be achieved in the project. This provides a good starting point for dealing with the uncertainty related to wicked problems, as observed in the World Café exercise. Even though the internal stakeholders of the case project form a heterogeneous group, a shared understanding of context allows them to build collective intelligence with relative ease.

However, this may not be the case if we bring a host of additional, external stakeholders into the mix. As illustrated in Figure 3 (p.28), the added social complexity that comes into play here further complicates matters and diversifies the range of potential solutions. This indicates that considerable skill and commitment is required from project management to navigate the downstream uncertainties in collaboration with external stakeholders.

## 5.2 Managerial implications and recommendations

Wicked problems are by no means limited to sustainability-incorporation within the context of complex urban development projects. There may well be many other issues along the way that exhibit wicked dynamics, and the presence of

social and technical complexity is quite typical for such endeavors. Building coherence through effective stakeholder engagement and other complementary strategies is therefore not merely an objective for sustainability management, but it should be a concern for project management also in a broader sense.

The World Café exercise supports the notion that the competence to address spatial, temporal and stakeholders related uncertainties can – and should – be found among internal stakeholders in a complex urban development project setting. Internal stakeholders should have a shared understanding of project context, main issues, and objectives. The ways to achieve such an understanding may vary, but the case project has arguably benefited from collaborative methods, such as the weekly Big Room meetings. Moreover, an extensive introductory phase has been implemented within the case project: its objective is to ensure that each new member of the project team is familiarized with the project background, values and methods of project work.

While there are numerous building standards available for evaluating and improving project sustainability, LEED and BREEAM standards prominent among them, a sustainability management framework based solely on meeting the criteria set through them is unlikely to yield good long-term results. A broader framework is needed to account for the complex, systemic nature of wicked problems such as sustainability. The value of continuous improvement is also well-understood within the construction industry and its principles are concretised through frequently utilized methods such as PDCA and Lean Thinking-related techniques. Such techniques, while extremely useful for general management purposes, may not be adequate for dealing with truly wicked problems, as argued by Stewart and Hocking (2019). In such cases these techniques should be complemented by disruptive techniques and tools designed to promote deep organizational learning and to harness collective intelligence (see Chapter 4.3.1).

The managerial implications of sustainability-incorporation in an urban development project setting are significant. Management needs to ensure that internal stakeholders have a shared understanding of project context and meaning, of key objectives and dimensions of critical issues, not to mention a uniform view of how sustainability-related project objectives will be reached. Furthermore, sustainability management calls for a readiness to confront a range of uncertainties in collaboration with other actors, indicating that skills related to facilitating forums of collaborative problem-solving are needed and active participation in diverse formal and informal networks is also highly beneficial.

Recommended next steps for the case project would be to utilize the results of the World Café workshop in developing its sustainability management framework, and extending collaborative efforts beyond the project team when addressing the remaining downstream uncertainties. This strategy is likely to result in a holistic understanding of the societal and dimensional considerations of sustainability and provide the basis for a well-rounded sustainability assessment framework. Even though assessment uncertainty is identified as the last step in Goel's (2019) concept map showing the interconnections between uncertainty categories, it is often prioritized over other concerns. Given the emphasis put on

controlling overruns in time and budget within the construction industry, it is not surprising that the measurable aspects of sustainability are more easily embraced as compared to more abstract considerations. However, skipping over the other steps may well lead to a superficial assessment framework and to detrimental sub-optimization.

Finally, it seems that any number of individual, innovative, super-sustainable buildings is not enough to bring about the much needed sustainability transition if those prototypes cannot be replicated on a larger scale. What the field of urban development needs instead is open communication regarding sustainability issues and collaboration across organizations. Yet, even sharing information within a given organization in a project-based industry seems to have its challenges. As a few interviewees noted, projects often operate with a high degree of autonomy and while the learning-curve within a project organization can be steep, efforts are needed to extend that learning beyond the specific project.

From the point of view of project-based organizations, this study suggests that project management does not need ready answers or easy fixes to the uncertainties related to sustainability. Due to the fact that each wicked problem is essentially unique, a given solution might not yield similar results in the context of a different project. What project-based organizations can do instead is provide support for individual projects with stakeholder engagement in the form of tested tools or concrete help with facilitating. Additionally, these organizations can also establish networks for project sustainability professionals in order to encourage collaboration and sharing of knowledge across projects.

### 5.3 Limitations

As with any research, this study has its limitations. In considering the research design, it should be noted that this study examined the field of urban development specifically in Helsinki, Finland, which is underlined by the case study approach and the choice of interviewees in the first data collection phase. While the body of interviewees is heterogenous, all of them represent urban development and/or sustainability professionals of organizations whose primary focus area is either Helsinki or Finland. This naturally limits the applicability of results. Another limitation is related to the second data collection method where moderators were given considerable freedom in their task. They were given general instructions and a set of guiding questions to help facilitate group discussions but they were not provided with strict guidelines. It is therefore possible that each moderator influenced the outcome of respective group discussions and the eventual group answers.

The case study approach assumed in this study ensures that a large amount of case specific information is generated. Given that the case study is undergoing its design phase and many key stakeholders remain unknown, the second data collection through a workshop exercise had to be focused on the

internal stakeholders' perspective. However, some conclusions can be drawn and recommendations made with reference to company or even industry wide practices. Particularly, the recommendation to apply collaborative techniques designed specifically for harnessing collective intelligence in sustainability management can certainly be extended to similar complex projects that are already in the habit of utilizing some collaborative methods for general management purposes.

On a more fundamental note, wicked problems discourse is but one way to conceptualize the challenges related to sustainability-incorporation. Other available choices regarding the theoretical framework may well provide equally interesting results or even challenge the ideas generated through the lens of wicked problems. The data-analysis carried out during this study leaned strongly on the established, theory-led conceptual framework presented in Chapter 2.9, which certainly influenced the eventual findings, meaning that a certain degree of confirmation-bias cannot be excluded from the limitations. Yet, the complexity related to incorporating sustainability into project management in the context of urban development is difficult to overlook, and in this light the wicked problems approach seems an appropriate starting point.

## 5.4 Future research

As observed, stakeholder engagement remains a fairly undertheorized area of research within the construction field, and calls for additional attention. Based on this study, focus should be directed on the relationships between stakeholders in future research, rather than the attributes or statuses of different stakeholders. Moreover, the wicked problem framework provides a good starting point for exploring the effects of stakeholder engagement on fragmentation and coherence among stakeholders. Yet there is still very little research on the specific methods that help build coherence, indicating that more efforts should be put on testing the available tools that might help boost and harness collective intelligence in the complex urban development project setting.

Another avenue for future research would be to further test the hypothesis that so-called downstream uncertainties are best handled in collaboration with external stakeholders. This line of inquiry is supported by the findings of this study, and additional research with other case projects on the subject would help validate the initial findings introduced here. Furthermore, testing the hypothesis in a case context that has progressed past the design phase would allow for juxtaposition of data collected among internal stakeholders and data collected among a larger pool of internal and external stakeholders.

Technical complexity was discussed briefly in this study as one of the main fragmenting forces. It is perhaps the most widely researched and well-understood of these forces, but there are still unexplored areas related to it. From the point of view of sustainability assessment in the construction field, and

particularly with regard to calculating carbon emissions, technical complexity still seems to have a significant role in causing fragmentation. The pace of development in this context is very rapid and combined with the sheer amount of different technologies that come into play, problems often arise with comparability and traceability of data related to environmental impacts. This notion introduces a demand for additional research on harmonizing such technologies.

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## APPENDIX 1: INTERVIEW QUESTIONS

### Finnish / English

#### Taustatiedot / Background:

- Voitko kertoa lyhyesti millainen rooli sinulla on organisaatiossanne? Kuinka kauan olet työskennellyt kyseisessä roolissa ja tässä organisaatiossa yhteensä? / *Can you describe your role within the organization? How long have you worked in this specific role and in the organization?*

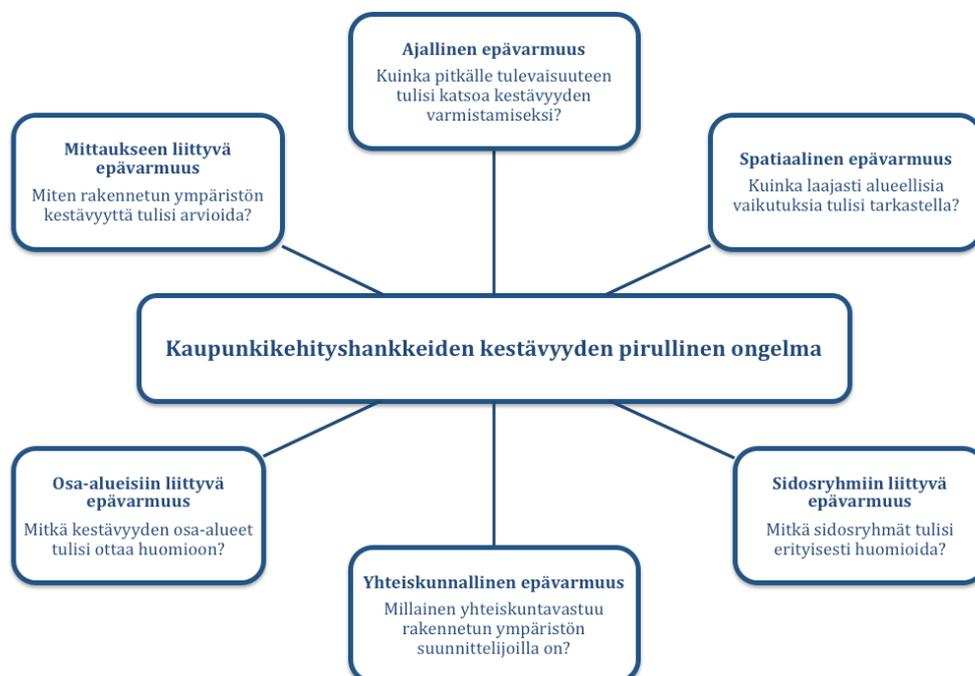
#### Käsitykset ja näkemykset kestävyydestä suhteessa organisaation tehtäviin / *Understanding and perceptions of sustainability with regard to the organization's tasks:*

- Millä tavalla kestävä kehitys ilmenee organisaationne toiminnassa? Millaisia haasteita ja mahdollisuuksia siihen liittyy tällä hetkellä? / *How does sustainability figure into the operations of the organization? What kinds of challenges and possibilities are related to it at the present time?*
- Suhteessa toimintanne kestävyYTEEN, mitä sidosryhmiä olette tunnistaneeT? / *With regard to the sustainability of your operations, which stakeholder groups have you identified?*
- Miten organisaatiossanne määritellään ja mitataan (yksittäisten hankkeiden/yleisesti työn ja tuotosten) kestävyytTä? Millaisia velvoitteita/tavoitteita/käytäntöjä teillä on? / *How does your organization define and measure sustainability (of projects / of operations and products or services)?*

#### Käsitykset ja näkemykset liittyen epävarmuustekijöihin / *Understanding and perceptions regarding uncertainties:*

- Kuinka pitkälle tulevaisuuteen rakennettua ympäristöä suunnittelevien tulisi katsoa varmistaakseen sen kestävyYden? / *How far into the future the planners of built environment should look to ensure its sustainability?*
- Kuinka laajasti rakennusalan ja rakennetun ympäristön alueellisia vaikutuksia tulisi tarkastella? / *How widely the spatial impact of construction industry and built environment should be considered?*
- Mitkä sidosryhmät tulisi huomioida? / *Which stakeholders' interests should be considered?*
- Millainen vastuu kestävällä rakennetun ympäristön suunnittelijoilla on yhteiskuntaan nähden? Millainen yhteiskuntavastuu? / *What is the responsibility of sustainable construction industry and built environment towards the society?*
- Mitkä kestävyYden ulottuvuudet/osa-alueet tulisi huomioida osana kestävyYden konseptia rakentamisessa ja rakennetussa ympäristössä? / *How many different dimensions (economic, environmental, social, cultural) are included within the concept of sustainability in construction and built environment?*

- Miten rakennusalaan ja rakennetun ympäristön kestävyttä tulisi arvioida/mitata? / *How can the sustainability of construction industry and built environment be assessed?*
- Uskotteko, että kaupunkikehityshankkeissa eri sidosryhmillä on yhteneväiset näkemykset näistä epävarmuustekijöistä? Koetteko, että sidosryhmillä on samankaltaisia tavoitteita kestävä kehityksen saralla ja samantapaisia tapoja tarkastella ja mitata kestävyttä? Voivatko ne olla risteäviä, päällekkäisiä, täysin erilaisia? / *Do you think that different stakeholders in urban development projects have a shared understanding of these uncertainties? Do you feel that stakeholder groups have similar objectives with regard to sustainability and similar ways of defining and measuring sustainability? Can the objectives, definitions and ways of measuring be clashing, overlapping or completely different from one another?*



The six categories of uncertainty with their respective questions were presented to the interviewees.

### **Käsitykset ja näkemykset liittyen kaupunkikehityshankkeiden kestävyteen / *Understanding and perceptions regarding sustainability in the context of urban development projects:***

- Millä tavalla organisaationne vaikuttaa Helsingin kaupungin kestävyteen (yleisesti/yksittäisten kaupunkikehityshankkeiden osalta)? / *How does your organization influence the sustainability of Helsinki (on a general level / through specific development projects)?*
- Miten näette organisaationne suhteessa Trigoni-hankkeeseen/Pasilan alueen kehitykseen? / *How do you view the relationship of your organization with regard to the case project Trigoni / the development of Pasila area?*

- Millä tavalla organisaationne ja sen tavoitteet tulevat huomioituksi kaupunkikehityshankkeissa rakennusliikkeiden toimesta? / *How are your organization and its aims taken into account in urban development projects by construction companies?*
- Mikäli näkemykset kestävydestä ja kestävyystavoitteet eivät ole sidosryhmien kesken yhtenevät, tehdäänkö niiden yhteensovittamiseksi yleensä tarpeeksi työtä? / *If the understanding of sustainability and of sustainability objectives differ among stakeholders, is enough effort put into harmonization?*
  - Onko yhteensovittamiselle tarvetta? / *Is there a need for harmonization?*
  - Miten yhteensovittamista tulisi toteuttaa? / *How should harmonization be carried out?*
  - Onko teillä kokemuksia tällaisesta työstä? / *Do you have experience of such efforts?*
  - Toivoisitko enemmän yhteistyötä sidosryhmien välillä kestävyyskysymysten parissa ja millaista? / *Do you wish that there was more collaboration among stakeholders regarding sustainability issues and if so, what kind of collaboration?*