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A Sustainable Business Model for Urban Natural

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A SUSTAINABLE BUSINESS MODEL FOR URBAN NATURAL

An Interactive Qualifying Project submitted to the Faculty of WORCESTER POLYTECHNIC INSTITUTE in partial fulfillment of the requirements for the degree of Bachelor of Science

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Abstract

The purpose of this project was to establish a value proposition and Business Model Canvas for Urban Natural, a green space participatory mapping tool. In order to do so, the general business needs of Growing Pathways and the value of the tool to stakeholders were determined, and the business models of similar mapping tools were evaluated. A Business Model Canvas for Urban Natural and a set of recommendations for future development of Urban Natural was created.

Acknowledgments

Executive Summary

Green initiatives have increased in popularity and global focus in recent years, especially within the European Union (EU). Members of the EU have begun adopting legislation focused on developing green infrastructure, and Denmark is no exception. Currently, Denmark is involved with GREEN SURGE, a conservation movement aimed at protecting natural resources and maintaining native wildlife.

In the city of Copenhagen, green spaces are one of the major means of addressing conservation efforts. Green spaces provide a wide range of benefits to the community while also aligning with green initiatives promoted by Denmark and the European Union.

The major stakeholders in green space development are community outreach organizations, environmentalists, municipalities, and planners and developers. Prior literature indicates that the overall functionality and success of a green space relies on these stakeholders agreeing on the potential and desired use of the space. One major obstacle to the creation of successful green spaces is limited communication between stakeholder populations. Researchers determined that participatory mapping—maps where the community has the ability to input data—is a highly effective tool for increasing inter-stakeholder communication.

In an effort to address the challenges in stakeholder communication, the sponsor, Growing Pathways, has created a prototype of a multi-stakeholder participatory mapping platform called Urban Natural. In order for businesses to be successful, the creation of a sustainable business model is recommended. This project laid the groundwork for creating a sustainable business model for Growing Pathways' Urban Natural tool by generating a value proposition and establishing a Business Model Canvas. Finally, the project developed recommendations for Growing Pathways based on findings from the collected data.

Generate a Value Proposition for Urban Natural

The value proposition is the cornerstone of the Business Model canvas and describes how a product benefits its customers. In order to develop a comprehensive value proposition, the project team conducted interviews with representatives of the major stakeholders in green space development. These include planners and developers, municipalities, outreach organizations, and environmentalists. From these interviews, information on the utility of Urban Natural was gathered. This data provided insight into how the stakeholders perceived Urban Natural and was used to create a detailed value proposition.

Establish a Business Model Canvas

A Business Model Canvas was created via three methods: an interview with the project sponsor, interviews with representatives from other participatory mapping tools, and a workshop involving the project sponsor and their close partners to develop the Business Model Canvas.

To begin the process of creating a Business Model Canvas, more knowledge of Growing Pathways' day to day operations was required. This was achieved through an interview with

Growing Pathways' co-founder. This yielded quantitative data on financial information which was used to aid in the creation of the Business Model Canvas.

After this, the project team identified similar mapping tools that have been widely adopted by their target consumers and conducted interviews with their representatives. From these interviews, information on the history, business model, and objective of each organization was gathered. The purpose of these interviews was to reverse-engineer a Business Model Canvas for each mapping application.

The final step before creating the project deliverables was hosting a workshop with the project team, project sponsor, and close partners. The goal of this workshop was to incorporate a variety of perspectives into the final Value Proposition and Business Model Canvases.

Conclusions and Recommendations

Once all methods were complete, these canvases were combined with the data gathered from the previous methods to form the project deliverables, a final Value Proposition Canvas and Business Model Canvas.

Value Proposition

The Value Proposition Canvas was completed with respect to each stakeholder individually and then a combined canvas was created to describe the overall value proposition of Urban Natural:

- Stakeholders in green space development are able to utilize the Urban Natural tool to facilitate effective communication and promote interdisciplinary collaboration.

- Urban Natural allows for the incorporation of citizens in the green space development process. Citizens using the tool will have the same voice in the discussion as other stakeholders.
- Urban Natural helps to break down the barriers and complications that arise from the process of the development and revitalization of green spaces.
- Urban Natural allows users to visualize and inspire community-driven projects in their surrounding and overarching communities.

Business Model Canvas

The Business Model Canvas for Urban Natural was created by merging the perspectives from the stakeholders and the partners of Growing Pathways. Using the Value Proposition Canvas as the starting point, a Business Model Canvas was created to establish a foundation for the future success of Urban Natural.

Tool Modifications

Based on findings from stakeholder interviews, the project team recommends that Growing Pathways include the following features in the Urban Natural tool before launching the platform:

- *Calendar and Events Filter.* Stakeholders request that there be a means of displaying upcoming events to promote community involvement.
- *Moderators and Expert Support.* Stakeholders feel that it is important for moderators and experts to be available to answer questions that anyone might have.
- *Idea Proposal Rating System.* Stakeholders suggest that there be a means of rating proposals in multiple metrics in order to determine the value of suggested ideas.
- *Incentives for Participation.* Stakeholders believe that Urban Natural needs a sustained and active user base. Establishing an incentive program that encourages active engagement is important to maintain the tool's effectiveness.

Future Work

- *Broaden the Dataset.* The project sponsor should continue to interview stakeholders who have varied roles within their stakeholder population to ensure a breadth and depth of information is collected.
- *Establish a Critical Mass.* Stakeholders indicate that participatory mapping platforms must have an active user base. Therefore, it is necessary for Urban Natural to establish a critical mass of users before commercial integration. This can be fulfilled by partnering with established networks, such as *Natur I Byen*.
- *Private Development*. Currently, the prototype of the tool provides some of the features that stakeholders were interested in using. However, many of the recommended features cannot be implemented due to the limitations of its current platform. Therefore, it is encouraged Growing Pathways should take on a programmer and create the Urban Natural tool in-house.
- *Beta Test Urban Natural.* Stakeholders should be contacted to participate in workshops to test new versions of Urban Natural. This will serve as a check to ensure that Urban Natural will be relevant and useful to stakeholders once it is fully released.

The project team believes that the work from this project will help Growing Pathways improve Urban Natural to ensure it is a sustainable and effective platform for green space development.

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Task	Primary Author	Primary Editor
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1. Introduction	CM	ALL
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2.2 The Challenges of Developing Urban Green Spaces	RJ	ALL
2.3 Addressing Collaboration Challenges Using a Software Platform	CM	ALL
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1. Introduction

Green initiatives have increased in popularity and global focus in recent years, especially within the European Union (EU). Members of the EU have begun adopting legislation focused on developing green infrastructure, and Denmark is no exception (Benedict & McMahon, 2006). Currently, Denmark is involved with GREEN SURGE, a conservation movement aimed at protecting natural resources and maintaining native wildlife (Olaffson, 2019).

In the city of Copenhagen, green spaces are one of the major means of addressing conservation efforts. A green space is defined as "a natural area in or around a development, intended to provide a buffer, noise control, recreational use, and or wildlife refuge, all in order to enhance the quality of life in and around the development" (Evans et al., 2007). Green spaces provide a wide range of benefits to the community while also aligning with green initiatives promoted by Denmark and the European Union. Whether it be through improving air quality, protecting natural biodiversity, or increasing the health of residents, green spaces work to improve quality of life in an efficient manner (Kolbe & Wüstemann, 2015).

In order for green spaces to have the previously stated impacts, the appropriate stakeholders must collaborate. The primary stakeholders involved in urban green space development in Denmark include municipalities, community outreach organizations, environmentalists, and urban planners and developers. Prior literature indicates that the overall functionality and success of a green space relies on these stakeholders agreeing on the potential and desired use of the space (Lee & Maheswaran, 2011). However, one major obstacle to the creation of successful green spaces is limited communication between stakeholders. Researchers determined that participatory mapping—maps where the community has the ability to input data—is a highly effective tool for increasing stakeholder communication (Johnson, Mauriello, Antunes, & Bergeron, 2018).

In an effort to address the challenges in stakeholder communication, the sponsor, Growing Pathways, is creating a multi-stakeholder participatory mapping platform called Urban Natural. The success of multi-stakeholder platforms has been demonstrated in other fields (Faysse, 2006), but there is limited research published on this specific application of a communication platform. Urban Natural aims to resolve communication issues raised by stakeholders of urban green space development, thus facilitating the creation of effective green spaces. Research exploring the market potential of Urban Natural in the city of Copenhagen suggests that the tool is desired by stakeholders and will provide benefits to the greater community (Johnson et al., 2018). If proven successful on a local level, Urban Natural has potential to expand to a global market.

In order for business to be successful, the creation of a sustainable business model is recommended. There is a consensus that a business model, regardless of its form, allows for proper planning, designing, and structuring of a business (George & Bock, 2011). Without a model to showcase the viability of a product, attracting prospective customers becomes difficult.

This project laid the groundwork for a sustainable business model by creating a Business Model Canvas and Value Proposition Canvas for Growing Pathways' Urban Natural tool. These canvases included an assessment of the product's value, market, customers, costs, and revenue streams. In addition to the business canvas, this project analyzed information obtained from stakeholder interviews to propose new features for Urban Natural and future work for the sponsor.

2. Background

The economic, environmental, and health benefits of urban green spaces have been the focus of research in recent years (Kolbe & Wüstemann, 2015). Despite these benefits, there are challenges in collaboration to build successful green spaces. Participatory mapping, a technique of using maps and user input to describe an area, has been identified as an effective way to increase communication through online platforms. Growing Pathways, this project's sponsor, has been working to create the participatory mapping platform Urban Natural with the goal of increasing green space stakeholder communication.

2.1 The Value and Stakeholders of Urban Green Spaces

Green spaces have a demonstrated positive influence on surrounding neighborhoods. These impacts come in many forms, the first being an increase in the livability of urban spaces. A team in China simulated temperatures in cities during hot summers and found that green spaces can reduce temperature highs by an average of 3.5°F (Sun et al., 2017). Residents of Sheffield, England were surveyed and overwhelmingly agreed that green spaces improve social inclusion and child development through outdoor activities and unstructured play. (Swanwick, Dunnett, & Woolley, 2003).

Green spaces also have significant effects on the property values of nearby homes. Researchers in Cologne, Germany found an inverse correlation between an apartment's distance to green spaces and its value, showing that every meter increase in distance leads to a 0.0038% decrease in apartment prices. Additionally, these researchers discovered that increasing green space coverage by 1% near a property increases its value by 0.1% (Kolbe & Wüstemann, 2015). Other researchers argue that green spaces are related to the health of the local economy as a whole: finding that lower green space cover is correlated with lower income areas (Christine Haaland & Cecil van den Bosch, 2015).

Beyond economic health, green spaces also promote environmental health. They can reintroduce native fauna and flora that were displaced by urban development increasing an area's biodiversity. Further, green spaces can improve air quality and trap carbon, thus helping to mitigate climate change (Kolbe & Wüstemann, 2015).

Given the positive value of green spaces in urban settings, the European Commission implemented the GREEN SURGE project in 2013. GREEN SURGE's mission was to explore and prototype methods of "...linking green spaces, biodiversity, people and the green economy in order to meet the major urban challenges..." (Olaffson, 2019). This initiative conducted research in eleven European countries—including Denmark— and utilized the data to provide relevant information on green infrastructure and its impacts in the European Union. From this data, guidelines on the governance and planning of urban green spaces were developed to better direct policymakers on the creation and oversight of effective green spaces in collaboration with the local stakeholders.

According to *The Governance of Urban Green Spaces in Selected EU-Cities* (Buizer et al., 2015), non-governmental organizations (NGOs) have increasingly been classified as participants in green space implementation and often represent different stakeholder groups. These include environmentalists and community outreach organizations. Environmentalists are vital to green space creation because they understand local biodiversity and how to create green spaces that benefit local flora and fauna. Community outreach organizations also play a vital role in green space development. A study examining community perceptions of green space development concluded that green spaces will have a higher chance of success if the community believes in their positive potential (Lee & Maheswaran, 2011). Therefore, it is important to engage the community in the planning and development process in order to construct a space that they will enjoy. Doing so will increase a green space's continued use and overall success.

In addition to NGOs, planners and developers and municipalities play a major role in green space development. Planners and developers serve as the physical actors in green space construction, providing the labor and equipment required to create the spaces. Recent research conducted in Copenhagen examining stakeholder interactions found that municipalities are the link between environmentalists, planners and developers, and local communities in green space creation (Johnson et al., 2018).

2.2 The Challenges of Developing Urban Green Spaces

The varied perspectives and values of stakeholder groups can make collaboration difficult. Examining stakeholder collaborations in Copenhagen, prior researchers found that the input of residents was often limited to initial design considerations and did not extend to conversations about routine use of the space or desired outdoor amenities (Johnson et al., 2018). For example, a previous Interactive Qualifying Project (IQP) found that during the construction of Mozart Plads, a green space renovated in 2014, only a few residents were surveyed to obtain feedback on desired functionality or green space amenities. Consequently, there was a reduction in post-renovation use by the community resulting in diminished upkeep of the space, as seen in Figure 1.

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Figure 1. Mozart Plads (Google Maps, 2017)

By contrast, in the 2015 renovation of Byparken a community committee was created who offered details on the desired features of the space, including a soccer field, volleyball court, and fruit garden (seen in Figure 2.)

Figure 2. Byparken (Hele ørestads Turns Ten and Still in Development, 2018)

These features were popular and resulted in residents joining sports leagues and maintaining the fruit garden; further supporting the idea that it is necessary to include the community during the planning stage of green space development.

Environmentalists and developers experience collaboration rifts. Given budgetary concerns, developers often do not consider the design input of environmental scientists who seek to promote biodiversity. Examining the Mozart Plads renovation process, researchers found that architects designing the park lacked the knowledge on how to increase biodiversity within the park but did not connect with environmentalists to obtain suggestions on how to increase the space's biodiversity (Johnson et al, 2018). Conversely, in Byparken, features such as a dirt pathway through different tree and shrub species were added at the advice of environmentalists. The addition of these features in combination with a hands-off approach by the maintenance

team allowed for Byparken to achieve a sense of being in nature rather than being in a park surrounded by apartment blocks.

The challenge of creating successful green spaces highlights the need for improved collaborative efforts. Increasing communication will allow the community to take advantage of the ecological, physical, and economic benefits provided by urban green spaces.

2.3 Addressing Collaboration Challenges Using a Software Platform

Using software as a means of connecting the general population has become increasingly valuable in recent years (GAP2, 2014). One way of utilizing software is through participatory mapping: the process of collaboratively developing a map with multiple participants. Maps can focus on any number of subjects, such as community boundaries or green spaces. This distributed approach allows those involved to gain a holistic picture of the subject of interest, ideally coming to a consensus that spans everyone's view. Maps can be created by allowing participants to draw on paper maps and combining them digitally or giving everyone access to an online mapping tool.

Researchers in the EU claim that participatory mapping has a wide array of benefits, leading them to be the most popular visual participatory method (GAP2, 2014). Participatory maps combine experience-based knowledge with specific locations, allowing users to add qualitative data such as their opinions of a location. This gives users a comprehensive view of sites encompassing numerous perspectives and values. While maps created by a single party can also convey qualitative data, it typically only represents the views of the map's creator. Additionally, participatory maps open a dialogue to create a cohesive understanding of a space by allowing individuals to interact with each other and discuss their personal viewpoints. Further, participatory mapping can rapidly produce an overview of the problems a community may be facing. By representing issues in a spatial medium, participants can work together to connect seemingly independent problems and develop solutions to the larger issues affecting the community (Lienert, 2018).

Green Map System, Inc. is an example of a participatory mapping tool. Teams of users have the ability to add icons and information about locations to a map. Green Map allows participants to add a variety of icons, ranging from environmental features, to cultural features, such as public works, landmarks, neighborhoods, and information on sustainable living. The site has a wide array of maps that are free to view, depicting everything from the location of urban green spaces to the location of energy efficient buildings, as seen in Figure 3 (Green Map System, Inc., 2018).
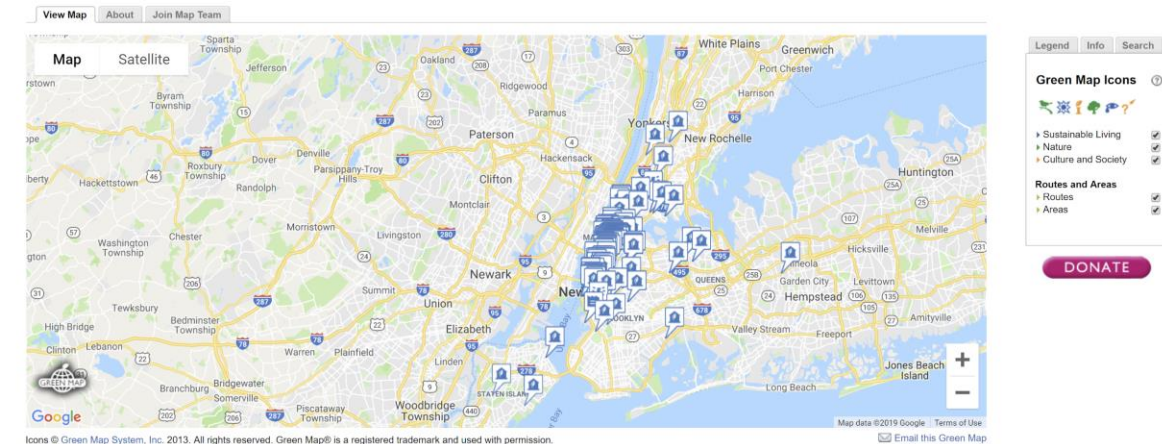
Figure 3. Green Map System Screen Capture (Green Map System, Inc., 2018)

After clicking on an icon, a detailed description of the site appears, which can be viewed in Figure 4 below.
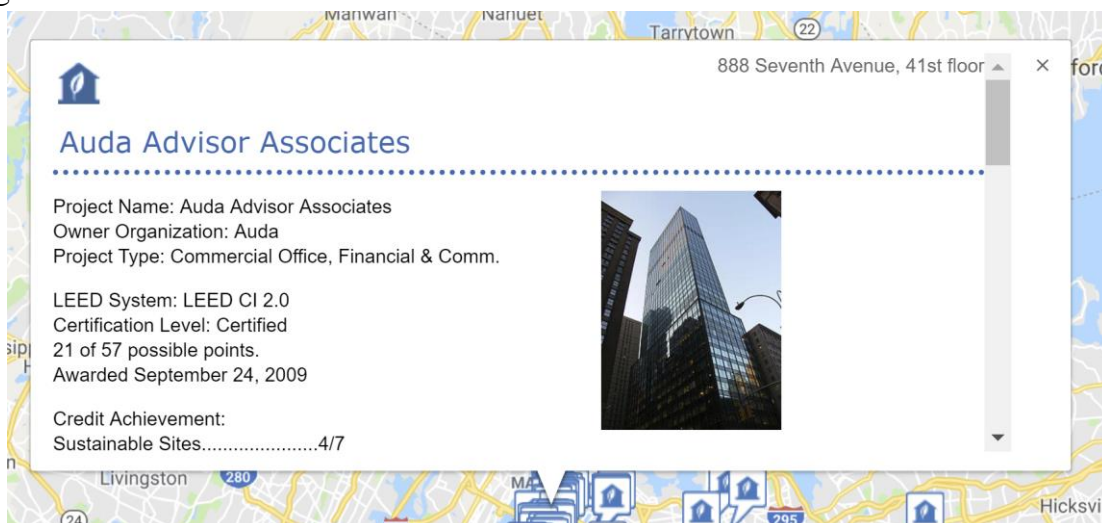
Figure 4. Detailed View of a Site in Green Map (Green Map System, Inc., 2018)

Another example of green space mapping is OS Greenspace. This map exists within Ordnance Survey Maps, which allows users to view green spaces in Wales, Britain, and Scotland. Users can also plot a route through an area of their choice (OS Greenspace, 2019). However, this tool is not participatory as there is no way for users to add, rate, or comment on green spaces presented on the map. This limits the applications of the map, meaning that it does not lend itself towards improving communication between green space development stakeholders. Despite its many features, the lack of communication in OS Greenspace hinders its ability to achieve the benefits of participatory mapping.
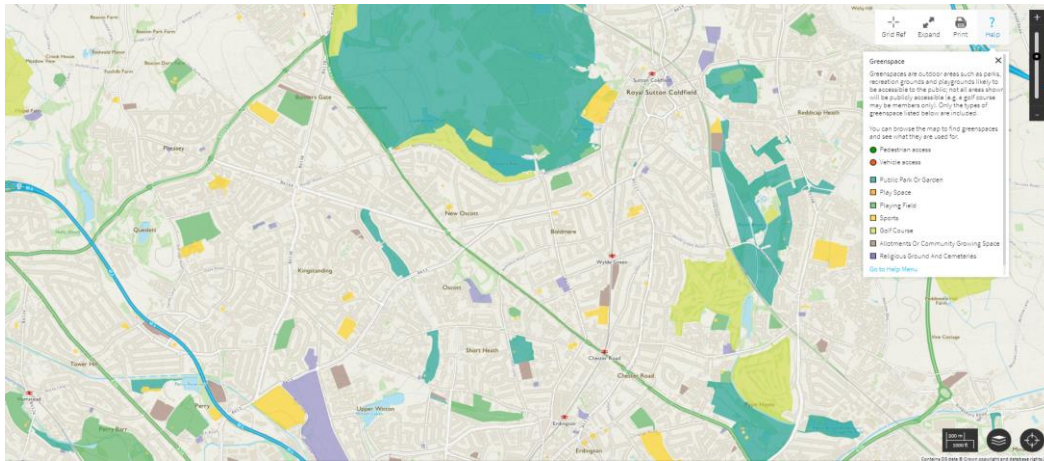
Figure 5. OS Greenspace Screen Capture of Birmingham, Scotland (OS Greenspace, 2019)

2.4 Growing Pathways

To increase the number of successful green spaces like Byparken, the sponsor, Growing Pathways, looks to improve stakeholder communication during all phases of green space development and use. Growing Pathways was established in 2015 with the mission to promote "healthy human-nature relations" and create sustainable business opportunities (Growing Pathways, 2019). To do so, Growing Pathways is focused on three United Nations Sustainability Development Goals: Sustainable Cities and Communities, Climate Action, and Life on Land. Sustainable Cities and Communities are focused on developing resilient and sustainable settlements, where Climate Action and Life on Land promote combating climate change and protecting plants and animals on land (2019).

Formerly based at the Copenhagen Business School, the organization focuses on entrepreneurship and creativity to change how humans interact with nature in Denmark and the Baltic Region. Growing Pathways believes that the widespread distribution of information can enable more creative and greener business solutions.

Growing Pathways has already started to solve communication issues within the ecological sector by creating *NaTur i Byen* (Nature in the City or NiB), a network to connect hundreds of experts and volunteers in order to share knowledge and collaborate on projects. Growing Pathways worked with Miljøpunkt Indre By & Christianshavn, Agenda 21 Centre Central Copenhagen, and Life Exhibitions to create NiB. The network showed tremendous promise by the end of its pilot year with nearly 600 members (Growing Pathways, 2019). Due to its growth, NiB received an additional grant and will continue to connect experts and volunteers interested in sustainable development. While NiB has created a loose network between stakeholders, collaboration in green space development is still a prevalent issue.

In an effort to address these challenges, a previous IQP project suggested that Growing Pathways use a software platform for sharing ideas and aligning visions (Johnson et al, 2018). This was manifested in the Urban Natural tool, which is a pilot project within the grant for NiB.

The tool is currently in the prototype phase and is hosted on Mapotic©. This was recommended as a social media-based mapping software to provide context about specific locations and allow users to classify spaces with various filters focused on the contents of the area. This generates a platform that works on a local level without having to engage with other networks.

Urban Natural uses specific locations as central elements in mapping urban nature value and urban change, and allows for knowledge, memory, visions, and experiences to be visible to all surrounding stakeholders. The functionality of the mapping tool will be improved as Growing Pathways moves towards a beta version. As seen in Figure 6, the current user interface allows users to add media, text, data, or even offer their vision of why a site has value.
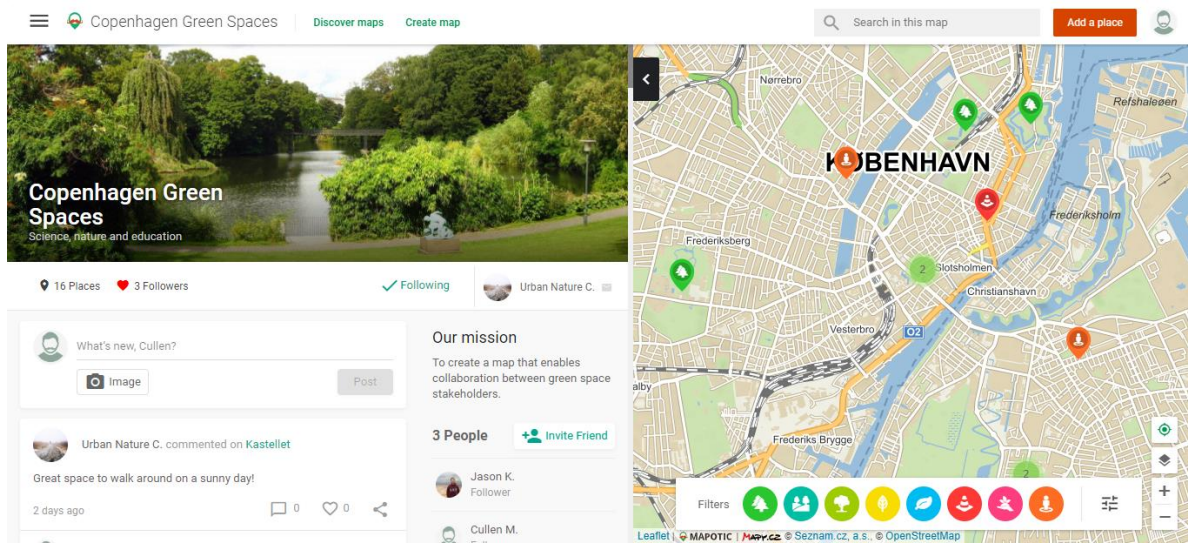
Figure 6. Urban Natural Prototype Screen Capture of Copenhagen (Growing Pathways, 2019)

Urban Natural will give green space stakeholders easy access to data previously difficult to obtain. Further, it will give municipalities a real-time view of issues communities are facing with specific green spaces and suggestions people have to improve them. The user is able to filter their search in order to find local stakeholders associated with each location. A link to the live prototype can be found in Appendix X for readers to explore the tool. Once the tool has been fully developed, Growing Pathways will use it as a means to become financially sustainable as a business.

As discussed previously, similar mapping tools exist, however none of them fill the gap in green space development identified by Growing Pathways. While they may share some features with Urban Natural, they do not strive to accomplish the same goals. The project analyzed numerous tools before arriving in Copenhagen and collected its findings in the spreadsheet found in Appendix X.

2.5 Creating a Business Model for Urban Natural

Growing Pathways would like to transition from a grant-based funding strategy to a more consistent revenue stream (Growing Pathways, 2019). In order to help them progress along this path, this project focused on affirming the value proposition and developing a Business Model Canvas for Urban Natural, both of which are essential elements of the business model. The modern concept of a business model came about in the 1990s as a result of competition between companies to attract investors during the initial explosion of startup businesses in Silicon Valley (Piscicelli et al 2017). Research on business model concepts has grown as companies seek to attract investors (Standing & Mattsson, 2018). A survey of nearly 4,000 senior managers by Raphael Amit and Christoph Zott revealed that creative new products and services are believed to be a "source of competitive edge" in an industry (Dringoli, 2009, p. 41). Yet, to harness this competitive edge, companies need a plan for how they will conduct business.

Researchers at Baylor University explored the shared meaning and understanding of business models. They surveyed 101 entrepreneurs and found that business models are frequently associated with exploration, planning, mapping, design, and structure (Gerard George & Adam J. Bock, 2001). As seen in Figure 7, Professors of marketing Harlan Spotts and Janelle Goodnight created a flowchart for mapping a business model that involves an assessment of environment, value creation, e-strategy, and implementation.

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E-Business Planning Audit
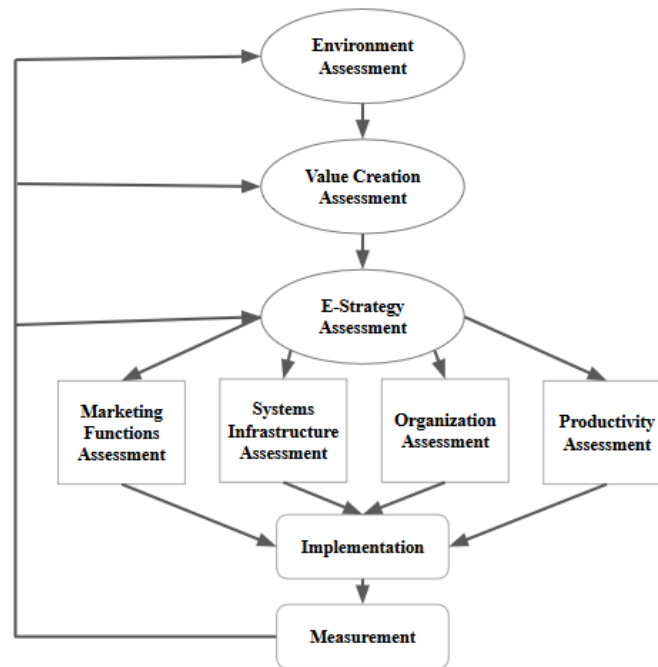
Figure 7. Flowchart showing the E-Business Planning Audit (Spotts & Goodnight, 2001)

First, the *Environment Assessment* involves entrepreneurs exploring the economic opportunities and challenges they face, such as socio-cultural, climate, potential customers, and financial risks. Second, the *Value Creation Assessment* is designed to aid entrepreneurs in understanding what incentivizes customers to conduct business with the company. Finally, an *E-Strategy Assessment* includes creating a value proposition and defining the user experience including marketing, systems infrastructure, organization, and productivity (Spotts & Goodnight, 2001).

One of the most common methods for organizing a business model is the use of the Business Model Canvas. Strategyzer© presents one variation of the Business Model Canvas, dividing business model creation into 12 elements, as seen in Figure 8. These elements are similar to the assessments proposed by Spotts and Goodnight by encouraging planners to ask a series of questions about their business development. Both models have similar categories ranging from a value proposition to details on resources and infrastructure needed to bring a product to market.

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Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
	Key Resources		**Channels**	
Costs Structure			**Revenue Streams**	

Figure 8. Business Model Canvas (Strategyzer, 2018)

The Business Model Canvas further explores dimensions related to customers, including types of customers, channels of product or service delivery, and marketing strategies. Additional elements on the Business Model Canvas relate to activities, partners, and resources. Financial information such as Revenue Streams and Costs Structure are found at the bottom of the Business Model Canvas. Definitions of each element can be found in Table 1.

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Canvas Element	Definition
Value Proposition	Describes the products and services that create value for specific customer segments.
Customer Segments	The type of customers and groups that find value in in the business products. Some customer segments may not produce revenue.
Channels	How the company communicates with and reaches its customer segments to deliver the value proposition.
Customer Relationships	The relationship between Customer Segments and the business.
Key Resources	Describes the assets required to make the business model work. For an online business, this could include server banks to run a product, programmers to create the software, and employees to update the program with new features or events.
Key Activities	The things a business undertakes to make its business model work.
Key Partners	The collaborators/suppliers that make the business model work.
Revenue Streams	How the business will bring in money needed to sustain itself. This should include detailed pricing methods to monetize the value created by the value proposition targeting the Customer Segments.
Costs Structure	The costs associated with running a business and encompasses other elements that require capital to function.

Table 1. Descriptions of the 12 Elements Comprising the Business Model Canvas

As the central element of the Canvas, the Value Proposition describes the value generated by the business to attract customers. To create a Value Proposition, Strategyzer suggests the use of a Value Proposition Canvas, as seen in Figure 9.

Value Proposition   *Customer Segments*

Gain Creators		Gains
Pain Relievers		Pains
Products & Services		Customer Jobs
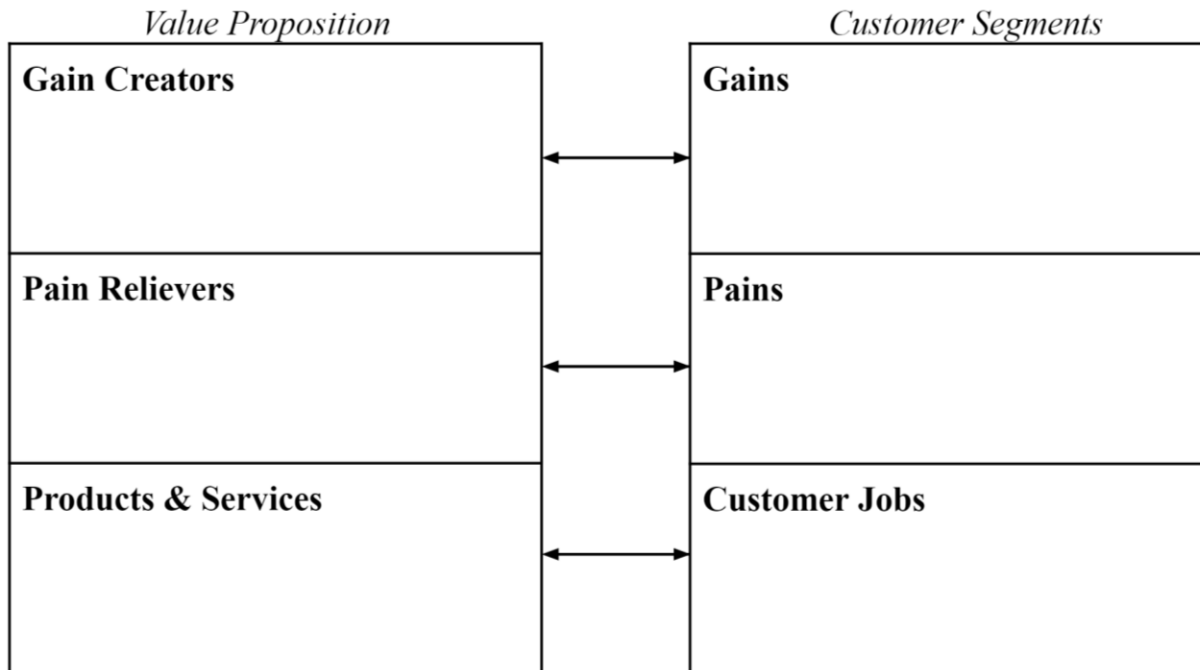
Figure 9. Value Proposition Canvas (Strategyzer, 2018)

This canvas contains six elements, breaking down the Value Proposition into the benefits the business provides to its customers, the challenges it solves, and the actual products it offers. These elements are defined below.

Canvas Element	Definition
Gains	The advantages customers receive by using a product or service.
Gain Creator	The way in which Gains are created for the customer.
Pains	Challenges customers normally face when completing a certain task.
Pain Relievers	How a product or service reduces the Pains faced by customers.
Customer Jobs	The actions customers must complete to get the Gains and Pain Relievers of a product.
Products and Services	Specific actions/goods made by the company that create the Gain Creators and Pain Relievers for customers.

Table 2. Descriptions of the Six Elements of Value Proposition Canvas

As interest in developing green spaces continues to grow, there is an ever-growing need to help stakeholders communicate with one another. This will ensure that new green spaces will improve the quality of life for surrounding citizens and have positive environmental and economic impacts. Using a combination of the Value Proposition Canvas and Business Model Canvas, this project will create the framework for the future business model of Growing Pathways' Urban Natural tool.

3. Methodology

This project aimed to lay the groundwork for the creation of a sustainable business model for Urban Natural. In order to accomplish this, the project had two primary objectives:

1. Generate a Value Proposition for Urban Natural.
2. Establish a Business Model Canvas for Urban Natural.

Figure 10 displays the chronological development of the methodology that was followed to attain the research objectives within the seven weeks dedicated to this project.
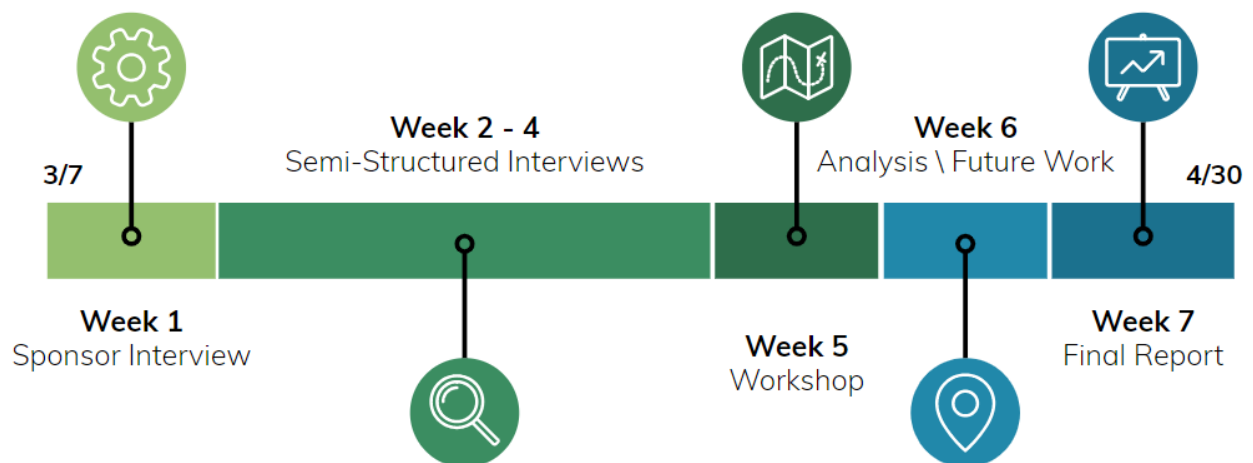
Figure 10. Research Methodology Timeline

3.1 Objective 1: Generate a Value Proposition for Urban Natural

The first objective of the project focused on creating a Value Proposition for Urban Natural. This is the cornerstone of the Business Model Canvas, describing how Urban Natural benefits its customers and helps to promote successful green space development. The project team combined prior published research and the results of interviews with green space development stakeholders to gain a deeper understanding of the value of Urban Natural.

3.1.1 Semi-Structured Interviews with Green Space Development Stakeholders

In order to develop a comprehensive Value Proposition, the project team conducted interviews with individuals from each stakeholder category: community outreach organizations, environmentalists, municipalities, and planners & developers. From these interviews, information on the utility of Urban Natural was gathered.

Stakeholders were contacted from a list provided by the project sponsor, and interviews were conducted with individuals who responded to the requests. The project aimed to interview at least 12 individuals from each group as this is the minimum number deemed sufficient for a study of a relatively homogeneous population (Guest, Bunce, & Johnson, 2006). However, due

to stakeholders' availability and time constraints, the team was unable to achieve this number of responses. This presented sampling bias as individuals unwilling to talk to the project may have offered an alternative perspective, however it was determined that given the time constraints it was paramount to focus on stakeholders who were accessible and willing to offer insights.

Interviews began by asking all participants a set of general questions. First, the team established the stakeholders' role in green space development and their current attitudes toward prioritizing sustainability. Next, the concept of participatory mapping was introduced through a presentation of Urban Natural and the features it contains. Participants were asked if they had used anything similar in the past and their rationale behind that decision. Additionally, the team gauged participants' interest in Urban Natural by asking them to identify current features they like and disliked, as well as potential features they would like to see implemented.

Once the general question set had been completed, the team moved on to questions tailored to each stakeholder group. A brief sample of these questions can be found below:

Community Outreach Organizations:
- Do you face any issues when trying to build successful green spaces?
- How much time do you spend per project finding and contacting developers?

Environmentalists:
- Do you believe that proper attention is given to biodiversity in the development of green spaces in Copenhagen?
- How would you like to see this change?

Municipality Representatives:
- Can you walk us through the general process of green space development?
- How much time do you spend per project finding and contacting developers?

Planners and Developers:
- Does your organization reach out to environmentalists or community groups during green space development?
- Are there incentives for using environmentally-friendly construction practices?

A full list of questions is included in Appendix III. The semi-structured nature of the interviews also allowed for additional questions and discussion topics to emerge. Most interviewees engaged the team in detailed discussions about their work and their opinions on Urban Natural, leading to an average interview length of approximately 60 minutes. To maintain consistency, all stakeholders were shown the same version of Urban Natural during their interviews, and the team refrained from adding ideas brought up in prior interviews to the discussion. This ensured that no additional biases were introduced from interviewees basing their feedback on an inconsistent set of information about Urban Natural and the project as a whole.

Most interviews were conducted in person, either at the workspaces of stakeholders or at the offices of Miljøpunkt Indre By & Christianshavn. Stakeholders located in foreign countries were interviewed via Skype. All interviews were voice recorded with permission from the interviewee, and detailed notes were taken. Informants were told of the purpose of the interviews

and their role in the project through a consent statement, offered in Appendix II for virtual interviews and Appendix V for in-person interviews.

In some cases, the organization's point of contact did not have time for a full interview, in which case the interview questions were sent via email. In order to better explain Urban Natural to these interviewees, the project team created a YouTube video giving a demo of Urban Natural. The video's objective was to give a viewer from any background a working knowledge of Urban Natural in concise manner. The video highlighted the key features of the tool, focusing on the general and advanced filters for green spaces and stakeholders, as well as how users contribute and interact with one another. In addition to the video, interviewees were also sent a link to the Urban Natural prototype, so they could explore it in more depth if they wanted. Links to the YouTube video and Urban Natural prototype can be found in Appendix X.

The interview responses were organized into a matrix and key themes were noted. This allowed the project to assess the aggregate responses and determine overlapping themes within stakeholder groups and across all stakeholders. This data provided insight into how the stakeholders perceived Urban Natural, which the project team used to create a detailed value proposition.

The final step of the interview analysis was to suggest modifications for the tool in order to make it useful to as many stakeholders as possible. The team analyzed the coding from the stakeholder interviews, looking for features and sources of value most commonly expressed by each stakeholder population. These features are discussed in depth in the Chapter 6.

3.2 Objective 2: Establish a Business Model Canvas for Urban Natural

The second objective focused on creating a Business Model Canvas for Urban Natural. To accomplish this, three methods were employed: an interview with the project sponsor, interviews with representatives of other participatory mapping tools, and a workshop to develop the Business Model Canvas.

3.2.1 Semi-Structured Interview with Project Sponsor

To start the process of creating a Business Model Canvas, more knowledge of Growing Pathways' day to day operations was required. This included their desired revenue streams, expenses, and customer relationships. While some information was publicly available, the team had great deal of knowledge gaps to fill. To address this, a semi-structured interview was conducted with Growing Pathways' co-founder. A list of sample questions is provided below, and the full list of questions is included in Appendix I.

- What is Growing Pathways' desired growth in the next year? The next five years?
- How does Urban Natural currently bring in revenue?
- What expenses does Growing Pathways currently have?

The interview was conducted during the first week of the project and took approximately 120 minutes. The participant was asked to give verbal consent (Appendix II) prior to their interview, which informed the interviewee of the purpose of the interview and their specific role

in the project. An audio recording of the interview was made, and notes were taken in a text document. Quantitative data on financial information was extracted from the notes and placed into a separate text document to aid in the creation of the Business Model Canvas.

3.2.2 Semi-Structured Interviews with Similar Green Space Mapping Organizations

As discussed in Background chapter, a wide range of green space mapping tools exist. While the goals of these tools differ from those of Urban Natural, they can provide valuable insight into the keys to developing a business model for a mapping application. The project team identified which tools have been widely adopted by their target consumers and was able to secure interviews with the representatives from two other mapping applications. From these interviews, information on the history, business model, and objective of each organization was gathered. The semi-structured nature of the interview also allowed for additional questions and discussion topics to emerge. Given the limited availability of resources, convenience sampling was used. Despite this, the organizations provided valuable insight into creating viable participatory mapping tools.

Interviews began by asking all participants a set of general questions. These questions explored how each organization operates, challenges they faced in their early stages, and what they have learned throughout this process. Logistical data including size and scope of their organization was collected as well. A set of sample questions is given below. A full list of questions is included in Appendix IV.

- What is the inspiration for what you do?
- How is your organization funded?
- What challenges did you face during the development phase of your product?

Interviews were conducted over Skype as both organizations were based internationally. Each interview was recorded with the permission of the interviewee, and detailed notes were taken. Interviews took an average of 60 minutes.

After the interview, the project set out to reverse-engineer a Business Model Canvas for each mapping application. The notes and transcript were used to identify major parts of the Canvas, specifically focusing on Revenue Streams and the Value Proposition. In addition to the Canvas, the project outlined the major milestones each application had achieved since its inception and their growth strategies. Once completed, the project sought to find commonalities between the interview results to highlight potential factors for success that could be incorporated into the final Business Model Canvas for Urban Natural.

3.2.3 Business Model Canvas Template Workshop

The final step before creating the project deliverables was hosting a workshop with the project team, project sponsor, and one of the sponsor's close partners. The goal of this workshop was to incorporate new perspectives into the final Value Proposition and Business Model Canvases. This was accomplished by filling out both canvases as a group and discussing each

element in-depth. With the participants' permission, the workshop was voice recorded and photos were taken of the discussion.

The workshop began with the project team distributing printouts of Strategyzer's Business Model Canvas and Value Proposition Canvas adapted to frame the components of the project team's research, as seen in Figures 11 and 12.

Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
	Key Resources		**Channels**	
Costs Structure			**Revenue Streams**	

Figure 11. The Business Model Canvas (Strategyzer, 2018)

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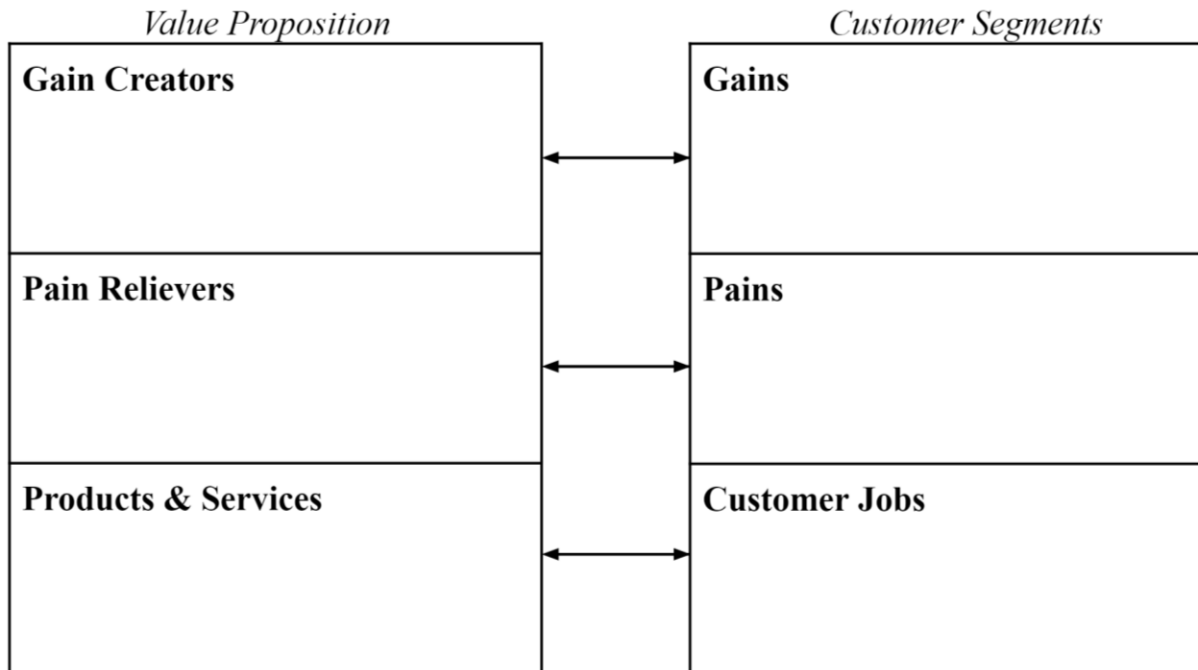
Figure 12. The Value Proposition Canvas (Strategyzer, 2018)

Starting with the Value Proposition Canvas, the project team presented each canvas element to the participants, explaining its definition, and how it fits into the Business Model Canvas as a whole (Table 2). Participants were given an opportunity to ask clarifying questions about each element before taking three minutes to fill in the element on their own. Once time was up, participants discussed what they had written. The discussion continued until a consensus had been reached and the element was completed to the group's satisfaction. This process was repeated until the Value Proposition Canvas was entirely filled in.

Next, the group summarized the entire Value Proposition Canvas in order to place it into the overall Business Model Canvas. Then the group repeated the process of writing and discussion to fill out the rest of the elements in the Business Model Canvas. The workshop concluded when the group felt no more information could be added at the current stage of Urban Natural's development.

The project team prepared probing questions to help drive the conversation forward if it stalled. Some of these can be seen below:

Value Proposition
- What are the dimensions of value that customers knowingly care about?
- What are the value(s) that customers may not be able to articulate yet?

Customer Segments
- Who uses Urban Natural?
- What do users find valuable about the tool?

The canvases created during the workshop were collected and converted into digital files shortly after. These were consolidated to create a Value Proposition and Business Model Canvas

that represented the consensus reached during the discussion, as seen in the Results chapter. Once all methods were complete, these canvases were combined with the data gathered from the previous methods to form the project deliverables, a final Value Proposition and Business Model Canvas.

4. Results

The following results were obtained through the methods described in the previous sections. All personal information has been removed from responses where necessary in order to maintain the anonymity of the participants. The data listed below is the paraphrased responses from each interview.

4.1 Interview with Project Sponsor

The interview with the co-founder of Growing Pathways revealed that the current focus of Urban Natural is on facilitating collaboration between community outreach organizations, environmentalists, municipalities, and planners and developers. Urban Natural is a pilot project stemming from NiB, which the Nordea Fund granted 800,000 USD towards development and expansion. This grant serves as the main form of income for the non-profit. Growing Pathways also brings in a small amount of revenue from speaking fees and workshops related to leadership and sustainability. Expense-wise, Growing Pathways has three employees working on a part-time basis.

Growing Pathways is currently operating on a 2-year plan, scheduled to end in 2020, and is developing a 5-year plan concurrently, scheduled to end in 2023. This plan has Growing Pathways reaching prototype testing of Urban Natural in 2020. In its five-year plan, Growing Pathways seeks to diversify its revenue streams. Growing Pathways is seeking to increase the revenue generated through the tool and have this level match the amount being currently awarded through grants. This target will set the grants received and the capital generated by Urban Natural as the primary revenue streams of Growing Pathways, with a smaller percentage being brought in through workshops and leadership development conferences. Additionally, Growing Pathways plans to have three or four full-time employees in the coming years who will be focusing on programming and community outreach. The project's sponsor will continue to align their work with principles and policies laid out by the United Nations' Sustainable Development Goals (SDG)s. The organization seeks to create a simple narrative on sustainability for all citizens to understand.

4.2 Interviews with Green Space Development Stakeholders

After completing interviews with green space development stakeholders, the information gathered was compiled into a series of categories to compare information across the different stakeholder groups. The distribution of stakeholders interviewed can be found in Table 3.

Stakeholder Type	Number Interviewed
Community Outreach Organizations	4
Environmentalists	3
Municipalities	4
Planners and Developers	3
Total	**14**

Table 3. Distribution of Stakeholders Interviewed

The occurrence percentages for the remainder of Section 4.2 were calculated by using the number of times a concept was stated within a stakeholder group. This can be found in the vertical columns of the tables below. The occurrences are then added across the row, and the percentage is determined by dividing that number by the total number of stakeholders interviewed across all groups. These range from zero to the maximum number interviewed for each stakeholder group.

As stated in the Background, participatory platforms are the most popular form of mapping, therefore it was important to determine the frequencies of such tools among stakeholders in the city of Copenhagen. Below, Table 4 indicates the trends in the use of participatory mapping tools.

CO: Community Outreach Organization, E: Environmentalist, M: Municipality, PD: Planners and Developers

Have you used or seen participatory mapping tools similar to Urban Natural?					
Concept	CO	E	M	PD	Occurrence (n=14)
Seen	3	2	2	2	64.29%
No	1	1	2	1	35.71%

Table 4. Results from Stakeholder familiarity with Participatory Mapping Platforms

Of the stakeholders interviewed, 64.29% are familiar with the concept of participatory mapping for personal or professional use. These organizations were receptive to the idea of utilizing participatory mapping, but across every discipline there was no stakeholder currently using a participatory platform in the development process. This suggests that current similar platforms do not satisfy the needs of the different stakeholder groups in the commercial context.

The prototype version of Urban Natural was demonstrated to the stakeholders in order to determine their initial impression and the value related to different aspects of the tool. Table 5 indicates the features that were mentioned and the frequency that it occurred across stakeholder groups.

CO: Community Outreach Organization, E: Environmentalist, M: Municipality, PD: Planners and Developers

What features (of Urban Natural) are appealing to you?					
Concept	CO	E	M	PD	Occurrence (n=14)
Stakeholder Location Filter	4	1	2	1	57.14%
Increase Community Dialogue	3	1	2	1	50.00%
Participatory Aspect	0	1	2	2	35.71%
Underdeveloped Filter	2	0	1	1	28.57%
Advanced Filters	1	1	1	1	28.57%
Developing Area Filter	1	0	1	1	21.43%

Table 5. Result from appealing features of the Urban Natural Tool

Value of a tool such as Urban Natural is based greatly on the features that stakeholders find appealing and useful in their process. These aspects of the tool have been found valuable by multiple stakeholder groups and are essential in setting Urban Natural apart from similar platforms. The data suggests that these features should be incorporated in the final tool in order to market the tool and allow for commercial integration.

The Urban Natural version shown to interviewees was a prototype, therefore it was important to ensure that any potential new features were determined prior to major development. Below, Table 6 indicates recommended features discussed during the interviews and the frequency with which each aspect occurred.

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CO: Community Outreach Organization, E: Environmentalist, M: Municipality, PD: Planners and Developers

Are there any features you would like to see added?					
Concept	CO	E	M	PD	Occurrence (n=14)
Event Filter	4	2	1	0	50.00%
Calendar	4	2	0	0	42.86%
Partner with Established Platforms	0	0	4	0	28.57%
Moderators/Knowledgeable Question Answers	2	1	1	0	28.57%
Other Information Sources	2	1	0	0	21.43%
Idea Proposal and Rating System	0	1	0	2	21.43%
Contact List	0	0	0	1	7.14%
Incorporate Site History	0	0	0	1	7.14%
Mission of Organization	1	0	0	0	7.14%
Obvious Reason for Use	0	0	1	0	7.14%
Qualitative Benefits of Site	0	0	0	1	7.14%
Underwater Sites	1	0	0	0	7.14%
None	0	0	0	1	7.14%

Table 6. Results for features that Stakeholders desire to be included in the Urban Natural Tool

There are six recommended features that multiple stakeholder types agreed would be beneficial. These should be taken into consideration when creating future versions of Urban Natural. Including these features will allow the tool to be attractive to multiple stakeholders. This will aid the tool in successfully integrating into the commercial realm.

As discussed previously, stakeholders interviewed in the city of Copenhagen do not currently utilize participatory mapping platforms in their development process. Thus, it was important to determine the major issues seen in the implementation of Urban Natural. Table 7 indicates the potential issues with the tool.

Do you see any potential issues with using Urban Natural?					
Concept	CO	E	M	PD	Occurrence (n=14)
Attracting Critical Mass of Users	3	0	4	2	64.29%
Needs In-Person Interactions	4	0	3	1	57.14%
Network Already Established	0	0	3	2	35.71%
Difficult to Communicate with Citizens Through Online Platform	0	0	3	0	21.43%
Qualified Individuals on Site	2	0	1	0	21.43%
Unsure of Commercial Integration	0	0	0	2	14.29%
Too Many Filters	0	0	1	0	7.14%
Educational Process Needed	0	0	0	1	7.14%

Table 7. Results for potential issues of commercial integration of the Urban Natural Tool

The data suggests that there are five potential issues that at least 21.43% of stakeholders are weary of before the tool is commercially viable. These should be taken into consideration when further developing the tool, as addressing these concerns is crucial before the tool can be marketed as beneficial. With attention to these five issues, Urban Natural will have greater success integrating into the commercial sector.

After finding the value of the tool and future improvements, the stakeholders' opinion of the tool and its potential for integration was addressed. Table 8 indicates the stakeholders' opinion of the tool from a commercial sense. It provides insight into the perception of the tool as an aid in the green space development process.

Do you see Urban Natural significantly improving inter-stakeholder communication during the process of green space construction?					
Concept	CO	E	M	PD	Occurrence (n=14)
Yes - Unconditional	1	1	1	1	28.57%
Yes - If Promote in Person Communication	3	1	0	0	28.57%
Yes - If Further Developed	0	0	2	2	28.57%
No	0	1	1	0	14.29%

Table 8. Results for the overall opinion of commercial integration of the Urban Natural Tool

Based on the above data, 85.71% of stakeholders interviewed believe that the Urban Natural tool has the potential to improve the interdisciplinary communication required for green space development. There are some qualifications to this support; 28.57% believe the tool will be

beneficial if it is aimed toward facilitating in person communication, another 28.57% believe that it is a strong foundation but requires significant development before it can achieve its purpose. There was also 14.29% that stated they do not see Urban Natural improving their process. These organizations stated that the tool is not something that they want to utilize at the moment. This stance was based primarily on personal opinion of these stakeholders. A quote taken from the interview with M3, found in Appendix VII, states: "I don't believe in digital, I believe in people". There will be people who are opposed to utilizing an online platform, it is crucial that the value of its use is conveyed in such a way that it becomes attractive to all.

A compilation of the information received from the stakeholder interviews can be found in Appendix VII. Complete data coding can be found in Appendix IX.

4.3 Interviews with Similar Green Space Mapping Organizations

Representatives of Green Map System and Parisculteurs were interviewed for this project. Both organizations are well-established, with Green Map being founded in 1991 and Parisculteurs in 2015. Further, Green Map has over 100 local Map Makers leading projects and approximately 1,000 active locally-made maps across the globe. Despite their shared mission of promoting sustainability and working towards the United Nation's Sustainability Development Goals, the two platforms have very different operational structures.

Green Map is a flexible tool, allowing users to create maps on a wide variety of topics, ranging from cultural and ecological sites to sustainability in their own cities. The now-open source organization provides free education and engagement tools, plus the Open Green Map platform, under a Creative Commons license (the former sliding fee ended in 2018). Approximately 600 Green Maps are available to the public, made by city agencies, universities, NGOs, schools, and community groups. All utilize Green Map's set of 170 icons. Version 2 of this mapping platform is in development, with ability to add other icons such as the United Nation's Sustainability Development Goals or local recycling symbols.

In contrast, Parisculteurs enables the construction of spaces for urban agriculture. The organization works with the government and private entities to find sites for urban gardens. These are described on the Parisculteurs website and developers of urban agriculture projects can apply by proposing a project for each site. Parisculteurs' map documents their current and future projects, serving as a guide for citizens to explore urban agriculture in Paris as well as providing inspiration for other projects. Parisculteurs has been able to use the city's desire to increase urban farming to attract organizations seeking to collaborate on projects and have expanded their work to the Parisian suburbs. Currently, the platform is in their third call for projects, beginning the process for new space development.

Both Green Map and Parisculteurs used existing networks to expand their connections and find projects in the beginning of their development. Additionally, they use competitions, media, and showcases to show off their work and attract interest. Green Map and Parisculteurs use workshops to engage citizens and ensure projects continue to grow. The information provided by these similar participatory platforms was placed into the reverse Business Model

Canvas seen in Table 9. This table was created by fitting elements found in the interviews into a Business Model Canvas.

Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
Municipalities	Workshops Networking	Allow users to visualize spaces in a community and inspire projects. Attract attention and funding to projects.	Fostering community	Citizens Community Outreach Organizations Municipalities Businesses
	Key Resources Server Website Employees		**Channels** Website Workshops	

Costs Structure	Revenue Streams
Salaries Website hosting Offices	Consulting Donations from projects on site Municipality Funding

Table 9. Reverse Business Model Canvas for Similar Participatory Mapping Platforms

4.3.1 Value Proposition for Similar Participatory Mapping Platforms

Parisculteurs and Green Map provide users with the ability to visualize spaces in a community. Both platforms allow users to identify valuable spaces and inspire thought about the untapped potential of locations. The combination of visual and spatial information with details on projects can inspire users to start their own projects, seek collaborators with current actors, or join existing projects. Users can create or nominate a variety of projects on each platform. The ability to see projects in an area has also given users the benefit of increased attention to their work.

Green Map's and Parisculteurs' use of mapping enables projects to attract attention. Users can contribute to the map directly in the former and see future plans of development in the latter. Each platform serves as a repository of information that can be accessed by users. This creates an online platform that project actors can use to attract attention. Attention can lead to new collaborators, new volunteers, or potential for funding of a project. Municipalities can view project ideas in their region and monitor their progress or support them with funding.

4.3.2 Key Segments for Similar Participatory Mapping Platforms

Parisculteurs and Green Map have different approaches with Key Partners. While Green Map works with a wide range of organizations and individuals, Parisculteurs works closely with the local municipality. Each approach has a benefit. For Green Map, each local Green Map Makers is responsible for ensuring their project's success and fairness, and are not dependent on permission from the organizations and sites being mapped. This prevents sponsors from being able to influence content. This gives the organization more freedom for the types of project hosted on the site. Parisculteurs has the benefit of attracting funding from the municipalities it

works with. Since the municipality has focused on urban farming, Parisculteurs maintains a focus on urban farming as well. Both organizations use workshops and networking events for their Key Activities. These events serve as ways to bring their tools to market. Since both platforms are based online, their Key Resources involve website hosting, web developers, community engagement specialists and office spaces.

4.3.3 Customer Segments for Similar Participatory Mapping Platforms

Green Map's participatory mapping platform cater to a variety of customers. The platform is publicly accessible and can be used by stakeholders. While the ability for these stakeholders to contribute to projects they are not a team member of is limited, they are able to access the information on the website, seek to collaborate in projects teams, or contact the moderators of the platform to add additional information. Community outreach organizations can attract attention and collaborators on the platform. Municipalities are included in this segment since they can use the platforms for projects they are running or help fund projects based on the platform. In contrast, Parisculteurs helps to facilitate communication between developers and the municipality to find and develop new projects. Their map is used to showcase past, current, and future projects as an example of the positive impacts of green space creation.

4.3.4 Costs Structure and Revenue Streams for Similar Mapping Platforms

The costs of running Parisculteurs and Green Map are similar. Both need to support their online website, employees, host workshops, and pay fees associated with attending conferences. Each organization offers several services, ranging from showcasing projects, consulting work, and providing information about an area. Despite offering similar services, Parisculteurs and Green Map take different approaches to Revenue Streams. Green Map uses a combination of pro bono support and crowdfunding, while Parisculteurs is entirely funded by the city of Paris.

4.4 Business Model Canvas Template Workshop

A workshop was held in accordance to the methodology section with the sponsor and major collaborators. The canvases received from each individual were then compiled into a single canvas that consists of all the points discussed in the workshop. Table 10 presents the result of the Business Model Canvas workshop.

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Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
Nordea Fund/Others OpenStreetMap & Mapotic©? Scouts Miljøpunkt Research Institutions Local Councils	Workshops Networking events Advertising Test projects with user trials Update tool with info and usability Customer service Measure nature **Key Resources** Developers Server Hosting Urban Nature agents/influencers	Multi-stakeholder urban-based co-creation Information enhanced collaboration and communication Places all users on same level Reduce barriers to changing spaces/taking over development Identifying other actors to collaborate with/inspire other Data is useful, effectively export for architects	Foster sense of community Assisting & Educating Customers **Channels** Workshops Networking Events Word of Mouth	Entrepreneurs Politicians Citizens & Civic Groups Placemaking Organizations Biologists Engineers Municipalities & Employees Planners & Developers Community Outreach Organizations

Costs Structure	Revenue Streams
Website hosting Workshops Salaries Data security Work space	Facilitating offline networking events & workshop for $ Calendar & events are paid to have event listed at top/advertise? Initial startup & continued use payment method may have different revenue streams Pay to access maps Request deeper suggestions

Table 10. Completed Business Model Canvas from Workshop

This Canvas is the summation of all the ideas brought forth by the participants during the workshop, the written canvases can be found as a supplement in Appendix X. The following sections will go into detailed discussion of the information presented above.

4.4.1 Value Proposition

The Value Proposition element provides an insight into the tool's nature and consumer trade-off when Urban Natural is brought to market. The tool centers around multi-stakeholder urban-based co-creation, which is to say that the tool brings stakeholders together and promotes collaborative shaping of urban green spaces. This is facilitated by providing the same level of communication and information to all users of the tool from citizen to CEO, thereby helping to break down communication barriers between users. These barriers would have previously prevented green space construction actors from identifying, collaborating with, and inspiring one another.

4.4.2 Key Segments

Focusing on the Key Partners for Urban Natural, a broad range of associations came to mind. Funding organizations such as the Nordea Foundation are viewed as crucial for the evident reason that a continuous funding stream is necessary to operate and develop the tool in a business context. Digital services such as Mapotic© and its source map, OpenStreetMap, are key as they provide the necessary digital hosting service for Urban Natural to exist. Partnerships with organizations such as the Scouts and the Miljøpunkts are paramount as these organizations have a far-reaching ability to distribute the tool and integrate it with programs they run. Research institutions such as universities and think tanks provide centers of integration in the academic world and partnering with the local councils will allow for a level of support from the local governments and citizens in Denmark.

The Key Activities for Urban Natural are focused around networking and providing service to the customers. Holding workshops and attending networking events were viewed as vital in spreading awareness and usage of the tool amongst those involved in the green space development industry. The usage of advertising brings citizens into the community as well as spreading awareness of the tool. In addition to physical activities, the team behind Urban Natural should perform activities online. These include hosting pilot projects, updating the tool consistently, providing customer service, and being an involved member of the community.

Key Resources of Urban Natural were determined to pertain to technology and social promotion. Developers are crucial as they make tool updates and interface intuitiveness possible. Server hosting provides a critical resource as this is what allows the tool to exist and be accessible to everyone. With regards to social promotion, the idea of Urban Nature agents or influencers was brought forth. These people would promote the use of Urban Natural through interactions with their followers. This resource would provide a means of distribution and credibility which is essential for the continued success of the tool.

4.4.3 Customer Segments, Relationships, and Channels

The Customer Segments portion of the canvas contains an overview of the potential clients for Urban Natural. It was determined that—in addition to the four large stakeholder groups: community outreach organizations, environmentalists, municipalities, and planners and developers—the clients of Urban Natural could potentially include entrepreneurs, politicians, civic groups, engineers, biologists, and placemaking organizations. All of these groups could potentially benefit from use of Urban Natural and thus are potential sources of revenue.

With regards to the relationships Urban Natural should have with its consumers, two major ideas were presented. The first is that the tool and team should foster a sense of community. By making the users feel as if they are a part of something much larger than themselves, the tool will continue to be effective. The users will want to continue inputting data and communicating with each other, all the while this will grow the user base and market potential. This will also create an awareness of nature and green movements among the users.

The second major idea is that the team behind Urban Natural should assist and educate its consumers in the use of the tool. As with any online platform, a degree of customer service will be needed. It was agreed that if assistance can also incorporate educational elements with regards to the tool, then the user will be able to use the tool more effectively and want to continue doing so.

The Channels element of the canvas provided an insight into the methods of communicating the tool to new consumers. It was agreed that the best ways of spreading awareness of Urban Natural are through workshops, networking events, and word of mouth.

4.4.4 Costs Structure and Revenue Streams

The Costs related to Urban Natural are similar to that of many businesses and online platforms. The physical costs boil down to employee costs, office space, and workshop hosting. Employees need to be paid and need a place to work, and workshops are needed for many reasons, chief among them being spreading awareness and gaining feedback on the tool. Costs are also present in the form of servers and data security.

There are a variety of Revenue Streams for Urban Natural. While hosting workshops initially will cost money, once established they could potentially be a relevant source of income with clients paying for their staff to be educated on the use of Urban Natural. In addition, there are many potential features which could yield revenue for the tool. A calendar and events filter with the option for consumers to pay for their event to be advertised at the top could provide a route for creating revenue. Another avenue for profit that arose from the workshop was the idea of payment plans for premium features. If the larger companies and municipalities were to acquire the tool with premium features, such as data exportation and topographical map overlays, it is plausible that they would pay for the tool. This could be realized in either an initial payment or subscription payment plan.

5. Analysis

Using the results of this project, final drafts of the Value Proposition and Business Model Canvases were created. These final drafts combined information from the Value Proposition Canvases and Business Model Canvases in Chapter 4.

5.1 Value Proposition Canvas for Urban Natural

The Value Proposition Canvas was completed with respect to each stakeholder individually, and then a combined canvas was created to describe the overall value proposition of Urban Natural. By combining the information from the interviews with stakeholders and the Business Model Canvas Template Workshop, the Value Proposition Canvas, as seen in Table 11, was created. This canvas is the culmination of values identified by stakeholders and Growing Pathways. To create the Value Proposition, the project focused on identifying the components needed for creating a minimum viable product, or basic tool ready for market use.

Value Proposition Canvas

Value Proposition	*Customer Segments*
Gain Creators PD: Showcase sites of interest E: Publicly listed to be contacted, ability to identify underdeveloped sites M: Central space to organize projects, ability to find new project sites CO: Ability to list underdeveloped sites All: Map with filterable data, public forum, calendar/event listings, contact network	**Gains** PD: Community feedback, access to location data E: Public involvement and awareness of green spaces, biodiversity awareness M: Community feedback, identify underdeveloped spaces, promote new projects CO: Promote events, public involvement and awareness All: Line of communication with stakeholders
Pain Relievers PD: Participatory aspects of map E: Increased public awareness among map users M: Easily see projects on map CO: Events and workshop advertisement, calendar, contact info easily accessible to others All: Ability to filter information, alleviate ineffective communication, public forum	**Pains** PD: Poor reputation with community, unsuccessful green spaces, lack of technical information on sites E: Lack of biodiversity, public awareness, and public participation M: Finding projects, unsuccessful green spaces CO: Lack of engagement, hard to contact P&D All: Ineffective communication
Products & Services Act as a visual and spatial phone book Calendar to show upcoming workshops/events Ability for people to add new places Filters to sort info quickly Search function using keywords Forum for green space development discussion Incentivise people to participate	**Customer Jobs** PD: Add developing sites E: List themselves, provide expert advice M: Add developing sites, look for underdeveloped sites, CO: Post events, list themselves All: Engage with other users on the platform

Table 11. Finalized Value Proposition for Urban Natural

5.1.1 Gains and Gain Creators

Each stakeholder group has different Gains from the Gain Creators in Urban Natural. Overall, every stakeholder group would gain a line of communication with other stakeholders. This is achieved by the platform having a map with filterable data, public forum, calendar and events, and contact network. By using Urban Natural, planners and developers would gain

community feedback on projects, potential projects, and access to location data. This was determined by the number of responses highlighting the participatory aspects of Urban Natural as appealing and the sponsor workshop. The participatory mapping feature of Urban Natural enables this gain by allowing users to add information about locations and have discussions on the platform. Municipalities gain access to community feedback, identify underdeveloped spaces, and promote new projects. These Gains are created by Urban Natural being a centralized platform that organizes projects, and the ability for users to add potential projects and underdeveloped locations. Ecologists would gain increased public involvement and be able to promote biodiversity awareness through the use of Urban Natural. Community outreach organizations using Urban Natural have a new platform to promote events and encourage public involvement and awareness.

5.1.2 Pains and Pain Relievers

Through the methodology, it was found that each stakeholder group faces a series of Pains when creating successful green spaces. As found through interviews with stakeholders, each stakeholder group faces the challenge of ineffective communication. However, the lack of communication between stakeholders is not the only challenge in green space development.

Planners and developers have difficulties with maintaining a positive relationship with the community, creating successful green spaces, and acquiring technical information on sites. These Pains can be relieved through the participatory aspects of Urban Natural which enable a dialogue with local communities, provide information on desired locations, and allow stakeholders to easily communicate. Some municipalities struggle with finding new projects and identifying targets for revitalization. Urban Natural solves this by allowing users to add project they are passionate about to the map. Environmentalists often face the challenge of promoting public awareness of biodiversity and encouraging public participation in sustainability efforts. Urban Natural relieves this pain by providing a platform to increase public awareness of biodiversity and sustainability issues. Similarly, community outreach organizations have challenges with public engagement and contacting the planners and developers. These Pains will be addressed through Urban Natural's ability to list events, workshops, and contact information.

5.1.3 Products, Services, and Customer Jobs

To relieve the Pains in current green space creation and produce Gains for its users, Urban Natural must offer several products and services. The main product of Urban Natural is providing a visual and spatial platform to find other stakeholders, projects, and events. This would be accompanied by a calendar to help users find networking events, community outreach events, and other activities promoting urban green space development. As a participatory map, Urban Natural would enable users to add new places and could help filter this information quickly. The use of a search bar can help with filtering information. The comments section would help facilitate discussion on the platform. Lastly, Urban Natural should incentivize users to contribute to the map.

Due to the participatory nature of Urban Natural, users play an important role in ensuring the platform's success. Each stakeholder brings different experiences and information to the platform. In general, all users should engage with other stakeholders on the platform in order to gain the most value from the tool. Planners and developers should add sites they are working on to the map in order to foster discussion on those locations. Environmentalists need to list themselves on Urban Natural's stakeholder filter and provide expert advice in discussion threads on the site. Municipalities engage with the platform by adding developing sites, like planners and developers, and looking for underdeveloped sites to start projects. The job of community outreach organizations is to post events they are hosting and list themselves in the stakeholder filter feature similar to environmentalists.

5.1.4 Summary of Urban Natural's Value Proposition

The Value Proposition of Urban Natural can be summarized into four main components. These are multi-stakeholder communication and collaboration from using the platform, allowing users to have the same weight in the development process, reducing barriers to changing spaces, and visualize and inspire community driven projects. These were determined by identifying similarities across the value proposition for each stakeholder group.

5.2 Business Model Canvas for Urban Natural

The Business Model Canvas for Urban Natural was created by merging the perspectives found in Chapter 4. This final canvas is shown in Table 12.

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Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
Miljøpunkt Indre By & Christianshavn Mapotic©	Workshops Exhibitions & Competitions Educational events Networking events	Multi-stakeholder communication and collaboration Allows users to have the same weight in the development process Reduce barriers to changing spaces Visualize and inspire community-driven projects	Foster active community Assist & educate users	Planners & Developers Municipalities Community Outreach Environmentalists Citizens
	Key Resources Server hosting Web developer Moderators Critical mass of users Natur i Byen / Network		**Channels** Workshops Advertising, Word-of-mouth Exhibitions & Pilot projects Newsletters	

Costs Structure	Revenue Streams
Advertising Web hosting Web development Travel Workspace	40% Urban Natural, 40% Grants, 20% Educational & Speaking events Subscription for Municipalities and Planners & Developers 2% of percent of project cost Fees for facilitating offline networking events and workshops

Table 12. Final Business Model Canvas

5.2.1 Summary of the Value Proposition

As discussed in Section 5.1.4, there are four main components of the Value Proposition for Urban Natural. These components are derived from common values identified for the four different stakeholder groups. All stakeholders benefit from the communication and collaboration platform provided by Urban Natural. The platform provides an equal voice for users to discuss suggestions during the development of a site. Further, it helps to reduce barriers by increasing stakeholder communication and helping to identify project sites. Lastly, the participatory and visual aspects of Urban Natural can inspire users to build community driven projects.

5.2.2 Key Segments

The Key Segment describes the logistical aspects of Urban Natural. The first element is the Key Partners, which lists individuals and organizations that will work with Growing Pathways to develop and maintain Urban Natural. Through the sponsor interview, the team learned that Miljøpunkt Indre By & Christianshavn collaborates with Growing Pathways to organize Natur i Byen (NiB). The team believes this collaboration could be extended to Urban Natural as Miljøpunkt Indre By & Christianshavn is part of the community outreach stakeholder

group and could offer valuable insight into the usefulness of Urban Natural. Further, they can work with Growing Pathways to expand the reach of Urban Natural by embedding the tool in NiB's website.

Another potential Key Partner is Mapotic©, the platform on which Urban Natural is currently built. The project sponsor told the team that one possible strategy for the future of Urban Natural is to partner with Mapotic© to develop the tool and maintain the website. It should be noted that the project sponsor emphasized this is only one of many possibilities, and the ideal scenario would be to have an in-house developer create Urban Natural. This could save money in the long-term as Growing Pathways would maintain full ownership of the tool and wouldn't be subject to price hikes or other fees from Mapotic©.

The second element of the Key Segments is the Key Activities. These encompass the day-to-day activities of the company as well as large events and marketing campaigns. As discussed in Chapter 4, a majority of stakeholders believe Urban Natural will be most effective if it gets users to take the discussion offline and meet face-to-face. The project sponsor is already engaging members of NiB through workshops and networking events. This experience can be used to help facilitate events amongst green space stakeholders when they want to open an in-person dialogue. Further, Growing Pathways can host events to educate the public about Urban Natural. These would serve a dual purpose of increasing civic engagement with Urban Natural and getting its name out to attract potential customers.

Urban Natural can gain publicity through conferences and exhibitions about urban green spaces. These events will allow the project sponsor to network with like-minded individuals and spread knowledge of Urban Natural throughout the green space development community.

The final element of the Key Segments is the Key Resources, which are the logistical means by which Urban Natural operates. The first of these are related to Urban Natural's infrastructure, consisting of server hosting, web developers, and moderators. Once Urban Natural's infrastructure has been built, it will require a sufficient number of users to keep the tool relevant and useful. The need for a critical mass of users was mentioned by 64% of stakeholders and discussed at length during the Business Canvas Workshop. Further, representatives from similar mapping applications also highlighted this as a key point for Urban Natural to focus on to better the chances of success. Without a large enough user base, Urban Natural could stagnate and fail. It is paramount that Growing Pathways works to keep users active and engaged by connect them with other users in person. The project elaborates on potential strategies to accomplish this in Chapter 6.

The final Key Resource is the NiB network. Growing Pathways will be able to leverage these connections at the early stages of Urban Natural's launch, both to beta test the tool and spread awareness of its existence. The success of interpersonal networks could decrease the need for advertising to gain a critical mass of users.

5.2.3 Customer Segments

There are two important components of the Customer Relationships element of the Canvas. The first is fostering a sense of community. As stated before in Chapter 4, the sense of

community is paramount to retaining users and having the tool be an effective means of improving green space development. The success of the tool is inextricably dependent on the continuous input of information and dialogue among users. Thus, Growing Pathways must take efforts to establish a community between all of the users. The second component is that the team should incorporate educational aspects during the process of assisting their users. Urban Natural strives for an intuitive interface, however there will always be an element of user guidance that the team must provide. The most beneficial form of this guidance would manifest in a process wherein the user is both assisted with their challenges surrounding the tool and subsequently educated on how to utilize the tool.

The Customer Segments portion of this canvas showcases the biggest potential clients for Urban Natural. The two major potential financial contributors are municipalities and palnners and developers. These organizations hold the largest financial and developmental resources in the green space industry; therefore, it is important that the tool address their needs. Community outreach organizations are essential clients as they have the potential to spread the tool through their day-to-day interactions. The last groups of potential customers are environmentalists and citizens. The environmentalists would serve an important role on the platform in the form of providing expert knowledge on biodiversity issues. The citizens would not generate any revenue as a customer, but their usage and dialogue on the platform would provide a value in the form of information. Customers identified in Chapter 4, such as engineers, biologists, and placemaking organizations, will most likely fall under one of the four previously identified stakeholder groups.

In order to contact these groups and successfully convey the full value of Urban Natural, Channels of communication need to be open with the Customer Segments. As suggested in the previous canvases, workshops, word-of-mouth, and advertising are all tools in this regard. Additions to this canvas element are pilot projects and exhibitions. The pilot projects serve as credibility and awareness boosters for the project, while exhibitions serve as opportunities to showcase Urban Natural to a large audience. Newsletters would serve as a way of keeping current and potential users informed about and interested in the platform.

5.2.4 Costs Structure and Revenue Streams

The Costs Structure and Revenue Streams elements of the canvas establish the known avenues of capital flow, both positive and negative. At this stage in Urban Natural's development, it is difficult to assign numbers to the Costs Structures and Revenue Streams of the tool. However, the general methods themselves can be determined.

Urban Natural is a web-based platform, which requires specific expenses. The most prominent being web hosting. Maintaining the platform requires funding; it is the bare minimum expense that Growing Pathways must address in order to have a product. For Urban Natural to continue being relevant and up to date, there must be people working to constantly develop the platform. Web developers must be utilized to update the platform and implement new features. Without this the threat of having the tool becoming obsolete increases. Aside from what is required to continue upkeep on the tool, there are additional costs needed to support the tool

externally. Growing Pathways needs a central office from which they can consolidate and oversee the tool. In order to do this, a space must be established and paid for. The other major costs identified are related to networking and marketing. Urban Natural must be marketed to develop a clientele. This is done primarily through advertising campaigns and traveling to exhibitions and workshops. This cost is less rigorously defined and requires a varying amount of capital depending on the action. Regardless, it is still fundamental to the success of the Urban Natural tool.

In order to offset the expenses and allow for further growth, the tool requires means of obtaining consistent revenue. Based on the research conducted, three major avenues have been identified: grants, revenue derived from the use of the tool, and educational and speaking events. Growing Pathways has stated that the revenue breakdown should consist of 40% obtained through Urban Natural, 40% through grants received, and 20% through miscellaneous educational and speaking events. Grants are obtained through proposals to foundations; currently this is the significant funding method. They require Growing Pathways to continuously go through the application process and are not guaranteed. The tool itself should be able to establish revenue. This can be done through a series of payment methods. A subscription for municipalities and planners and developers would provide a continuous stream of capital. This subscription could provide these stakeholders with features that have been identified as valuable to their groups specifically and unavailable to the basic user. Also, the implementation of a project fee could be applied to any project using the tool, consisting of a small percentage of the overall project cost. Additionally, Growing Pathways could charge for facilitating offline networking events and workshops. The last potential revenue stream identified by the team is speaking fees for educational events and conferences.

6. Conclusions and Recommendations

This project sought to develop the framework for a sustainable business model for Growing Pathways' Urban Natural tool. Numerous stakeholders and key players in green space development were interviewed to determine the value of Urban Natural and the logistics of Growing Pathways' business in the future. The project team also identified additional improvements that can be made to Urban Natural to improve its effectiveness and made recommendations for how Growing Pathways can ensure the future success of Urban Natural.

6.1 Conclusions

The key deliverables produced by the project are the Value Proposition Canvas and the Business Model Canvas. These outline the value Urban Natural provides to its customers and gives an overview of how Urban Natural does business.

The Value Proposition Canvas summarizes how Urban Natural helps stakeholders do business, how it relieves issues they currently have, and describes how the tool is used. Through interviews with stakeholders, the project found that the value proposition for Urban Natural is that it is a multi-stakeholder communication platform which improves collaboration during the green space development process. The tool reduces the collaboration barriers which exist between stakeholders. In addition, Urban Natural gives these stakeholders a line of communication with the communities in which these spaces are being built.

The team completed the Business Model Canvas outlining the logistics of how Urban Natural operates as a business. Several resources, partners, and activities are required to generate value for customers. Miljøpunkt Indre By & Christianshavn and Mapotic© have the potential to be partners with Growing Pathways to develop Urban Natural. To create Urban Natural, several information technology (IT) resources such as web hosting and developers need to be acquired. In addition, the platform needs to consider its users as a resource critical to its success. To attract users, Growing Pathways should conduct workshops, exhibitions, networking, and educational events. These activities are not only ways to reach potential customers, but also help to build an active and educated community. Urban Natural's customer base should consist of planners and developers, municipalities, community outreach organizations, environmentalists, and citizens. Smaller industry-based subgroups exist within these categories; however, they function as one of the larger stakeholder groups with regards to interactions with Urban Natural.

The costs of producing and operating Urban Natural are straightforward, while the potential revenue streams vary. Advertising, IT, employees, and a physical workspace will be the main costs for Growing Pathways. Conversely, Growing Pathways should consider asking for donations of projects using the site, offering promotional services for events listed on the map or calendar, and offering educational workshops or networking events for green space stakeholders in order to generate revenue. Growing Pathways should also consider offering a subscription service to municipalities and planners and developers who frequently use the site and could create premium features for these organizations.

The Value Proposition Canvas and Business Model Canvas serve as frameworks for the future success of Urban Natural. In order to make these a reality, several recommendations should be considered in the coming months.

6.2 Recommendations for Modifications to Urban Natural

During interviews, the project team showed a prototype version of Urban Natural to stakeholders and representatives from similar mapping applications. The team collected feedback on potential features interviewees suggested and picked the most commonly referenced ideas as recommendations to include in the next version of Urban Natural. The majority of stakeholders believed that Urban Natural should have an events filter which would be used to show the location of workshops or networking events being hosted by users on the platform. In conjunction with an events filter, many interviewees expressed an interest in having a calendar on Urban Natural. Similar to the events filter, a calendar would help to advertise workshops and create networking opportunities. Several stakeholders expressed that the most progress on green space creation happens in person. Thus, the addition of an events filter and calendar would be in Growing Pathways' best interest.

Stakeholders demonstrated an interest in Urban Natural becoming a source of valuable and accurate information. Based on this, the project team recommends several features be added to the tool. One such addition is moderators or expert support. They would help users navigate the tool, curate inappropriate content, and educate them on sustainability issues. It was also found that stakeholders are interested in an idea proposal rating system. Such a system would allow users to show their interest in potential projects. This system could help municipalities and planners and developers find popular projects to fund and execute.

One issue that most web platforms face is keeping users engaged and active. To combat this, the project team recommends that users be incentivized for using Urban Natural through a system of badges and points. Users could get awards for participating in workshops, partaking in discussions, adding places to the map, or updating map information. These accolades could then be viewable to everyone so users can show off how active they are on the platform. These features could help Urban Natural build and maintain an active user base that is excited to contribute and help improve green spaces.

6.3 Future Work

This project was carried out over the course of seven weeks. While this project was unable to achieve saturation, each interview yielded valuable information. Each stakeholder offered a unique perspective on green space development, giving the project team a holistic view of the process. The project sponsor should continue to interview stakeholders who have varied roles within their stakeholder population to ensure a breadth and depth of information is collected.

Beyond interviews, stakeholders should be contacted to participate in workshops to test new versions of Urban Natural. This will serve as a check to ensure that Urban Natural will be relevant and useful to stakeholders once it is fully released. The project team discovered that many stakeholders were too busy or unwilling to be interviewed and assumes the same will apply to beta testing workshops. It might be beneficial to provide incentives for participation, such as an "early adopter" status or discounts for various Urban Natural features. This will also help alleviate one of the largest challenges for this platform: establishing a critical mass of users. This challenge was the one of the most recurring themes throughout all stakeholder interviews, with the majority of municipalities and planners and developers emphasizing this is as major concern. The use of events to advertise the existence of Urban Natural could be done with the help of the Key Partners. This potent combination of interviews and workshops will help to pave the way for the success of Urban Natural's initial release by improving its usefulness to stakeholders and serving as an informal advertising campaign by spreading awareness of the tool at the same time.

While adding an events filter to the tool in its current form is feasible, Mapotic© does not have a method for incorporating a calendar or points system into Urban Natural. In order to create these features, Growing Pathways would have to pay Mapotic© for special development or hire an in-house developer to build the tool from scratch . In light of this, the project recommends that Growing Pathways determines what its relationship with Mapotic© will be in the future before developing a minimum viable product and moving forward with the launch of Urban Natural. As Urban Natural becomes more established, it should continue to expand the services available to users particularly those it can use to bring in revenue.

The project team believes that the work from this project will help Growing Pathways turn Urban Natural into a sustainable and effective platform for green space development.

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Appendices

The following appendices present additional information too detailed to include directly in the report. This information was summarized and a reference to the corresponding appendix was included.

Appendix I - Questions for Interview with Growing Pathways

- How does Urban Natural currently bring in revenue?
  - Current grants that Growing Pathways is working under?
  - What stakeholders have paid/expressed interest in paying for Urban Natural?
  - What financial revenue streams has Urban Natural used in the past?
- Can you tell us more about the Nature in the City grants?
- What must be fulfilled to get a grant?
- Can you tell us more about what is required to apply for a grant/re-apply for a grant?
- Can you tell us about the relationship between Growing Pathways and Mapotic©?
  - How does Mapotic© help create Urban Natural?
  - Is Mapotic© treated as a contractor or a partner?
  - Paid for every prototype or on a regular basis?
- What expenses does Growing Pathways currently have?
  - How many regular and contract employees are there?
  - How are these expenses anticipated to change in the future?
- You mentioned bringing on an in-house programmer to make the tool. What analysis has been done about this decision?
- What is Growing Pathways' desired growth in the next five or ten years?
  - How many employees?
  - What types of employees? (Software Engineers, Marketing, etc.)
  - Who do you envision paying for Urban Natural: Governments, planners, other non-profits?
- Do you want to focus on a specific customer type?
- Do you anticipate focusing on Urban Natural or expanding to larger projects?
- What is the long-term goal for Nature in the City?
- What are GP's largest unknowns for the future?
  - Company size? Customers? Revenue?

Appendix II - Verbal Consent Statement

We are a group of students from Worcester Polytechnic Institute. We are conducting this study in order to obtain information to further develop Growing Pathways' Urban Natural tool.

Your participation in this study is completely voluntary and you may withdraw at any time. At this time, we would like to ask your permission to directly reference you in our report and to record this interview.

Appendix III - Questions for Interviews with Stakeholders

General Questions:
- How would you classify your organization's role in green space development?
- How would you describe your organization's opinion towards sustainability and green development?
  - Has this opinion changed in the past few years? If so, why?
  - What are your organization's reasons for this stance?
- What policies does your organization have relating to sustainability and green development?
  - What are your organization's reasons for implementing these policies?

Urban Natural was then presented to the interviewee

Issues with current solutions
- Have you used or seen participatory mapping tools similar to Urban Natural, such as Open Green Map or Parisculteurs?
  - Can you list their names?
  - What was your opinion of them?
  - Would you choose any of them over Urban Natural?

Perception of Urban Natural
- Given the current state of Urban Natural:
  - What features are appealing to you?
  - Are there any features you would like to see added?
- Do you see any potential issues with using Urban Natural?
- Do you see Urban Natural significantly improving inter-stakeholder communication during the process of green space construction?
  - How so?
  - Why not?

Organization Specific Questions:

Questions for Community Outreach Organizations:
- Can you walk us through the general process of green space development?
  - Who initiates green space development?
  - How much community engagement is there? Feedback? Comment period?
  - Is there a bidding process?
  - What environmental incentives are there to construct green spaces?
- How much time do you spend per project finding and contacting developers?
- Do you face any issues when trying to build successful green spaces?
  - How is feedback on constructed green spaces gathered?
- How often are your interests taken into account during green space development?
  - Do you think this could be solved by use of Urban Natural?

Questions for Environmentalists:

- Do you believe that proper attention is given to the biodiversity in development of green spaces in Copenhagen?
- How often you are contacted about biodiversity issues concerning green space development?
    - If so, how are you contacted?
    - Do you think this could be solved by use of Urban Natural?

Questions for Municipality Representatives:
- Can you walk us through the general process of green space development?
    - Who initiates green space development?
    - How much community engagement is there? Feedback? Comment period?
    - Is there a bidding process?
    - What environmental incentives are there to construct green spaces?
- How much time do you spend per project finding and contacting developers?
- Do you face any issues when trying to build successful green spaces?
    - How is feedback on constructed green spaces gathered?

Questions for Planners/Developers:
- Does your organization reach out to contact environmentalists or community groups during green space development?
    - How much time do you spend per project finding and contacting other stakeholders?
    - If so, what are the challenges your organization has faced contacting these stakeholders?
    - How does your organization contact these stakeholders?
        - Email?
        - Phone number?
        - Social Media platforms?
    - If not, what are the reasons behind this decision?
- Are there incentives for using environmentally-friendly construction practices?
    - If so, what are these incentives?
- Are citizens involved in the development process?
    - How are citizens contacted?
    - Do you think having access to a tool like Urban Natural would increase your desire to contact other stakeholders?

Appendix IV - Questions for Interviews with Mapping Organizations

- How they operate
  - What is the inspiration for what you do?
  - What would you say were the turning points in the development of your organization?
  - What were the big milestones deliberately set for the organization?
    - User numbers? Types of funding?
  - How did your organization publicize itself and gain users?
  - In your mind, what sets your organization apart from others?
  - What are you proudest of about your organization?
- Company size
  - How large is your team?
    - What is the composition of your team?
- How is your organization funded?
- Challenges they faced
  - What challenges did you face during the development phase of your product?
    - How did you overcome them?
  - What challenges are you currently facing?
    - What steps are you taking/planning to take to overcome them?
- Things they did well
  - What would you say you did well during the development phase of your product?
  - What would you say you are doing well during the marketing phase of your product?

Appendix V: Written Consent Statement

We are students at Worcester Polytechnic Institute in Worcester, Massachusetts. We are conducting a research project on behalf of Growing Pathways to determine the primary aspects of a creation of a business model for Urban Natural. As part of this project we are conducting a series of interviews with key individuals. We have asked you to participate because we believe you have unique knowledge of these issues that will be valuable to the project.

Before we begin, we would like to thank you for taking the time to participate in the interview which will last about 45 minutes. Your participation is entirely voluntary. You may refuse to discuss any question or terminate the interview at any time. With your permission we would like to record the interview. The tapes, notes, and subsequent transcripts of the interview will be kept confidential and will be accessible by only the members of the team and our immediate faculty advisors. Your name will not be used in any subsequent report or publication without your permission.

If you consent to be interviewed at this time, we would ask that you indicate your agreement below.

I agree to participate in the interview: _____
               Interviewee Signature

               _____
               Date

               _____
               Interviewee Name

Please initial for permission to record: _____
               Interviewee Initials

Appendix VI: Results from Interview with Project Sponsor

What is Growing Pathways' desired growth in the next year or five years?

Currently, Growing Pathways has a two-year plan and is developing a five-year plan. Prototype testing of Urban Natural should happen until the beginning of 2020, when a beta version will be created. Growing Pathways hopes to move from being grant funded to having more income from workshops and other work. Ideally this would be 50-50 between the two methods. Over all this should move to 20% odd jobs, 40% product driven (like Urban Natural) and 40% grant based. The budget for Growing Pathways will be low. Revenue from a product would be used to grow the organization. Ideally Growing Pathways would work with urban nature, culture and sustainability related projects.

In 2019 Growing Pathways will continue connecting with Sustainable Development Goals (SDG). Growing Pathways is working to become the link between SDGs and cities, offering services connecting people to the SDGs. The organization hopes to create simple narratives so that layman can understand. Currently, Growing Pathways is working with projects related to the broader idea of sustainability with municipalities in Denmark.

Growing Pathways will not have many employees. At least one social facilitator with an understanding of urban nature and developer to create a beta version is needed. Currently there is only one employee under the payroll. Others are involved on an irregular basis, often taking an advisory role. Growing Pathways envisions governments, planners, and nonprofits paying to use Urban Natural. Specifically, organizations involved with developing land will be targeted to bring in revenue.

What are GP's largest unknowns for the future?

One unknown is potentially partnering with firms interested in Urban Natural or selling to them. Growing Pathways has not considered attracting venture capitalists, partially due to the lack of a product prototype. Climate related investment is not high in Denmark. Therefore, competition for funding is high. However, if one hits the market at the right time (like toogoodtogo) success can happen. It was said that "We don't want to work with an aggressive growth plan." Grants are a source for helping project development but do not create profit. There is also a potential for using crowdfunding, investors, or having a network driven approach-having a pool of funders who have a share in the product but no say in how Urban Natural is developed. It is planned for Urban Natural to expand to other cities.

Can you tell us more about the Nature in the City grants?

First phase was funded 90/80% by the Nordea Fund. The remaining 10% came from partners like Growing Pathways, Miljøpunkt, and Life Exhibitions. There were also other contributions from organizations that donated spaces, time, or money to help the project. Phase one had a budget of 5.34 million DDK, 800,000 USD, for the first 15 months of activity. Grant money was given in six-month up-front installments. Partnerships helped with public relations and advertising. For example, NiB partnered with the metro which helped lower the cost of metro ads.

To complete a grant, a timeline is set up. An organization must show progress on goals to continue to get funding. The grant application/reapplication process varies for each foundation or funder. For example, at the Nordea Foundation, there is a project manager that must approve the project and agree that it has relevance, anchors and capacity for growth. After this a board has to see the budget, project plan, and approve the grant. Velux has a similar process. The long-term goal for NiB is working to identify potential places to increase the value of urban nature. This will mostly be done through their website.

How does Urban Natural currently bring in revenue?

Urban Natural is currently getting revenue through small side collaborations, mainly through the use of workshops with a focus on developing culture and sustainability with an emphasis on leadership.

Do you want to focus on a specific customer type?

Growing Pathways plans to use Urban Natural to target planners & developers, and environmentalists.

Can you tell us about the relationship between Growing Pathways and Mapotic©?

Currently, Urban Natural is using the free version of Mapotic©. They (Mapotic©) has assisted in communication and campaigning. Growing Pathways seeks to avoid clients paying for services that Growing Pathways isn't actually offering. Mapotic© gives Growing Pathways access to their platform without a fee. They treat Growing Pathways as a client. There is the potential for Growing Pathways to partner with Mapotic© to create a custom version that would become Urban Natural. They would most likely need a larger user base before they became interested in this option.

What expenses does Growing Pathways currently have?

See previous responses for number of employees. The product is prioritized before people in terms of budget.

Appendix VII: Results from Interviews with Green Space Development Stakeholders

Responses recorded are labeled using the stakeholder type associated with organization interviewed. Each was randomly assigned a number within their stakeholder type to maintain confidentiality. For clarity, stakeholder type was abbreviated as follows:
Community Outreach Organization: CO, Environmentalist: E, Municipality: M, Planning and Development: PD

A note on E2: E2 is a stakeholder who had previously worked with our sponsor on the tool, and whose schedule did not allow for our interview to progress past 30 minutes. Therefore, our interview with them consisted strictly of questions about the tool. Questions pertaining to their stance on sustainability and role in the green space industry were omitted due to the time restriction.

General Questions:

How would you classify your organization's role in green space development?

E1: People say they want a green space in a certain area. They come to me with an idea and I design the space with my years of experience and vast knowledge of horticulture.

E3: Currently my role is between the community and larger organizations. I work on projects which attempt to engage the community, and work with the municipalities and developers utilizing my years of experience. I write a lot of literature on the topic of urban green in an effort to educate the public.

PD1: To increase the development of green spaces, and to transform current spaces into projects that facilitate community participation. Create projects that react to the deterioration of urban spaces through community engagement.

PD2: To develop spaces in the city. Focus on rethinking nature where a space can double as a meeting place and a nature preserve. Creating spaces that improve the cultural and natural landscape of a place.

PD3: To define what green truly means and what people are looking for in a space. Inspire and guide those to figure out what they want to do. Facilitate a lot of the early stage aspects like concept and project development.

CO1: Our organization is a public organization developing urban green spaces.

CO2: To design services that are accessible to people. We work on facilitating community events, like composting, and teaching citizens how to reuse their green waste. We also work with urban/green spaces, co creation and project design. We also help apply for funding to develop spaces.

CO3: Green movements are a lot of thing. We work with knowledge and try to educate the public towards being green. We grant access for people who are hesitant about being green and encourage people to plant. We have a bottom up approach and work with the municipalities to create strategies to achieve green aims.

CO4: We are a community group organized by two local councils. We organize the public relations between these local councils and the public. We have about 2,000 people in our network, with 600 members following our Instagram account. We focus on conservation efforts and educating the public, often through the use of guided walks.

M1: Our organization is a very big player. We own the largest parks in the municipality. The maintenance and development of these parks—and subsequently smaller ones—is our job. However, our role is changing. We recently worked on an urban renewal project in which our goal was to make the area greener. This signifies a movement away from parks as the primary means of green in the city.

M2: Tasked with supporting local non-government organizations. There is a large focus on local cooperation. Do not develop plans but advise and support the local community in designing areas they want. Funding is given to start projects but is not continued out of initial phase. Facilitate discussion for priority of development and overarching plans for the upcoming years through workshops and forums.

M3: Our primary focus is integrated urban renewal. We go into disadvantaged neighborhoods, talk with the people there, hold workshops based on reconciling the ideas of the citizens and the ideas of the municipality, and establish policies and fund projects to renew the area.

M4: We act a as an intermediary between the citizens and the city council. The citizens come to us with projects and ideas, and we distribute funds from the city as seen fit.

How would you describe your organization's opinion towards sustainability and green development?

E1: Always forward. I have been pushing for green spaces for years.

E3: I've been interested in nature all my life. I strive to find any means I can to better the earth.

PD1: Sustainability and green developments are more than just plants in a park. Each space grants benefits to the surrounding community and the city as a whole. The projects and processes are done with local interests, resources, and community in mind.

PD2: Company was founded with green in mind. Incorporate anthropologists, biologists, and other experts to help develop the most effective spaces.

PD3: The concept within the mission of the organization focuses on being green. The values are always aimed at increasing sustainability and biodiversity. Also, on a personal level, it feels better to be surrounded by nature. Plus, it allows for people to benefit without being costly to the individuals.

CO1: Our opinion is described by our mission. We seek to create a number of community-based spaces and adopt an understanding of design that solves problems while developing green spaces. We contact citizens and the government and prioritize improving the well-being of the population through the development of green spaces.

CO2: Our organization has a focus on architecture and wants to use design to change the world. This can be done through a multidisciplinary approach to solving real world problems.

CO3: The use of a bottom up approach, building relationships, credibility, and acknowledging volunteers is how we create value and work on sustainability.

CO4: Sustainability is a new thing for our organization. We have been around for longer, but have been actively promoting sustainability for six years. Our organization has always promoted nature and biodiversity. Sustainability is now a higher priority. We realized the link between sustainability, biodiversity, and community.

M1: When developing, the creation of diverse and sustainable green spaces is essential. We have always tried to create green spaces for the aesthetics, however with recent research we are also focusing on biodiversity and the benefits of the green spaces as well.

M2: Always been friendly towards sustainability, there has been a shift within the last year that has created more of a focus on it. They have always supported initiatives such as active recycling. Social sustainability has been on the agenda since the beginning.

M3: Sustainability has always been a part of our DNA as an organization. We have continued collaboration with a variety of groups on key environmental issues. However, we have shifted focus towards the United Nations' 17 Sustainability Development Goals.

M4: We have always had a large focus on sustainability, and take great efforts to see that it is a central focus of all projects, especially those related to local green space development.

What policies does your organization have relating to sustainability and green development?
E3: I strive to focus mainly on projects relating to sustainability and circular economy.

PD1: No direct policies in place, but the organization's mission incorporates the movement.

PD2: Avoid plastics and asphalts. Upgrade materials, use products that are considered waste Reuse many material and use materials that have positive impacts. Develop a relationship between build environment and green environment.

PD3: Not strict policy, but operation is done under the knowledge that mother nature needs to be preserved, increasing biodiversity is high priority.

CO1: In the past six months we have developed a community interaction platform. We have supported a hatchery initiative. We plan to interact with individuals in particular areas working in educating people on the capacity and other aspects of green practices. Our organization holds workshops to benefit the people in an efficient and inexpensive manner, often partnering with other NGOs to achieve goals. These meetings are often in informal settings, outside or indoors depending on the goal. We take a hands on approach to sustainability, visiting the major actors and facilitating interactions. Often we tap the community's expertise and unite them under common interests. We start conversations before work begins.

CO2: A holistic approach, looking at both green and financial sustainability in the same scope. This process has us ask what is the problem: this focus results in sustainability.

CO3: Our organization's purpose has been to work locally to promote sustainability and better the environment. We try to build relationships and credibility, as these are important for success. Our view has always been to work from the bottom up and create more value.

CO4: Our policies come from the local committees. We present research to the local committees to get funding and begin long term planning. If they agree, they (the local committees) form a sub-group to discuss the plan and what they want.

M1: We are developing policies which work alongside the Sustainable Development Goals set by the United Nations.

M2: There are no defined policies. But there is a push towards sustainability, especially in the social realm. Most work is done through improving existing spaces, rather than bulldozing and starting anew. It is supported through initiatives with a focus on a mix social blend. The goal is to link people of all social status and promote a sense of comradery.

M3: We do not have any defined rules about sustainability and green development, however the general policy is to promote sustainability as much as possible. There are no check boxes for this.

M4: We have a number of practical policies related to sustainability. We supply reusable utensils at street fairs, we don't send out our monthly meeting minutes on paper, and we take care to sort our waste pragmatically. We have been moving from promoting sustainable actions among the citizens to realizing sustainable practices in the city buildings themselves.

Have you used or seen participatory mapping tools similar to Urban Natural, such as Open Green Map or Parisculteurs?

E1: No I have not. I have seen and used iTree before, but nothing like this.

E2: Go Green Denmark and One Zest. Mapping things is difficult, need to have qualifying and quantifying metrics for the evaluations of spaces and stakeholders.

E3: No I have not.

PD1: No, I have not used something similar, despite personal paper mapping.

PD2: Nothing quite like this. iTree is popular, but its use is narrowed.

PD3: Not currently using any. Has seen tools such as Green Map Copenhagen, using platforms like Natur I Byen. But not using any participatory mapping tool. Seen Parisculteurs before, thought t it was helpful, but no longer using it.

CO1: We have used mapping before to map a variety of nature and spaces within urban environments. We have also used mapping to highlight cultural sites. We have also seen the Mapotic© tool before from Growing Pathways. It is similar to maps we have seen before made by others.

CO2: Yes, but cannot remember the names. These were online platforms that were difficult to use. It is preferred to meet people face to face to build relationships. Sometimes finding an expertise is difficult. Big companies generally appear first, but smaller ones can be better to work with.

CO3: We have seen Open Green Map, iTree and an Invasive Nature Map. The municipality needed people to interact to remove invasive species. The map was interactive and allowed users to mark the location of the species, add photos, and a description. It would be updated if a citizen or municipality removed the invasive species. This tactic has since been adopted in other apps. We liked that it got the community involved.

CO4: No. Instagram is the platform we use the most, but it is not optimal. It does allow for picture and location sharing, but it is not that good. The platform is mostly public relations

focused and promoting activities going on. We also use a Facebook group, which is nice because people already have accounts to these platforms.

M1: No. I have heard of their existence, but never used one.

M2: Witnessed projects trying to map green projects. There was a network for community gardens in the works, but it fell through. But nothing that incorporates participatory mapping.

M3: I have seen many at conferences. However, I have yet to see one that does not experience problems with citizen engagement. People need to be outside and this kind of tool creates distance. It's too abstract as a concept.

M4: I have seen Byhost. Unfortunately, the accuracy of the information presented was not consistent. I know of Civitist, and another app which lets the citizens map and report street issues to the city. I have not used any participatory mapping tools commercially though.

What features (of Urban Natural) are appealing to you?

E1: I like the accessibility and the fact that the digital world is pushing green initiatives forward. I like the filters of the spaces.

E2: I like the specific filtering, however it could be a little more informative with regards to what each filter means.

E3: I love the idea of it and the different categories of green spaces. The visualization of green spaces and stakeholders is very appealing to me.

PD1: I love the idea that it is a participatory tool, it allows for all of the citizens to be actors in the process. I also like the intuitive-look of the platform

PD2: It seems like it might make communication easier, but it needs to be developed more. I like the advanced filters, and that it can show the history of development.

PD3: The display of stakeholders is very important. Planners and developers are the main drivers of change. Currently planning and developers are powerful, but including this could make the path to decisions smaller and streamlined. It can help create connections between people and urban farmers for example. This can facilitate sale.

CO1: It seems like this tool could be useful. We work with placemaking and Urban Natural addresses this. It focused on public spaces, not just nature spaces. In principle there is a huge contribution that such a tool can make in communication.

CO2: The stakeholder feature is the most interesting. It is good for new organizations or maybe finding different stakeholders who are knowledgeable in other fields. We already have a network of experts in the field we operate in.

CO3: Seeing the location of stakeholders is good.

CO4: The program looks really nice. I like the biodiversity filters. The platform seems simple, but in a good way. Anyone could use it. It is not overly complicated This is a tool that could inspire everyday exploration.

M1: The stakeholder layer is nice. It allows us to see which experts are where, and would be useful for contacting local experts. The consistency of the communication is also very appealing.

M2: People can advertise and promote things that they are involved with, like an urban garden. It also allows them to find other similarly minded people. Likes the in-development icon, they have

done work to show that even point green spaces are wanted, this could be helpful in that initiative. Likes the participation aspect, it helps show smaller spaces to more people.

M3: I like the photos and the ability to upload them from my phone, and the interaction this could generate with the environmentalists. However, this interaction would need to be guaranteed for me to be satisfied.

M4: I like how professional it looks, and the layers that you have. This format really helps visualize the spaces. It's sleek, straightforward, and makes sense.

Are there any features you would like to see added?

E1: I'd like to see a filter for quiet places, nurseries, and plant shops.

E2: I'd like to see more filters like blue (water) spaces and community gardens. I'd also like to see more advanced filtering options like "expected impacts" or "SDGs involved", and events relating to green spaces in the area in the near future.

E3: More dates and events on the site, definitely a calendar for events and activities. Keep it free for the citizens.

PD1: At the moment I cannot think of any, the ones you have provide a good start.

PD2: Maybe finding a way to allow people to rate and bring in ideas at different states in the process. Figure out how municipalities work, it might be beneficial to cater the program to them. If you could incorporate a time-lapse and a way to measure impact, like air quality before and after.

PD3: It seems that if it was enriched more, then it could open up dialogue. Seems like it could be best implemented in municipalities. It could help describe specific contacts and who is working on what from the municipalities, which makes it easier for other stakeholders to give their input. It can also help green-minded individuals a place to voice their opinion.

CO1: There should be a repository of information from many organizations that is shared. The tool needs to be flexible. Urban Natural should have an events layer and create a timeline and calendar approach towards the map. It should also have a layer to see zoning of the city and planning policies. The green mapping aspects should be enriched, right now it is very site-specific. Add underwater sites.

CO2: Include a mission page. Something needs to be done to help encourage physical meetings. One needs to develop motivation to visit the map.

CO3: Understanding human interactions is important. If we do not interact we will lose interest in the system. There should be a way to verify that experts are a part of the network. A moderator could do that. Maybe an expert group could answer questions. Adding a calendar would be good. Allow for the exchanging of contact information, but they might not want a space on the cite itself to do that. Also add libraries to the map.

CO4: Include a biodiversity filter so users can see how good an area is. Expanding the known plants and animals in an area is a good thing. However, this can get complicated and get confusing quickly. Having events or notifications would be nice as well.

M1: If there were a clear reason for using this platform over others that would be nice. Also the platform needs to be established on a much larger basis before it will be useful to municipalities who already have their own platform.

M2: It could be beneficial to collaborate with the Københavnerkortet; it has a lot of information on it. It would be a good means of establishing critical mass. Things in development could be great spaces for nonpermanent parks. Create some sort of events feature. It will allow people to see what is going on in development or events that are occurring. People can find places they can join or resources to contribute. Maybe make it like a handpicked phonebook style, do not show everything, just the best ones.

M3: I would like to be able to see and say why a space would be worth preserving. I would like to see the map having an ability to plan for the future, and a more in-depth analysis of others opinions. For this too succeed you need to tap into pre-existing networks like Facebook which already have the user base.

M4: No.

Do you see any potential issues with using Urban Natural?

E1: You need to encourage passion for nature in people. People will become more environmentally conscious and respect the jobs related to nature much more if there is that passion. This is the largest hurdle.

E2: Identifying green space potential is difficult, there is much wasted space but not much general knowledge on what to do with it. You need to excite people about it. Get them to workshops and make sure they understand that this is more than a database. You need to link this to other networks, subjects, and projects in order to culminate the larger vision for sustainability in the future. Integrate the tool into the culture and everyday life.

E3: Need to translate to physical meetings.

PD1: I don't see issues, but I think it could be necessary to have an educational process for stakeholders. That way they can use the tool and appreciate the potential of the platform.

PD2: Based on current practice I wouldn't really know how to incorporate it into the private context.

PD3: Companies already have their networks for a lot of different stakeholders already. They have their own contacts they regularly go with. The underdeveloped and in development filters are interesting. It does allow for spread of information, but just because a stakeholder sees this need, they would still need approval from the municipality. It is also hard to get into contact with the correct people, and flooding input from general public might not be entirely beneficial. New is not always better. Try to do anything you can to improve the rating and perception of the spaces. Try listing 'housing association' type groups, they will allow for the most people to reached.

CO1: Change comes from people meeting, agreeing, and sharing tools to achieve their ideas. The most change happens offline and on the ground. Urban Natural itself would not be a major driver of change.

CO2: Copenhagen is very small. You will need to convince stakeholders to do this. A lot of these people already have existing networks that they made. The tool needs to incorporate a sense of unity and mission. It should have a mission on the landing page.

CO3: Qualifications and having experts talk could be an issue.

CO4: I am not sure. It may be hard to get a large user base. People may not know where to go, digitally or physically.

M1: I see the idea, but the physical meeting of the stakeholders and citizens involved is what matters. The reasoning behind why people should use this needs to be more concrete. Many municipalities already have a platform for communication, so yours would have to supersede it in many ways for them to want it. There is an inherent difficulty in communicating with citizens on a digital platform.

M2: There might be too many criteria. Too many filters might make it less straightforward. The big challenge will be establishing the tool. You need heavy traffic and to convince the people that it is necessary. Try using a minimum viable project strategy. Establish a core, the rest can be created later.

M3: I'm old and grumpy. I would rather spend my time outside building things and making connections with the locals. This tool is too distant. If I wanted to use an online platform I would use Facebook. They already have that critical mass of users and an effective forum for discussion. If you integrated this tool into Facebook it would have a chance of surviving the massive graveyard of prototypes of this type of tool. This also is overshadowed by the Københavnerkortet, which has more information.

M4: There are a lot of platforms out there to compete with, and Google and Facebook are no exceptions. You might need to partner with one of these larger organizations in order to survive as a platform. You also need to get everyone on the same platform—obtain the critical mass of followers—another issue which could be solved with the partnership. Another issue is that people need a really good reason to start using another social media app. It's a time and effort commitment which a lot of people don't want to make. The final issue I see is that many projects like this fall apart when they run out of money, so funding would be a huge issue. Maybe advertise projects and take a percentage of their revenue to solve this.

Do you see Urban Natural significantly improving inter-stakeholder communication during the process of green space construction?

E2: This will only work if the tool is integrated with a larger network and the lives of everyday citizens.

E3: Yes.

PD1: Absolutely, this could really help put all involved on the same level.

PD2: Currently we focus on face to face meetings with experts to help us. Based on current practice I wouldn't really know how to incorporate it into the private context.

PD3: It is an interesting tool. It sounds like it could be helpful to newer organizations to develop a contact list. But for those already established, you will need to bring a more developed tool.

CO1: This tool can do a lot. However, communication in person communication important.

CO2: Yes, this tool could be a first step. Physical meetings are still preferred, but the first step to plan these meetings can be done on a tool. The tool also needs to be scalable to larger cities. Also, reconsider renaming the tool to something that describes your message.

CO3: Big yes. Hopefully it will allow anyone to get involved. The tool should motivate people to interact for themselves. No organization needs to control it, just facilitate conversations. That is why meeting places are important, to make it happen and get people to interact.

CO4: Yes, it seems like it could. It could interlink things. I really like the developing/underdeveloped filter. Current filters seem well thought out.

M1: If the platform were widely established in the population, then yes. However, right now not really.

M2: It could improve the process of getting ideas out there. Or to find specific locations or places to be involved It could facilitate interpersonal connections and opinion sharing.

M3: No. I have professional tools which accomplish my specific tasks, and I would rather go meet people in person and make the connection there than online. I don't believe in digital, I believe in people.

M4: Absolutely. The country of Denmark has been making a lot of progress towards sustainability, so the timing is really good. I can see this functioning as a springboard kick start green space stakeholders, and evolving into a universally used app.

Questions for Community Outreach Organizations:
How much time do you spend per project finding and contacting developers?

CO1: One project we did took 3-4 years to move from an idea to doing the actual project. To reach developers we hold focus groups with stakeholders to figure out more specific details. This is an iterative process that takes 4-6 weeks to find partners interested in working with us. Overall, the time varies per question.

CO2: My organization is approached by developers. Generally, we do programs that they want to do. They have the money to fund the projects.

CO3: The process is currently very slow. Communication is the biggest factor in educating/changing behavior. Contacting stakeholders has become fast in recent years, but it is not as fast as it needs to be.

CO4: It depends how long the local committees take to make a space. As they meet monthly, this process can take months.

Do you face any issues when trying to build successful green spaces?

CO1: Due to our organization being a public entity, flexibility is restricted because we have to follow public and government procedure which is difficult and can cause frustration and prolong projects. Overall, our organization does not have all the resources needed to navigate all the aspects of green space development. Therefor we need to collaborate frequently, often with young energetic companies with limited scope and resources. While overtime these smaller groups have limited issues collaborating, this had not always been the case. Earlier on in the environmental movement organizations with different goals were in competition for limited

funding. Younger NGOs have a broader picture of sustainability. By starting a project, we attract attention and gain collaborators.

CO2: Engaging citizens can be a challenge. We have found that not using apps is better. The best way to engage people is by using programs that they are already a part of.

CO3: Involving locals, networking, and getting people off the computer, meeting face to face, keeping curiosity and people interested are the issues we face in the green space construction process.

CO4: Due to our location it is hard to collaborate with other organizations, especially those in the city center that have more resources than us. Starting communications to improve the dynamics of our project would help. The light needs to be brought onto the little guys. Smaller projects need spotlights too.

How often are your interests taken into account during green space development?

CO1: Often, we are generally leading the development of these spaces.

CO2: Generally, we accommodate for the builders of the site.

CO3: *This question was not asked as it did not pertain to their organization.*

CO4: Yes, often through the use of the local committees that approves projects. We play a role in communicating with the area and relaying this to the committees.

Questions for Environmentalists:

Do you believe that proper attention is given to the biodiversity in development of green spaces in Copenhagen?

E1: No. Labor is a low-profile job and the upkeep of biodiverse green spaces in Copenhagen costs significant amount of money for the municipalities.

E3: The mayors are scared of not being re-elected, so they are scared to give permission to new things.

How often you are contacted about biodiversity issues concerning green space development?

E1: On an almost daily basis via email.

E3: I am chairman of Østerbro Lokalråd, so yes.

Questions for Municipality Representatives:

Can you walk us through the general process of green space development?

M1: Currently many, if not all, underdeveloped spaces are privately owned. This makes it very difficult to acquire or develop the land. Many private owners do not want to create public green spaces. However, when public land opens up for green space development we start out with a meeting. We have citizen attend and give their input. This allows the citizens to be involved from the beginning. Once we have a gauge of the local opinion, we form local associations and partnerships. We are of the opinion that if we put money into a project, it should be worthwhile.

M2: If there is an established plan. Send in an application with a description. It will be reviewed by the council and either get denied, ask questions, or approve the plan. If an individual wants something, they can go to working groups. They can then get support. Then it can be adopted

and shaped by the council. In the end a person needs to be driving it, a counselor needs to steward it. If it is hard to get a council member to work on it, then it will not be acted on.

M3: It starts by finding the problems in an area by asking questions of the community. We then workshop with the community, refine the plan, and begin to co-create with the community. We create local committees with an autonomous budget and let them begin. These committees are elected, and make sure the actual interest of the community are represented throughout the process by means of workshops. We use an asset-based community development model.

M4: We are part of the development of many small projects. People come to us with plans, and we provide the funding from the city. We help lay the logistics, organize the project, and get it off the ground. There is no direct interference with the project, however we make sure all the conflicts in the project are addressed.

How much time do you spend per project finding and contacting developers/environmentalists?
M1: We are always contacting environmental experts at the universities around us.

M2: There are 40 or 50 thousand staff in municipalities. Sometimes it is hard to find the right place, or the right person. Finding who to contact, establishing a main contact point is very difficult.

M3: It depends. Some are easy to launch because the locals are engaged, and some are not due to the local not being engaged. However, we have a well-established network which speeds the process along.

M4: We generally have people come to the committee with the plans already laid out, however when this is not the case sometimes the communication can be difficult if the organization is bad at communication.

Do you face any issues when trying to build successful green spaces?
M1: It is very difficult to acquire underdeveloped land as the majority of it is owned privately.

M2: Land ownership or land use discussion. Even a vacant lot still has an owner. There is a need to convince all parties to agree. There are many regulations, so it can be difficult to work with the municipality. Council support helps things, they know what questions to ask, they have one foot in the door and one foot out in the opening. If a problem occurs, the proper solutions are expensive. If you are looking for alternatives, you need to contact people that know what to do and what to expect. Having the right people involved is great, the wrong person can ruin it. When the city steps in to 'help', it can hinder things. Being too ambitious can be hurtful.

M3: If the perceptions starts out as negative then the project will start slow. A lot of this is solved by means of going out and physically talking to people. We want the community to want this, and not just impose what we think is right on the people living here.

M4: We need to make sure cooperation is continued throughout the project to ensure that everyone involved is equally represented. We need to make sure all departments and stakeholders in the area are on the same page. We have some issues with privately-owned land These issues focus around communication with the owners and the development of the area because of the fact that it is privately-owned. Holding onto volunteers for a project is also

difficult sometimes. We use workshops to bring people in, but it is difficult to make people see what will be there when it is not there. There needs to be something physical.

Questions for Planners/Developers:
Does your organization reach out to contact environmentalists or community groups during green space development?
PD1: Not ecologists so much. Most contact is with community groups, but I think a synergy with ecologists could be important and helpful in the process.
PD2: We spend time trying to contact local experts mostly. Including the community is important, but sometimes people might not appreciate your approach. Contacting other stakeholders can be time consuming and expensive.
PD3: The main point of contact is the investor. They have the money and are making the plans. The investor then has them contact the current collaborators. Most communication occurs when you are needed. So, when the investor needs you they contact you. You are not contacted when a new idea is being proposed initially. There is an appreciation for transdisciplinary approaches, try to include experts in many fields when needed.

Are there incentives for using environmentally-friendly construction practices?
PD1: No, but most people work with that mentality.
PD2: Municipalities are beginning to subsidize development of public spaces. It also gives the organization a better reputation so that we are contacted by investors or invited to architecture competitions.
PD3: Not specifically. Everything is about sustainability.
Are citizens involved in the development process?
PD1: Yes, this is fundamental to the process. Their feedback is what drives development.
PD2: They are in a limited extent. It is important to include them, but people often believe they are experts when they are not. The public vision is often times less effective than the vision of experts.

Do you think having access to a tool like Urban Natural would increase your desire to contact other stakeholders?
PD1: Yes, I believe so. Urban Natural could increase the sense of community and participation.
PD2: I see potential. It might be a good way to open dialogue, which is often overlooked. But it would need further development and support before it is viable.
PD3: It could be helpful in setting up dialogue. Again, new is not always better. But if you focus on involving the users in the area, then you might have yourself a good tool.

Appendix VIII: Results from Interviews with Similar Green Space Mapping Organizations

Responses below were obtained through interviews as described in previous sections. Consent was obtained to use the identity of the organizations in the analysis. For clarity, the organizations were abbreviated as follows:

G: Green Map NYC, P: Parisculteurs

What is the inspiration for what you do?

G: Trying to find ways to use the internet to improve the world. There was an understanding that many cities had very poor models for urbanization, so they sought to change this. They aimed to make New York City a model sustainable city for the rest of the world.

P: With a new mayor being elected in 2014 the city sought to grow the number of urban farms within the city to 30 hectares.

What would you say were the turning points in the development of your organization?

G: Once the project began receiving recognition it grew rapidly. There were many small breakthroughs that snowballed into larger contributions. A focus on collaboration with other projects and an interactive development process allowed for interesting work to be done. Do not be afraid to work without money, start working anyway. But understand that not all projects will be successful. Once recognition begins, it leads to the ability to take on larger projects and get your name out there.

P: There have been three major calls for projects. In total, there have been 236 projects for 85 sites over these three calls. The first big moment was the first call for projects. Using workshops with project leaders and finding businesses that were interested in being a part of projects was important.

What were the big milestones deliberately set for the organization?

G: Goals were loosely set; things were very unpredictable. It was rare to set launches and demonstrate new features as development sequencing became a constraint. Made an effort to attend all of the competitions and showcases as possible, even if it is not an overwhelming success, the attention will facilitate growth. Use established work as a pilot for any new idea that is presented. Novel ideas come in strange ways; it is never known who might appreciate new developments, for example, the TED organization selected our Director as a Resident in 2017, opening new doors. The main milestones should be working with the people for endorsement and to establish credibility and trust.

P: These were outlined by the city of Paris calling for the creation of 30 hectares for urban farming.

How did your organization publicize itself and gain users?

G: Through the Green Maps, competitions and showcases. Went to conventions or anywhere we could be heard. People would show interest from these, and then the projects would gain support.

P: The Mayor's office endorsed us. We used a project management assistant to check each project site and ensure the project was feasible. These are presented to city hall which decides which sites will be funded. We have a close relationship with the city. We found places, not projects, to work on first and then grew around that.

In your mind, what sets your organization apart from others?

G: *This question was not asked.*

P: We work closely with the city and have the knowledge on how to build good urban agriculture spaces.

What are you proudest of about your organization?

G: *This question was not asked.*

P: We have a lot of projects and our project calls are well received by businesses.

How large is your team?

G: The team has included 125 interns over the years. Currently, it's decentralized, with techs in Europe, board and office in NYC, and key contributors in several locations.

P: We have six or seven people on our team, depending on the time. Most doing analysis and monitoring projects.

How is your organization funded?

G: Mainly through donations. In 2000, the fee structure was 2% of total project expenses. This was a poor mechanism and is not very equitable. We have always welcomed service exchanges instead of fees. Developed a sliding annual fee based on the type of entity, average income of country, gave options to pay up to three years in advance. Nobody wants to pay a fee every year, even when we had 800 projects paying, it only funded 10-15% of the budget. Our current budget and staffing are lean.

P: Through funding by the city of Paris and surrounding municipalities. The government set aside 8 million euros.

What challenges did you face during the development phase of your product?

G: The biggest challenge is that it is very expensive to develop new technology. With the structure of the organizations, personnel changed frequently. This can lead to complications in development and stall progress, especially when related/underlying technology is constantly changing. Using MVP is highly recommended – build the minimum viable project and test it with intended users. As an open source organization, our new platform is being donated. We expect to have new platform ready for user testing by fall 2019.

What challenges are you currently facing?

G: Trying to determine how to function moving forward. Growth is exciting, but size can be difficult when collaborating. The 'back and forth' can be more single sided, which leads to strains between partners. Be wary of continuity, it is best to document everything that you do.

P: It is necessary to take into account the rules of fire safety, rules of building construction, and town planning rules. Associations of residents are sometimes opposed to certain projects and file appeals against building permits. The stability of the economy of the projects and their financing

is also important, as are the steps to obtain the authorization to exploit and put products on the market, as well as the health rules and the question of pollution.

What would you say you are doing well during the marketing phase of your product?
G: *This question was not asked.*
P: Our organization was created at the right time to take advantage of the interest in urban agriculture and provided the tools to create projects that the city could fund.

Appendix IX: Concept Coding of Stakeholder Analysis

CO: Community Outreach Organization, E: Environmentalist, M: Municipality, PD: Planner and Developers

Concept	CO	E	M	PD	Occurrence (n=14)
Have you used or seen participatory mapping tools similar to Urban Natural?					
Yes	3	2	2	2	64.29%
No	1	1	2	1	35.71%
What features (of Urban Natural) are appealing to you?					
Stakeholder Location Filter	4	1	2	1	57.14%
Increase Community Dialogue	3	1	2	1	50.00%
Participatory Aspect	0	1	2	2	42.86%
Underdeveloped Filter	2	0	1	1	35.72%
Advanced Filters	1	1	1	1	28.58%
Developing Area filter	1	0	1	1	21.44%
Are there any features you would like to see added?					
Event Filter	4	2	1	0	50.00%
Calendar	4	2	0	0	42.86%
Partner with Established Platforms	0	0	4	0	28.57%
Moderators/Knowledgeable Question Answers	2	1	1	0	28.57%
Other Information Sources	2	1	0	0	21.43%
Idea Proposal and Rating System	0	1	0	2	21.43%
Do you see any potential issues with using Urban Natural?					
Attracting Critical Mass of Users	3	0	4	2	64.29%
Needs In Person Interactions	4	0	2	1	50.00%
Network Already Established	0	0	3	2	35.71%
Difficult to Communicate with Citizens Through Online Platform	0	0	3	0	21.43%
Qualified Individuals on Site	2	0	1	0	21.43%
Unsure of Commercial Integration	0	0	0	2	14.29%

Concept	CO	E	M	PD	Occurrence (n=14)
Do you see Urban Natural significantly improving inter-stakeholder communication during the process of green space construction?					
Yes - No Qualification	1	1	1	1	28.57%
Yes - If Promote in Person Communication	3	1	0	0	28.57%
Yes - If Further Developed	0	0	2	2	28.57%
No	0	1	1	0	14.29%

Appendix X: Electronic Files

Spreadsheet of research on features of similar green space mapping applications:
https://docs.google.com/spreadsheets/d/161S2c6mNbNz0I5paySW0vs9rlXVq5dkfTvurW88lBwM/edit?usp=sharing

Prototype of Urban Natural tool:
https://www.mapotic.com/copenhagen-green-spaces

YouTube video giving an overview of Urban Natural:
https://www.youtube.com/watch?v=HWKc1l5ZmY8

Concept Coding from Major Stakeholder Interviews:
https://docs.google.com/spreadsheets/d/1cLInTAGJb7hDJflD7SiOKKy7mWtoe_8iQ_FPeJjIfGM/edit?usp=sharing

Business Model Canvas and Value Proposition Results from Workshop with Sponsor
https://drive.google.com/file/d/12qpy_ZMtoEFEfm5PPCmf5zn_XZbrMlWR/view?usp=sharing