

TLO-35247 2020-2021-01 DATA AND SOFTWARE BUSINESS
SOFTWARE BUSINESS - JASSE

Anni Tuomela H274355

Eero Yli-Rahnasto H273761

Samuli Sormunen 50182295

Saana Lahdelma H283396

Joel Leskinen H246132

WORK ALLOCATION

Our start-up works as an equal team with no specific managers. We organized our tasks by individual expertise and interests. Our aim was also to make sure that everyone has a suitable workload that do not prevent getting into flow while working.

Table 1. *Our team's work allocation for the report and pitching.*

Team member	Parts of the report responsible for	Role in the pitch
Anni Tuomela	1, 2.2, 2.7, 3.3, 3.4, Conclusions	Present
Eero Yli-Rahnasto	2.3, 2.5, 2.10, 3.1, 3.5, Conclusions	Present
Samuli Sormunen	2.1, 2.3, 2.4, 2.11, Appendix 2–3	Pitching and making the presentation slides
Saana Lahdelma	2.2, 2.6, 2.9, 3.6, LEAN-canvas	Present
Joel Leskinen	2.3, 2.8, 2.12, 3.2	Pitching and sparring presentation

TABLE OF CONTENTS

1.	INTRODUCTION	1
2.	LEAN BUSINESS MODEL CANVAS	2
2.1	Problem	2
2.2	Existing alternatives	2
2.3	Solution	3
2.4	High-level concept	3
2.5	Unique value proposition	4
2.6	Unfair advantage	4
2.7	Customer segments	5
2.8	Early adopters.....	5
2.9	Channels.....	6
2.10	Key metrics	6
2.11	Cost structure.....	7
2.12	Revenue streams.....	7
3.	PESTLE ANALYSIS.....	9
3.1	Political factors.....	9
3.2	Economic factors.....	9
3.3	Social factors	10
3.4	Technological factors	11
3.5	Legal factors.....	12
3.6	Environmental factors	12
4.	CONCLUSIONS.....	14
	REFERENCES.....	16

APPENDIX A: Lean Canvas, user interface pictures, diagrams, graphs, elaborated finance calculations etc.

1. INTRODUCTION

In scale of Europe, carbon footprint per capita in Finnish households are one of the highest, around 11,5 tonnes in 2010 (Salo & Nissinen 2017). Salo & Nissinen presented in their report that this level could be cut down to 7,2 tonnes. To achieve this level, there needs to be change in households and inhabitants' everyday life. The good news is that according to Special Eurobarometer on climate change (European Commission 2015), around 65% respondents from Finland stated that climate change was serious problem and around 96% respondents said that they had acted on this matter in past six months before the interview. This could have been for example through recycling and reducing waste. So, the will for the change is present but how to realise this in one's life?

First one needs to know from where their life's carbon footprint builds up. To track carbon footprint in everyday life, there are already different apps and solutions existing for users to help them understand their consumption. However, many of these solutions offer only couple ways to track carbon footprint and include only some areas of life, for example only transportation. In reality, carbon emission builds up from numerous areas in life, for example housing, travelling, food and other services (Salo & Nissinen 2017). Therefore, viewing only individual factors can create quite distorted view on carbon footprint total. To get more comprehensive picture, the solutions should be aiming to cover different sides of life more broadly.

For Tampere's city residents and visitors, Tampere.Finland app offers a way to calculate user's carbon footprint from their transport. This CO₂ calculator also has offerings for the user, based on user's level received from their use and CO₂ level from previous month. This feature is still under development, and available feature is not finished. But again, like presented in paragraph above, this app shares same limitations as other similar solutions. App has quite limited view on user's carbon footprint and does not offer inclusive picture of user's carbon footprint in their everyday life.

The solution created in this course work aims to assist app users to track their carbon footprint more closely and offer more extensive options for tracking. Though it might be hard to include all areas of life in one app, we have created solution to add more areas to make solution more inclusive. To present the solution created, we used LEAN business model canvas and PESTLE. In this work, we first go through LEAN business model canvas and its sectors more closely. After that we go through our solutions PESTLE analysis.

2. LEAN BUSINESS MODEL CANVAS

Base for our solution was done with the help of LEAN business model canvas. This chapter presents the different areas of canvas and explains a little further those areas than the actual canvas. Our solution's LEAN business model canvas can be found in Appendix A.

2.1 Problem

Problem we are trying to solve is everybody's own overall awareness of their carbon footprint in their life and how can you monitor it more effortlessly. People don't know how much data is already collected from their day-to-day life that already has information about their carbon footprint.

Currently there are no solutions that fully monitors your life's carbon footprint, only specific portions of it. Because there is no good way to monitor it, people don't usually want to see the effort that goes into it if you would use all the existing solutions simultaneously.

2.2 Existing alternatives

Tracking and following your carbon footprint have been around for a while already. Different options exist both on the internet and as mobile apps where you can track your impact to the carbon emissions. These options however offer quite limited view to following person's day-to-day carbon emissions in more than few aspects of life. More inclusive options seemed to be missing. This is what we consider as a problem. One problem with existing alternatives is also how alternative options receive data. Often data input is upon user to enter to apps. This can cause not so correct or precise inputs, especially if user can receive something else than just insights to get from the app, for example prices or other benefits.

The internet solutions we investigated seemed to usually offer some reference number of the carbon emissions according to the values fed to the questions asked. The questions concerned for example living, traveling, diet and shopping habits and the amounts were to be fed at a monthly level. Since the input values were quite imprecise, so was the output value, which was usually reported in an annual basis. Even though this solution is not optimal for person who wants to track their carbon footprint, it can offer vital knowledge on the impact of different choices in all the segments of life and highlight the differences between. These options also mainly were one use type of solutions and did not cumulate data and create history data from previous inputs. This makes it a bit more demanding for user to actively track their carbon footprint

The mobile app solutions, like Tampere.Finland, offered quite different view on things. Solutions that were offered were concerned usually around one or two different segments.

Most common segment was transportation and travelling. Some had options to track footprint over food and energy choices. Few of the apps also offered possibility to reduce the carbon footprint by doing some tasks or challenges. The yearly carbon footprint was also calculated according to the fed values concerning the same information as in the internet footprint calculators. Difference when compared to internet calculators is that in most app versions there is some historical data which offers user a possibility to compare changes in their carbon footprint over time. Apps also can have pop-up notifications, which reminds user more actively about their choices when compared to internet calculators. The apps usually also offered some information or tips and articles about sustainable choices. The problem in these existing apps was that the area of tracking was quite narrow, or it required a lot of time and attention from the user to keep up with a more precise tracing. This can again cause incorrect data input and incorrect results.

2.3 Solution

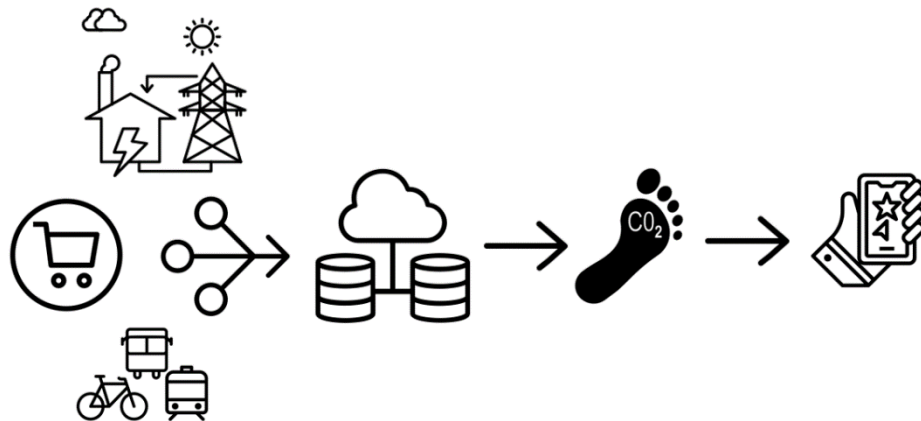
Our solution for more awareness about individual carbon footprint is to collect carbon footprint data from all possible sources and expand the existing Mobility carbon footprint calculator to calculate the big picture of user's carbon footprint. The data collection from different sources is planned to be as automated as possible, in order to make that awareness as easy as possible for the user.

Our approach is to add more modules step by step. Firstly, user's electricity usage is calculated with Tampereen Sähkölaitos Oy that already has a portal for usage data. There are also several other possible partners. For example, K Group could support to combine the carbon footprint of your food shopping collected with K-Ostokset service. In later steps reducing the carbon footprint can be gamified to motivate consumers. Users can be rewarded with discounts to greener everyday choices.

Integration with different data sources could be done in example with Rest API, there are lot of ways to send and receive data in Rest API and different ways to convert data into it. One of these conversion methods is Kepware Server that can handle multiple different data sources and data types. We will offer a simple way for our customers to get the integration done and provide the data to them with their choice of format and protocol. Data transfer of user data from different databases needs to be authorized by the user, as an example a login process (Appendix 3).

2.4 High-level concept

Life's carbon footprint monitor. Easy way to app users to monitor their carbon footprint in their choices and at the same time get something out of it. User can create iterative process based on this and that way make better long-term choices in their life.



2.5 Unique value proposition

Our value proposition is:

Understanding easy way to greener everyday life.

Same in Finnish as the solution is marketed in Finland first:

Ymmärryksen avulla kohti vihreämpää arkea.

This value proposition sums the main problem, benefits our solution offers, and the value that these benefits provide. Our solution promises to deliver an easy way to understand a carbon footprint of a citizen. Understanding is the first step to reduce it.

2.6 Unfair advantage

Our solution will reach unfair advantage from mainly three reasons:

1. Using strong automation through integration with multiple service providers from different sectors, possibly with exclusive right. The time and effort required for the full operation of the app is minimized through integration with service providers. Users using these services can accept the automatic transfer of their data from the services to the app. This reduces manual input of data from the user and instead user can concentrate on exploiting the output data of the app and analyzing their carbon footprint.
2. Being first to include wide range of sources of carbon footprint. We offer a comprehensive carbon footprint tracker / calculator which does not exist in the markets yet. Our solution considers the emission impacts of transportation, grocery shopping and household electricity consumption. We aim to give the user information of their day-to-day carbon emissions and provide as thorough understanding of one's choices as possible.
3. Exploitation of already existing platforms and their users. Using already existing platform (Tampere.Finland mobile app) and the data collector and analyzer apps from service providers of different sectors enables us to focus on making our app as good

for the user as possible. These services have also already existing users who are likely to try the app since they are already utilizing part of the potential of it. The new app will also be easier to adapt by users who have been using these services before.

None of the existing alternatives offer these possibilities and we see these three things also as our way to obtain the maximum value to our customers.

2.7 Customer segments

For our solutions four main customer segments were identified. These are over 18 years old, aware of the effects of their choices on environment, able to change behavior and lastly benefits seeking customers. Our solution is mainly for the residents of the city where solution is used, in this case Tampere city's residents. Customer segments were recognized by analyzing our solutions geographic, demographic, psychographic and behavioural segmentations.

Our solution utilizes data from third parties. Usually, data would come through the usage of the offerings from these third parties. This often requires that the **user's age is above 18**. From here we separate customer segment to be more adult oriented.

Solution aims to tracking and lowering carbon footprint. Customers that are **conscious over their choices** in their everyday life and are somewhat enlightened about carbon footprints meaning for the environment might have value-based motivation to use the solution. Solution offers them better insight of their choices and helps to align choices with customer's values.

One segment is formed by customers that have **readiness to act** and for example resources to change their behaviour. They are able to make choices and have resources like money to choose different options. They might be seeking for better understanding what they can change and alternate, on what our solution could offer insights.

Because our solution would include some benefits, for example discounts or coupons, this could create a separate customer segment. Solution can attract **customers after the benefits** and customers would not otherwise use the app. They have different motivation to use the app when compared for example people conscious over choices.

2.8 Early adopters

Our solution comes as expand to existing software, so the existing users of Tampere application are probably one group of early adopters for our solution. From those existing users, those who are interested in environmental impact will probably start to use our solution first. Those existing users have come to application to use some other feature, and then end up investigating other features of that application.

Other early adopters for our solution could be people who want to decrease their carbon footprint and are really interested about climate change or environmental protection.

Probably those early adopters are also somehow familiar with software and devices, like young adults. The third early adopter group would be those industry insiders, like software developers who are interested in innovative technology, or people who have designed the Tampere application.

2.9 Channels

The main channel for our solution is the Tampere.Finland mobile app which operates as the platform. The users access the carbon footprint tracker through the app and have a profile and their data stored there. This is also the main channel for one group of early adopters, the already existing users of the Tampere.Finland app. The tracker could also be advertised in the Visit Tampere website and other Tampere's webpages and services related to the tracked segments of the carbon tracker.

Another channel to our customers is through the service providers and partners of our app, as Tampereen Sähkölaitos and Kesko. They could advertise and guide their customers to use the app and inform them of the possibility to utilize the data collected by the provider.

Advertising could happen also in Tampere's newspaper Aamulehti, around the city, for example in the bus stops, and in the universities of the city. Universities intranet could also be used. The university students are a valid early adopter segment since they are young, good with software and devices and interested in environmental impact of choices.

For already existing users one channel is also summary of the user's carbon footprint. This can happen on a weekly or monthly basis and via e-mail or app message, depending on the user's preferences.

2.10 Key metrics

Success of our solution can be evaluated in several metrics. Marketing and growth are measured by number of total users and new users per month (App Growth Network 2020). These numbers can be compared to marketing costs with cost per install. In addition to previous well-known application metrics, our solution would benefit from data about how many existing app users start to measure their carbon footprint. The Tampere.Finland app has already several users that may be motivated to use new features with good overall percentage. The solution can be attached to an existing app also for other customers. The key metrics are summarized in the table 2.

Table 2. *Key metrics to track success of the JASSE service.*

<i>Growth KPIs</i>	<i>Product KPIs</i>	<i>Business KPIs</i>
Total users	Monthly active users	Profitability
New users per month	Daily sessions per daily active users	Cost per integrated new module

As users have found the solution, their activity should be measured by monthly active users and daily sessions per daily active users (App Growth Network 2020). If the solution is gamified in the future, session length would indicate how the solution attracts and entertains users.

Finally, it is vital to have a proper view on financial side of the business. Simple metrics are revenue and costs that build profitability. Costs per integrated new feature or module indicates how large the app could be developed with an available budget and estimated income. (App Growth Network 2020) At first revenue and market share are the key metrics to illustrate financial growth but in the long run overall profitability will be in the first place. A start-up needs to scale fast and build a strong position in the market, but it must make profit for the invested capital.

2.11 Cost structure

Cost structures main costs are integration of data from different databases, app development, cooperation with other parties and maintenance. Here is explanation for all the main costs:

- Integration of data from different databases needs to be managed and handled correctly, correct data protection and integration validation needs to be done for all connections.
- Tampere.Finland app needs to be developed and updated if a different way of monitoring your carbon footprint is implemented, development process is more time taking on the first integration.
- All these integrations need cooperation with database owners, interface protocols, data structure needs and what kind of data we could use. All of these need to be discussed with all the parties.
- Our interface solutions need to be maintained and kept up to date. Lifecycle management makes sure that our services runs smoothly and with less downtime.

More cost can come from different options, example if customer needs a high availability server and we are using Kepware solution between the databases, then the servers need to be redundant. Different data protocols can also cost extra if a lot of changes need to be done.

2.12 Revenue streams

Revenue streams of our solution could be separated in two categories. As a startup we can have classic revenue streams from licensing our solution or software subscriptions from our customers. The other way of revenues streams could be some affiliate or advertising in our solution. Also, there is possibility for some data business from the collected

data or revenue from some climate change programs, but those first two categories are probably the main revenue stream for us. It is also possible that we have many of those revenue streams.

Our solution is possible to sell as product to our customers. That could be somehow complicated, because we will have the base model solution, and expansions in future. Second classic revenue stream could be subscription model where customer pay monthly fee from our solution. That subscription model is probably software as service solution, where we offer our product as service for our customers. Pay per user would be possible in both of these solutions too.

Affiliate or advertising revenue could be also option in our solution. Especially, because we must cooperate with grocery stores and electric providers, so it could be logic to have some advertising or affiliate with them. This option also could import some money from companies to our solution. For example, there could be some advertisement about climate neutral services or products to strengthen our positive climate impact.

3. PESTLE ANALYSIS

In this section our solution is analyzed more deeply with PESTLE analysis. The analysis covers different factors that will have impact on the success of our solution. The LEAN model in the previous chapter was re-evaluated based on this analysis.

3.1 Political factors

Political factors include government policies from local to EU level. The political factors have four main effects on business organizations: 1) impact on economy, 2) changes in regulation, 3) political stability, and 4) mitigation of risk. (Pestle Analysis 2021) Following the political aspects support managing risks in other PESTLE dimensions such as economic or legal.

Impact on economy may appear as changed tax rates or increased emissions trading but these factors are not considered as major threats or opportunities for our business. There are public operators funding startups in Finland such as Business Finland that may change their funding criterion. Politicians may ease or complicate getting external capital. For instance, the positive environmental aspects of our solution may increase possibility to gain funding.

Business around data is expanding widely can mean that using data needs to be functional for companies without too much bureaucracy or restrictions. However, changes in regulation could appear as a major threat for the solution if data laws are restricted more. Political stability is considered to stay on a satisfactory level at EU countries that are the main market for the solution in the beginning. For example, there are no changes in intellectual property law in prospect. Copyrights and possibly patents are one way to prevent rivals not to imitate the solution.

In the developed solution there are no indication for raising importance for mitigation of risk. Data security and privacy aspects have been more in public debate and some big tech companies have been imposed for massive fines. The public opinion may call for heavier sentences which means that the legal and privacy aspects need to be considered carefully.

3.2 Economic factors

Economic factors depend on which kind of revenue is utilized in our business models. If the revenue streams are from classic revenue streams like license payments or software as service, probably the biggest economical factor would be financial situation of our customer, which will be in first place Tampere. Financial situation of Tampere is dependent of many factors like employment rates, or local business success, which affect to tax revenue of our first phase customers.

In affiliate or advertising model our revenue streams are more dependent on local business success, and their ability to use money in advertising. Also, this business model would make our marketing, and affiliate budget significantly bigger, because we have actively found collaborator to our solution. These revenue models are not mutually exclusive, and probably combination of those revenue streams would be best solution for everyone.

On the other hand, we have many kinds of costs which affect to our finances. Our production costs will accumulate mostly from software design and data engineering. Those are very competitive fields, so our production could make significant costs even in MVP phase. Also, there could be some costs, if we must pay for companies from data, what we need in our solution, but in first place our aim is to cooperate with them and make that data sharing beneficial for all organizations. Of course, there are also some common costs, for example from taxation, licenses, or accounting, which will affect to us especially in early career of our startup.

Also, there are some external economic factors, which can have impact to our business. First, inflation can have negative impact to our solution, if more of people have lesser possibility to make greener choices. Inflation rates have been increasing lately, so this can have real impact for our business. Also, there have been some talk about threat of recession, because of inflation rates, overall increasing cost, and changing economic environment. Recession will probably decrease individual's interest in climate change when they must make choices based on financial situation more than climate neutral decisions.

3.3 Social factors

With social factors, it is beneficial to examine society's change in recent years and changed values. More and more in modern societies environment and eco-friendliness are rising values, which are also often addressed in organisational and governmental values and strategies. For example, ABB has addressed the to embed sustainability on their actions (ABB, 2021) and Finland's Ministry of the Environment (2021) has declared to aim to decrease Finland's greenhouse emissions. Even in individual level there is more common to be interested in environment and implement this value in everyday life and choices. Eco-friendliness has been as itself a trend, and shaped markets and customers choices. For example, in Forbes (Ellsmoor, 2019) declared 77% wants to be more eco-friendly in Australia and USA, based on study by Southern Cross University. When considering this change, it is also visible in education and even young students and children are familiar with these concepts, forming a strong audience for different solutions in the future. Also, knowledge among people on environment has risen, partly because of increased education level and awareness but also thanks to general discussion and media attention.

Change in society is possible because society, like in Finland, is stable enough to create change. There are resources and energy, that can be channel to this change. There is also

social pressure existing, that guides individuals' actions. Though this pressure can encourage people to act in environment friendly way and for example leverage environment focused apps, can this pressure as well create an opposite force, where some individuals reject the idea in profound level. As they do not want to act this way, because they feel too much pressure from society to this.

When considering social factors, we must examine the societies and individual's capability to implement new technology and apps in their life. What in knowledge level and readiness to use new technology and solutions. Using apps to monitor and guide one's life has been normalized, as people use more and more solutions like sports watches to gather and track data. Readiness and capabilities are there and should not be pose an obstacle for the solution. Also, the idea of these solutions is already familiar for the audience, and people might even use similar solutions already, just not as inclusive.

3.4 Technological factors

When covering our solutions technological factors, we must observe the accessibility and availability of technology. Our solutions use smartphones as a channel through which users use the app. Smartphone has come more general object in life past years, and at the same time their price has gone down, making them more accessible for larger public. Also, internet connectivity is more accessible and used in by the users, which enables the use of many apps, including apps where our solution would be used. In addition, because use of this technology has become general, users usually also have the capability and understanding to use it and also reach for the apps when searching for solutions.

Environment for our solution and what things it should be considering affect the solution. For our solution one thing to consider is data used in our solution. This comes to data privacy, data security and ultimately to GDPR. Data for our solutions can be seen as personal and sensitive data and needs to be handled accordingly. For data security this can mean for example data encryption and authentication. For privacy part this can mean legislations and data governance. Solution created should consider these and use solutions that protects users' data. Like encryption, data used should be encrypted.

If secure data use and users' data protection cannot be ensured, solution faces problems. Here we face problem of data availability, when data needed for solution is not available for solution to use. Advantage for our solution is, that data is already existing and collected. Energy companies and shopping services for example already collect data of their users. Problem is, if they are willing to share the data, even if they could profit themselves from this.

In our solution, the key is to how we are able to integrate data sources with services. We are aiming to supply our solution to different customers from different services, and different customers might have different options and capability for the integration. Luckily there are many ways created to execute the data integration, depending on the use cases.

One solution is Rest Api, like mentioned in chapter 2.3 Solution. Other solutions could also be used, like SOAP Api, Splunk and ODBC (Open Database Connectivity).

3.5 Legal factors

Observing the legislation forms the basis for all actions made by the startup. However, it is not always simple to make sure that every detail is right especially as legislation alternates. Handling data is one of the key aspects that lawmakers in EU have taken under consideration. Data related laws are also in key role while considering our solution.

GDPR provides more control over personal data and assures for EU citizens. Their information must be securely protected regardless of whether the data processing takes place in the EU or not. (European Commission 2021) Personal data includes a name, digital footprints, unique identifiers and so on. The GDPR is considered in the solution by the nature of data collected, the data bases in which data is stored and the way it is managed or processed. (Thomson Reuters 2021)

In our solution, collecting, transferring, and processing data is approved by users. It will be clear to customers that they are sharing their data with the app. While our solution is provided in apps owned by cities it will help us to convince users that their data is handled properly. Our partners that provide data for us are facing the same legal challenges with transferring data. Our solution needs to ensure that the data transfers from external sources observe the same strict security standards.

Once data is collected it will be stored. It is a vital responsibility of us to protect the data by taking reasonable security measures. Customers' need a guarantee that information about them is not a target for cyberattacks. Protecting sensitive customer information is mandatory to avoid legal risks.

Other legal factors that may impact on our solution are intellectual property laws. Supervising possible own rights and taking care of not to violate other's rights is not simple. Managing IPR may require plenty of resources but protecting a developing company for a trial can be profitable.

3.6 Environmental factors

For every solution and business idea the environmental factors also need to be examined. Since our solution seeks to help people make more environmentally friendly choices through understanding, the benefits are notable. When the user gets the information of the impact of their choices, they can make better choices that reduce the emissions from e.g., household energy, transportation, and grocery shopping. The users can monitor the concrete impact of their choices with our product which will increase the

When it comes to data businesses, the processing, transferring, and storing create their own share of carbon emissions. In our solution, this is minimized since we concentrate on exploiting already existing data from our partners.

During the use of the app and especially transportation tracing, the battery consumption of the mobile device might be increased. However, with the help of the automation we can reduce the screen time since no data has to be inserted manually. This again reduces the need for battery recharging and electricity consumption.

Since our product tries to directly reduce the user's carbon emissions, the solution supports Tampere's and Finland's goals regarding to the reductions of carbon emissions by 2030. This can offer extra support and boost for our startup.

4. CONCLUSIONS

Our solution aimed to offer users an efficient and way to track their carbon footprint in their everyday life. A way that they would not need actively save their records on the app, but it would be done for them, saving time and effort. Also, data would be covering user's life carbon footprint more comprehensively, not just level from transportation, for example. Our solutions would use third-party data that is already gathered, just putting it to a new use. The solution also offers ways for these third-party companies to offer even more environmental customer value. As there is a solution, there are advantages and challenges to face.

Advantage for our solution is, that there are not really solutions like this available, or at least there is not so many or easily accessible. Like said earlier, solutions to track carbon footprint tend to be more one sided and not measure carbon footprint in life from different sides of life. During our pitching and feedback, it was also mentioned, that Tampere city representative also recognized the need and lack of this kind of solution.

Other advantage on our solution is, that depending on the customer, like Tampere.Finland app, it is possible to execute this solution the way they prefer. Meaning that our solution is versatile. When there is data there is the solution. Different integration methods can be used to suit the customer's needs is also an advantage, making our solution easier for customer to approach.

Challenges faced by the solution are mainly technological and legal aspects. Observing all the regulations such as GDPR in all steps sets major requirements for the developed technology. The JASSE service needs to be developed in a short time and with limited resources to enable financial success. Therefore, our start-up must have a competent group of employees in many fields of expertise. In this analysis our team understood that there is a need for more expertise in technological aspects.

Selling the solution for the possible customers may also come up as a major challenge that requires professional skills. Our start-up must convince possible customers such as cities to invest in our solution to be provided for users like citizens. Cities should believe in possibilities to achieve environmental benefits. Reaching potential users and holding them requires communicating the value proposition clearly for the right segment. In addition to customers and users, partners are a vital stakeholder. Our solution needs to convince them to support the business idea and become active members of the data ecosystem. Finding supportive partners may appear as hardly imitable competitive advantage.

The JASSE service promises to solve complex problems for a customer. The modularity and the way of creating revenue streams may support achieving this but there is a risk of massive costs and unexpected technical problems. These challenges considered above

may occur to customers which means that our team must convince them that JASSE manages them.

To conclude, our solution may have markets and it may be possible in all aspects, but a lot of more research needs to be done. The opportunities must be clear for selling the idea for all stakeholders and there must be a plan for tackling the major challenges.

REFERENCES

ABB. (2021). Sustainability at ABB. Available (7.10.2021): https://global.abb/group/en/sustainability?_ga=2.265321995.561224740.1634893763-1992765952.1634893763

App Growth Network. (2020). 12 KPIs to Track for Your App in 2020. Available (5.10.2021): <https://appgrowthnetwork.com/blog/12-kpis-to-track-for-your-app-in-2020/>.

Ellsmoor, J. (2019). 77% Of People Want To Learn How To Live More Sustainably. Forbes. Available (7.10.2021): <https://www.forbes.com/sites/jamesells-moor/2019/07/23/77-of-people-want-to-learn-how-to-live-more-sustainably/?sh=b3bbfea2b011>

European Commission. (2015). Climate Change. Finland. Special Eurobarometer. Available: <https://europa.eu/eurobarometer/surveys/detail/2060>.

European Commission. (2021). Reform of EU data protection rules. Available (20.10.2021): https://ec.europa.eu/info/law/law-topic/data-protection/reform_en.

Pestle Analysis. (2015). Political Factors Affecting Business. Available (13.10.2021): <https://pestleanalysis.com/political-factors-affecting-business/>.

Salo, M. & Nissinen, A. (2017). Consumption choices to decrease personal carbon footprint of Finns. Finnish Environment Institute SYKE. SITRA. Available: <https://www.sitra.fi/en/publications/consumption-choices-decrease-personal-carbon-footprints-finns/>.

Thomson Reuters. (2021). 5 questions companies should ask about Big Data to avoid legal issues. Available (20.10.2021): <https://legal.thomsonreuters.com/en/insights/articles/ask-about-big-data-to-avoid-legal-issues>.

Ympäristöministeriö. (2021). Parempi ympäristö tuleville sukupolville. Available (7.10.2021): <https://ym.fi/strategia-ja-tavoitteet>

APPENDIX 1

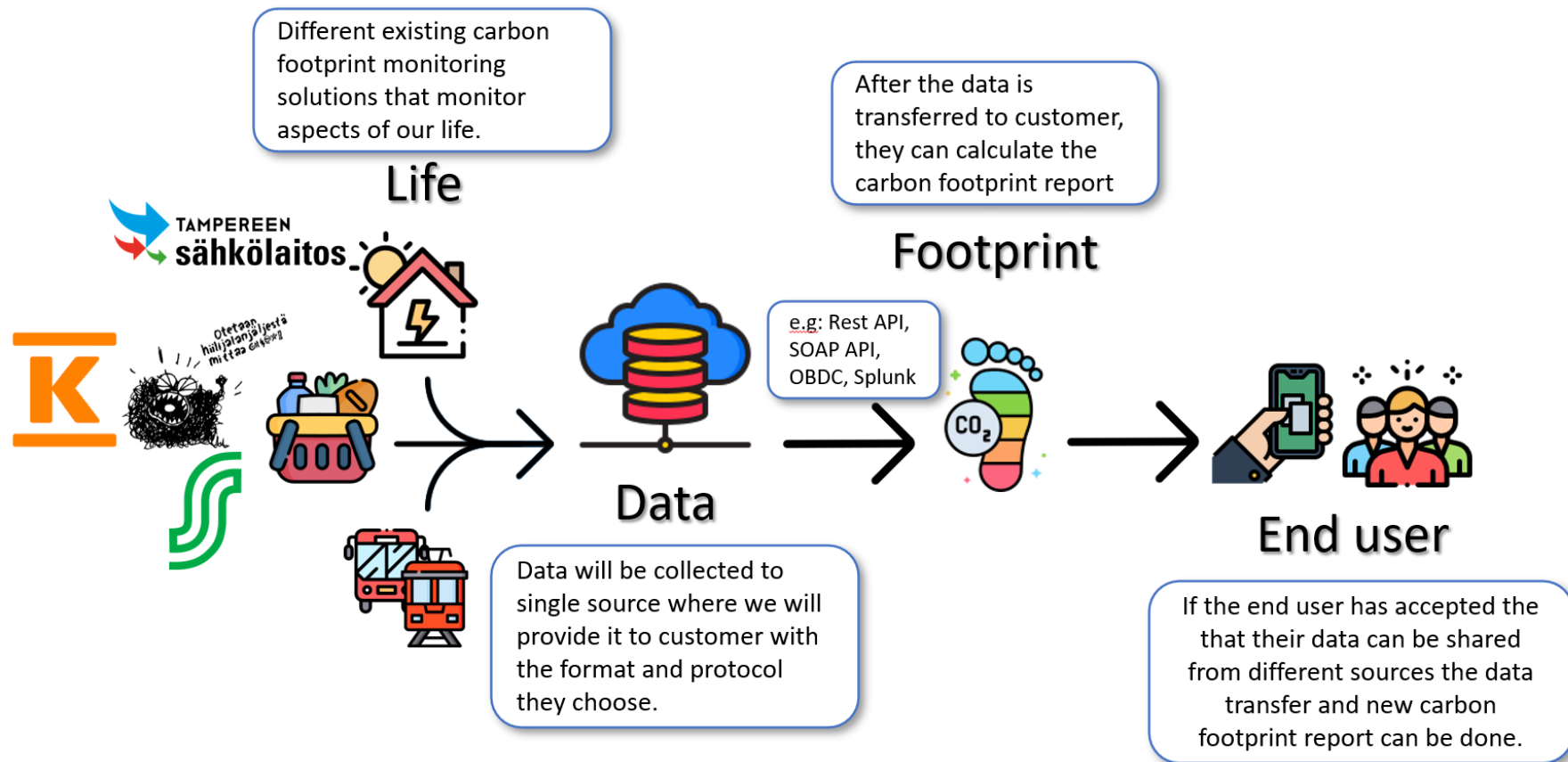
1

LEAN CANVAS MODEL

PROBLEM <ul style="list-style-type: none"> - Making impact to individual's carbon emissions is hard from outside - Little knowledge of the impact of different choices to personal carbon footprint - Monitoring of carbon footprint is complicated 	SOLUTION <ul style="list-style-type: none"> - Increase awareness about individual carbon footprint - Data automatically collected from different databases - Different segments of everyday choices included 	UNIQUE VALUE PROPOSITION <p>Understanding easy way to greener everyday life.</p>	UNFAIR ADVANTAGE <ul style="list-style-type: none"> - Being first to include multiple sources of carbon emissions - Exploitation of already existing users, platforms, and data 	CUSTOMER SEGMENTS <ul style="list-style-type: none"> - Age above 18 - Conscious over their choices - Readiness to act - Customers after the benefits
EXITING ALTERNATIVES <ul style="list-style-type: none"> - Online alternatives mostly calculators operating on an annual basis - Mobile apps cover usually only one segment, e.g., transportation - Require lot of manual data inserting 	KEY METRICS <ul style="list-style-type: none"> - Number of total users - New users per month - Percentage of existing users starting to use the app - Activity of the users, e.g., number of daily sessions per user - Costs per integrated feature - Overall profitability 	HIGH-LEVEL CONCEPT <p>User can monitor their carbon footprint, create iterative process based on this and better their choices in the future</p>	CHANNELS <ul style="list-style-type: none"> - Tampere.Finland app, usage, and advertising inside the app - Service and data providers, e.g., Kesko and Tampereen Sähkölaitos - Social media - Universities and university intranets 	EARLY ADOPTERS <ul style="list-style-type: none"> - Existing users of Tampere.Finland app - Tech oriented people, e.g., young adults - Industry insiders, e.g., software developers
COST STRUCTURE <ul style="list-style-type: none"> - Integration of data from different databases, e.g., data protection and validation - App development - Maintenance - Possible hardware costs - Marketing 			REVENUE STREAM(S) <ul style="list-style-type: none"> - Licensing of the solution - Advertising in the app / sponsoring 	

APPENDIX 2

Data integration example



APPENDIX 3

Authorization of personal data sharing