HANDBOOK

Assessment Tool for
The Neighbourhood Landscaping Company

TEAM 2109

Academic Consultancy Training

Spijkerkwartier, Arnhem

July 2018

Impact Assessment Tool

Index

Introduction

The Research Paper of our Academic Consultancy Training resulted in a set of indicators which were categorized into neighbourhood stocks and capitals. The six capitals make it possible for the NLC to measure their performance affecting the neighbourhood. The Tool - which is another product of the project - is an Excel file which the company can enter their measures in and assess the performance of the NLC in terms of capitals they provide to the Spijkerkwartier. The Tool can also be used by other enterprises.

In this Handbook, we will explain how to use this Tool. The Tool consists of 8 sheets: Description, Base year, Year 1, Year 2, Year 3, Natural capital, Physical capital, Human capital, Economic capital, Social capital, Cultural capital and Hexagram. The Handbook follows this order.

The remainder of the Handbook is as follows. Firstly, chapter *2. Description* informs the reader about the use, function and measures of indicators listed on the 'Description' sheet. Secondly, chapter *3. Data Input* gives instructions on how to enter data into the Tool. Thirdly, chapter *4. Data analysis* interprets the growth of capitals and their stocks and indicators in a respective order. In the last part of this chapter the final outputs of the Tool are explained, linked to the sheet 'Hexagram'. The Handbook is closed with chapter *5. Limitations and Further Research.*

1. Description

The first sheet of the Tool is Description. In this sheet, you can find an overview of all the stocks and the indicators needed to measure the capitals of the Neighbourhood Landscaping Company. The table in this sheet has 8 columns as presented in the Figure 1.

	A	B	C	D	E	F	G	H
1	Capital	Stock	Indicator	Data source	Input	Measure (Input)	Output	Measure (Output)
2	Natural capital	Rainwater retention	Retained rainwater in newly planted urban green	own measurement	newly planted green area (change from concrete to soil) and type according to picture	m2	Retained water in newly planted urban green	l/m2/yr
3	Natural capital	Rainwater retention	Retained rainwater in all planted urban green	own measurement	planted green area in total (change from concrete to soil) and type	m2	Retained water in all planted urban green	l/m2/yr
4	Natural capital	Urban heat island	Cooling by newly planted green area	own measurement	newly planted green area and type according to picture	m2	Fraction on a cooling effect of 1-4 Celsius degrees	number/type
5	Natural capital	Isolation	Saved energy by newly greened buildings	own measurement	newly implemented vertical green on buildings	m2	Energy saved by newly planted vertical green (summer cooling)	%/yr
6	Natural capital	Air quality	Carbon capturing	own measurement	newly planted green area, and type according to picture	m2	Captured carbon in newly planted urban green	kg/m2/yr
7	Natural capital	Air quality	Fine particle capturing	own measurement	newly planted green area and type according to picture	m2	PM10 purified in newly planted urban green	g/m2/yr
8	Natural capital	Biodiversity	Number of new species in the neighborhood	own measurement	newly planted green area and type according to picture	m2	Number of new species	
9	Physical capital	Cleanliness	Cleanliness	own measurement	time spent on cleaning the neighbourhood	h	Time spent on cleaning the neighborhood	h/yr
10	Physical capital	Cleanliness	Perceived cleanliness	survey	perceived cleanliness in the neighborhood by survey participants	Scale 1 to 10	Perceived cleanliness	1-10
11	Physical capital	Aesthetics and built environment	Prettiness	survey	perceived prettiness in the neighborhood by survey participants	Scale 1 to 10	Perceived prettiness	1-10
12	Physical capital	Aesthetics and built environment	Niceness	survey	perceived niceness (aesthetic value) in the neighborhood by survey participants	Scale 1 to 10	Perceived asthetic value	1-10
13	Physical capital	Circular material use	Organic waste to energy (energy)	own measurement	organic waste used for digestion	kg	Energy production from organic waste	kWh/yr
14	Physical capital	Circular material use	Organic waste for composted (fraction)	own measurement	organic waste used for composting/all organic waste	kg/kg	Recycling rate of OM,	%, %, %, %
15	Physical capital	Circular material use	Organic waste to digested (fraction)	own measurement	organic waste used for digestion/all organic waste	kg/kg	Recycling fractions of OM	%, %, %, %
16	Physical capital	Land use	Production space	own measurement	newly planted green area and type according to picture	m2	New production space	m2/yr
17	Physical capital	Land use	Green space	own measurement	planted green area in total and type	m2	Total production	m2/yr
18	Human capital	Education	Number of workshops held by the NLC	own measurement	Number of participants / Number of workshops held	number	Ratio between N of participants over N of workshops	
19	Human capital	Education	Citizens awareness of environmental issues	Survey	Perceived awareness of citizens about environmental issues	Scale 1 to 10	Perceived awareness	1-10
20	Human capital	Health	Physical health	Survey	Citizens feelings about physical conditions	Scale 1 to 10	Physical conditions	1-10
21	Human capital	Health	Mental health	Survey	Citizens feelings about their mental conditions	Scale 1 to 10	Mental condition	1-10
22	Human capital	Well being	Happiness	Survey	Citizens happiness	Scale 1 to 6	Happiness	1-10
23	Human capital	Inspiration	Inspiration	survey	perceived inspiration	number	Inspiration level deriving from NLC	1-10
24	Economic capital	Job creation	Employees' total amount of work	own measurement	Number of people employed and their working hours by the NLC	number	Amount of people employed	
25	Economic capital	Business	Tasks taken over from the municipality	own measurement	Number of tasks taken from the municipality	number	Amount of tasks taken from the municipality	
26	Economic capital	Housing price	Price of houses in the neighbourhood influenced by NLC	own measurement	Hedonic pricing method	€	House price	House price (€)
27	Socia Capital	Safety	Safety in the neighbourhood	Survey	Perceived safety of the citizens	Scale 1 to 10	Perceived safety	1-10
28	Social capital	Social cohesion	Neighbourhood cohesion level	Survey	Citizens feelings about social cohesion in the neighbourhood	Scale 1 to 10	Perceived social cohesion	1-10
29	Social capital	Citizenship	Citizens participation to neighbourhood events organised by the NLC	own measurements	Number of citizens participating to NLC events	number	Number of effective participants	On NLC events participation
30	Social capital	Citizenship	Perceived citizenship	Survey	Citizens feelings about belonging to the neighbourhood	Scale 1 to 10	Perceived citizenship	1-10
31	Social capital	Inclusiveness	Perceived inclusiveness	Survey	Citizens feelings about neighbourhood inclusiveness	Scale 1 to 10	Perceived inclusiveness	1-10
32	Social capital	Organizational learning	Trust in cooperating stakeholders	survey	Due to the Living Lab of NLC how much do stakeholders trust each others	Scale 1 to 10	Stakeholders trust in each other	1-10
33	Cultural capital	Cultural vitality	Number of cultural/artistic/humanistic events done	own measurement	Number of cultural/artistic/humanistic events done by the NLC	number	Amount of events	done monthly
34	Cultural capital	Built environment	Cultural heritage	Survey	Citizens perceived cultural heritage of the neighborhood	Scale 1 to 10	Perceived cultural heritage	1-10

Column A - Capital: consisting of 6 main dimensions that will be measured. The capitals also give the horizontal division of the table. Every capital is color-coded. The introduction of the capitals can be found in the Research Paper.
Column B -Stock: the benefits that are given based on the activities. The introduction of the stocks can be found in the Research Paper.
Column C -Indicators: the measurement that needs to be done. The introduction of the indicators can be found in the Research Paper.
Column D -Data source: data collected by either own measurement of the company or a survey.
Column E -Input: the activities that will be measured.
Column F -Measure (Input): what data the company should fill in
Column G -Output: the result of the measurement
Column H -Measure (Output): the way the measurements are put in data

This chapter includes an extensive description behind what is found in the Tool. Capital by capital the following information can be found:
- Description of capital
- Description of stocks
- Description of indicators
- Data collection (tracked by the company or survey)
- Data Measures (kg, m2 or L)

Natural capital

Natural capital can be defined as the stocks of natural assets which include geology, soil, air, water and all living things.It is from this natural capital that humans derive a wide range of services, often called ecosystem services, which make human life possible. It is composed by a set of indicators that aim to measure the impact of the NLC on managing natural resources.

Retained rainwater

The retained rainwater is the amount of water that is captured, stored and filtered in the soil. The retained rainwater increases when more soil and vegetation is implemented in an area, replacing for instance bricks and concrete. The retained rainwater is therefore measured by the newly planted urban green as well as the total of all planted urban green.

- Retained rainwater in newly planted urban green is calculated by the total of newly planted urban green per year and per vegetation type in meter square. The vegetation type is explained in the table below. The output will be in liters per meter square per year.
- The retained water in all planted urban green is measured by the total of all planted urban green per vegetation type in meter square. The vegetation type is explained in the table below. The output will be in liters per meter square per year.

Urban heat island

The impact of the NLC on the Urban Heat Island is measured by the cooling capacity of newly planted green area per vegetation type as well as the cooling capacity of the total of all planted urban green per vegetation type. A distinction between different vegetation types has been made due to varying cooling capacities.

- The cooling capacity of newly planted green area in total per type of vegetation is measured with the total newly planted urban green per year in m2. The output will show the cooling effect the vegetation has in degree celsius (1℃ up to 4℃).
- The cooling capacity of all planted urban green is measured by the total of all planted urban green per type in meter square.

Isolation

Urban green functions as isolation when placed on buildings. During warm weather the vegetation has a cooling function whereas during cold weather it warms buildings. This means the energy consumption related to cooling as well as to heating goes down when vegetation is applied. Isolation is measured with saved energy by newly greened buildings as well as saved energy by newly greened buildings. Greening of buildings includes green roofs, vertical vegetation and garden.
- The total of planted vertical green. Measured in the energy saved in greened buildings in percent per year.

Air quality

Different types of vegetation have a different capacity to take up a range of pollutants from the air. For this impact measurement the carbon storage and the fine particle uptake is being measured.

- To measure the captured carbon by the urban green the newly planted green area and type according to picture in m2 is needed as input. This measures how much carbon is stored in total in kg/m2/year.
- Furthermore, the total urban green area per type in m2 is needed as input. This measures how much carbon is stored in total in kg/m2/year.
- To measure the fine dust, specified here as PM10, that is captured by vegetation, it is necessary to measure the newly implemented urban green per vegetation type in m2. The vegetation type can be added following the table below and the output will be in g/m2/year.
- Furthermore, the total of the already planted area in m2 per type of vegetation is needed to measure purified PM10. The table below can be used for the distinction between vegetation types. The output will be in g/m2/year.

Biodiversity
Biodiversity can be measured by getting more insight into the number of new species in the neighbourhood. There are two ways to measure this.
- The newly planted green area and type according to picture.
- The planted green area in total and type, which comes from data from the NLC.

Physical capital
Physical capital refers to the physical dimensions of the neighbourhood, such as streets, buildings, sidewalks on which the activities of the NLC might have an impact. The company has several activities that can be regarding cleanliness, aesthetic, built environment, circular material use and land use.

Cleanliness
As the organization cleans the area, they need to measure the perceived cleanliness of the Spijkerkwartier. The NLC takes care of the maintenance of green (vegetated spaces) in the area and of the grey spaces (streets, lawns and paths).
- Neighbourhood cleaning activities is measured by the time put in cleaning the neighbourhood. This data will be in hours/year.
- The perceived cleanliness is measured by the maintenance of the green and the grey of the area. The answer will be on a scale from 1 to 10.

Aesthetics and build environment
Aesthetics is the beauty of the build environment of the Spijkerkwartier. How pretty people think the environment is due to the activities of the NLC is therefore important.
- Aesthetics of the build environment is measured by asking the question: *How pretty do you perceive the neighbourhood because of the activities of the NLC?* The answer will be on a scale from 1 to 10.

Circular material use
The company wants to contribute to the circular neighbourhood economy by using what is already there. Therefore, the company can measure how much organic waste is collected, digested and composted.
- How much organic waste is collected, the waste to energy, is measured by the amount of organic waste used for digestion. The output will be in KG/year.
- Organic waste to energy (fraction) is measured by the amount organic waste used for digestion/all organic waste. This is the amount of organic waste digested. The output will be in KG/year.
- Organic waste to compost (fraction) is measured by the amount of organic waste used for composting/all organic waste. The output will be in KG/year.

Land use

The stock land use describes the intensity of activity that takes place in a community (Bird, 2015). As one of the main focuses of the company is to green the area, we suggest to measure the newly planted green area and type and the total amount of planted green in the Spijkerkwartier.
- Production space is measured by the newly planted green area and type according to picture. The output will be the amount of new production space in m2/yr.
- Green space is measured by planted green area in total and type. The output will be the total production space in m2/yr.

Human capital
Human capital is related with the the quality of human being. It comprehends the dimensions of our human side on which the NLC activities might have an impact. There are four different stocks, such as education, health, well-being and inspiration. Every stocks has its own indicator, measuring the enterprise's contribution to human development in the area.

Education
The organization would like to educate people, and in particular they would like people to have more environmental awareness. The company aims towards this by giving workshops.
- Number of workshops held by the NLC is a first indicator for education of the company, which the company can count per year. The number of workshops may not give a good representation on how many people are achieved, so we suggest to calculate the ratio between the number of participants over the number of workshops.
- Environmental awareness is measured by asking the question: *How aware are you about current environmental issues thanks to the NLC?* The answer will be on a scale from 1 to 10.

Health
The health of the citizens is divided into two aspects. There are many (indirect) ways that the health of the company can be affected by the activities of the NLC. More green areas can make the living environment healthier, but also physical work or (social) activities kan make people healthier, both physically as mentally. To assess people's health in relation to the activities of the company, we suggest to use surveys for mental health and physical health.
- Physical health is measured by asking the question: *How much does the NLC contribute to the wellbeing of your physical health?* The answer will be on a scale from 1 to 10.
- Mental health is measured by asking the question: *How much does the NLC contribute to the wellbeing of your mental health?* The answer will be on a scale from 1 to 10.
-

Wellbeing
Wellbeing of the people in the Spijkerkwartier relates to how happy people in the Spijkerkwartier are as a consequence of the activities of the company. This can be best measured by a survey.
- Wellbeing is measured by asking the question: how much does the NLC contribute to your happiness? The answer will be on a scale from 1 to 10.
-

Inspiration
The impact that the NLC has on inspiring the people in the Spijkerkwartier concerns how much they feel like doing something for the neighbourhood as well.

- Inspiration is measured by asking the question: *How much do the activities of the NLC inspire you to contribute to the neighbourhood?* The answer will be on a scale from 1 to 10.

Economic capital

The Economic capital refers to the economic value created by the activities of the enterprise and the indicators gathered from the NLC activities, such as Job creation, Business and House pricing are built in order to observe a possible impact of the NLC on the economy of the neighbourhood.

Job creation

The NLC wants to create more jobs on the long term, and thus, more work hours for their company by people cleaning the streets and taking care of the green in the area.
- Employees' total amount of work is measured by input of data from the NLC on the amount of hours employees are doing activities like cleaning the streets and greening the area. If there is a contract made with the employees this source can be used. Measured in total amount of hours/year.

Business

- As the NLC is taking over tasks from the municipality, we included the stock business. This stock will be measured by looking at total amount of tasks the NLC has taken over from the municipality.
- The amount of tasks taken over from the municipality will be measured by input of data from the NLC.

Housing price

With the NLC working on creating a better living environment for the neighbourhood, the housing price can change due to the impact cleaning and greening the area, as well as a better living environment and more social cohesion in the neighbourhood.
- The housing prices are measured by the price of houses in the neighbourhood influenced by NLC. We suggested a hedonic pricing method. Measured in price of the houses (€).

Social capital

The social capital refers to the contribution of the NLC activities on creating a more social community and to the networks of relationships among people who live and work in a particular society, enabling that society to function effectively.
The stocks that are found are expected to detect the impact of the NLC on safety, social cohesion, citizenship, inclusiveness and organizational learning.

Safety in the neighbourhood

The activities of the company can increase the degree to which the residents feel safe in their neighbourhood. This be for example by an result of having more people on the streets or because of a cleaner neighbourhood or social cohesion.
- The safety of the residents is measured by the degree to which the citizens in this neighbourhood find themselves save by taking into consideration the NLC: *How much do you feel safe in the neighbourhood thanks to the NLC?* The answer will be on a scale from 1 to 10.

Social cohesion

Social cohesion as a consequence of the activities of the enterprise is a big aim of the company. They would like to increase the contact between people in the neighbourhood.

- Neighbourhood cohesion level is measured by asking the question: *How much does the NLC contribute to the neighbourhood social cohesion?* The answer will be on a scale from 1 to 10.

Citizenship

Citizenship that arises from the company relates to the level of (political) engagement of the neighbourhood residents (Bird, 2015). The company aims to increase the citizenship of the people by including them, and making them more responsible for their own area.

- The citizens' participation to neighbourhood events organised by the NLC is measured by number of citizens participating to NLC events. The NLC could count the amount of participants every time they have an event, and calculate with home much percentages this grows every year (so they take the first measurement as a baseline). The output is the number of effective participants on the NLC events.
- Perceived citizenship is measured by asking the question: *how much does the NLC makes you feel a citizen of the Spijkerkwartier?* The average grade of that year will be on a scale from 1 to 10.

Inclusiveness

With their focus on social activities, the company aims to include more and more people. To measure how much people feel more included due to the activities of the company, we suggest a survey.

- Perceived inclusion is measured by asking the question: *How much do you think the NLC contributes to the inclusiveness of the neighbourhood?* The answer will be on a scale from 1 to 10.

Organizational learning

With the starting of the NLC, there is a new structure between the municipality and the citizens. The organization and citizens are taking over tasks of the municipality, people become more active and learn from working. On the topic of organizational learning, the connection between the municipality and the NLC (and also SIGHT Landscaping) is of high importance. In this account, they have to trust each other.

- To measure the trust of stakeholders in cooperating with the NLC, SIGHT, and others involved, the question can be asked: *How much do the involved stakeholders trust each other due to the Living Lab of NLC?* The answer will be on a scale from 1 to 10.

Cultural capital

Cultural capital consists of a set of social assets of a person (cultural awareness, intellect, knowledge, style of speech and dress, etc.) that promote social mobility in a stratified society. The activities of the NLC aim to have an impact these assets, on the neighbourhood level; Therefore, the capital is composed by stocks that empower the enterprise to measure so.

Cultural vitality

The cultural vitality of the neighbourhood is high when art is encouraged and celebrated and when the neighbourhood acknowledges the (local) traditions and the national holidays of the Netherlands or other countries, and other celebrations. When the cultural vitality is high, people identify within a neighbourhood and they have a sense of place (Bird, 2015).

- The cultural vitality is measured by the number of cultural/artistic/humanistic events done in the neighbourhood.

Build Cultural Heritage

The Built cultural heritage is the number of monuments, groups of iconic buildings, and the preservation of heritage sites in a neighbourhood (Bird, 2015). We will focus on analysing the perceived contribution of the company to add to the values of buildings. The cultural heritage can be wall painting, building infrastructure, etc.
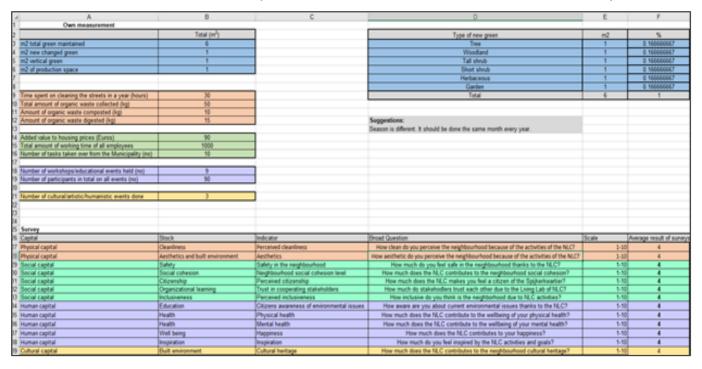
- The perceived build cultural heritage is measured by asking the question: *How much does the NLC contributes to the cultural heritage of the neighbourhood?* The answer will be on a scale from 1 to 10.

2. Data Input

1. Open the measurement tool.
2. Open the base year part and fill the data.

The second sheet is Base Year. It provides the column of the own measurements and surveys.

	Own measurement					
		Total (m²)		Type of new green	m2	%
m2 total green maintained		6		Tree	1	0.166666667
m2 new changed green		1		Woodland	1	0.166666667
m2 vertical green		1		Tall shrub	1	0.166666667
m2 of production space		1		Short shrub	1	0.166666667
				Herbaceous	1	0.166666667
				Garden	1	0.166666667
Time spent on cleaning the streets in a year (hours)		30		Total	6	1
Total amount of organic waste collected (kg)		50				
Amount of organic waste composted (kg)		10				
Amount of organic waste digested (kg)		15		Suggestions:		
				Season is different. It should be done the same month every year.		
Added value to housing prices (Euros)		90				
Total amount of working time of all employees		1000				
Number of tasks taken over from the Municipality (no)		10				
Number of workshops/educational events held (no)		9				
Number of participants in total on all events (no)		90				
Number of cultural/artistic/humanistic events done		3				

Survey					
Capital	Stock	Indicator	Broad Question	Scale	Average result of surveys
Physical capital	Cleanliness	Perceived cleanliness	How clean do you perceive the neighbourhood because of the activities of the NLC?	1-10	4
Physical capital	Aesthetics and built environment	Aesthetics	How aesthetic do you perceive the neighbourhood because of the activities of the NLC?	1-10	4
Social capital	Safety	Safety in the neighbourhood	How much do you feel safe in the neighbourhood thanks to the NLC?	1-10	4
Social capital	Social cohesion	Neighbourhood social cohesion level	How much does the NLC contributes to the neighbourhood social cohesion?	1-10	4
Social capital	Citizenship	Perceived citizenship	How much does the NLC makes you feel a citizen of the Spijkerkwartier?	1-10	4
Social capital	Organizational learning	Trust in cooperating stakeholders	How much do stakeholders trust each other due to the Living Lab of NLC?	1-10	4
Social capital	Inclusiveness	Perceived inclusiveness	How inclusive do you think is the neighborhood due to NLC activities?	1-10	4
Human capital	Education	Citizens awareness of environmental issues	How aware are you about current environmental issues thanks to the NLC?	1-10	4
Human capital	Health	Physical health	How much does the NLC contribute to the wellbeing of your physical health?	1-10	4
Human capital	Health	Mental health	How much does the NLC contribute to the wellbeing of your mental health?	1-10	4
Human capital	Well being	Happiness	How much does the NLC contributes to your happiness?	1-10	4
Human capital	Inspiration	Inspiration	How much do you feel inspired by the NLC activities and goals?	1-10	4
Cultural capital	Built environment	Cultural heritage	How much does the NLC contributes to the neighbourhood cultural heritage?	1-10	4

There are two main columns, which are: own measurement and survey. Firstly, in the own measurement part, we can fill in the data about:

- *m2 total green maintained.*
- *m2 new changed green.*
- *m2 vertical green.*
- *m2 of production space.*
- *Time spent on cleaning the streets in a year (hours)*
- *Total amount of organic waste collected (kg)*
- *Amount of organic waste composted (kg)*
- *Amount of organic waste digested (kg)*
- *Added value to housing prices (Euros)*
- *Total amount of working time of all employees*
- *Number of tasks taken over from the Municipality (no)*
- *Number of workshops/educational events held (no)*
- *Number of participants in total on all events (no)*
- *Number of cultural/artistic/humanistic events done*

The column below shows the variables that have to be measured in the own measurement part. For example, if we would like to check the educational stocks in human capital improvement through the workshops they held. The specific aspects that can be measured is the number of workshops/educational events held.

	A
1	**Own measurement**
2	
3	m2 total green maintained
4	m2 new changed green
5	m2 vertical green
6	m2 of production space
7	
8	
9	Time spent on cleaning the streets in a year (hours)
10	Total amount of organic waste collected (kg)
11	Amount of organic waste composted (kg)
12	Amount of organic waste digested (kg)
13	
14	Added value to housing prices (Euros)
15	Total amount of working time of all employees
16	Number of tasks taken over from the Municipality (no)
17	
18	Number of workshops/educational events held (no)
19	Number of participants in total on all events (no)
20	
21	Number of cultural/artistic/humanistic events done

In the following table of the Tool the NLC should fill in the type of urban green (in m2) they planted:

Type of new green	m2	%
Tree	1	0.166666667
Woodland	1	0.166666667
Tall shrub	1	0.166666667
Short shrub	1	0.166666667
Herbaceous	1	0.166666667
Garden	1	0.166666667
Total	6	1

For example, m2 of the total green maintained. The user can put the data in the base year of the total green that they have (in m2). The user puts the number of total green as 6 m2 as the base year data. We suggest to collect data every year in the same month because of season differences. If decided to do the measurements every six months, it is advised to only compare the data of two summers/winters for example. Comparing summer with winter data can give insights on the differences in activities in summer or winter, but will not give a reliable impact assessment between measurements.

Below you can see the column survey. This table indicates the collected data through surveys. The survey table consists of the capital, stocks and indicators.

	Capital	Stock	Indicator
25	**Survey**		
26	Capital	Stock	Indicator
27	Physical capital	Cleanliness	Perceived cleanliness
28	Physical capital	Aesthetics and built environment	Aesthetics
29	Social capital	Safety	Safety in the neighbourhood
30	Social capital	Social cohesion	Neighbourhood social cohesion level
31	Social capital	Citizenship	Perceived citizenship
32	Social capital	Organizational learning	Trust in cooperating stakeholders
33	Social capital	Inclusiveness	Perceived inclusiveness
34	Human capital	Education	Citizens awareness of environmental issues
35	Human capital	Health	Physical health
36	Human capital	Health	Mental health
37	Human capital	Well being	Happiness
38	Human capital	Inspiration	Inspiration
39	Cultural capital	Built environment	Cultural heritage

Below is another part of the base year sheet, which are: broad questions and scale.

Indicator	Broad Question	Scale	Average result of surveys
Perceived cleanliness	How clean do you perceive the neighbourhood because of the activities of the NLC?	1-10	4
Aesthetics	How aesthetic do you perceive the neighbourhood because of the activities of the NLC?	1-10	4
Safety in the neighbourhood	How much do you feel safe in the neighbourhood thanks to the NLC?	1-10	4
Neighbourhood social cohesion level	How much does the NLC contributes to the neighbourhood social cohesion?	1-10	4
Perceived citizenship	How much does the NLC makes you feel a citizen of the Spijkerkwartier?	1-10	4
Trust in cooperating stakeholders	How much do stakeholders trust each other due to the Living Lab of NLC?	1-10	4
Perceived inclusiveness	How inclusive do you think is the neighborhood due to NLC activities?	1-10	4
Citizens awareness of environmental issues	How aware are you about current environmental issues thanks to the NLC?	1-10	4
Physical health	How much does the NLC contribute to the wellbeing of your physical health?	1-10	4
Mental health	How much does the NLC contribute to the wellbeing of your mental health?	1-10	4
Happiness	How much does the NLC contributes to your happiness?	1-10	4
Inspiration	How much do you feel inspired by the NLC activities and goals?	1-10	4
Cultural heritage	How much does the NLC contributes to the neighbourhood cultural heritage?	1-10	4

In the survey table, it divides into 5 columns: capital, stock, indicators, broad questions and score. This tool only contains the physical capital, social capital and cultural capital, as the human capital, economic capital and natural capital have own measurements. Each capital consists of some stocks. Each stock has certain questions to measure the perceptions of people who live in the neighbourhood.

1. Physical capital
For the physical capital, the tool provides two stocks: perceived cleanliness and aesthetics.

Perceived cleanliness	How clean do you perceive the neighbourhood because of the activities of the NLC?
Aesthetics	How aesthetic do you perceive the neighbourhood because of the activities of the NLC?

Cleanliness
In the physical capital, the stock is cleanliness and the indicator is perceived cleanliness. To measure this perception, the tool gives the example of the broad question: *How clean do you perceive the neighbourhood because of the activities of the NLC?* The final survey questions can be formulated how the user might think fitting. The user can collect the data via survey and fill the data in the grey columns. The answer should be on a scale between 0-10 (where 0 is very bad and 10 is excellent). Thus each scale from 1-10 represents certain perceptions.

Aesthetics and Built environment
The aesthetics can be measured by the survey. For instance, by using this broad question as a guideline: *How pretty do you perceive the neighbourhood because of the activities of the NLC?* The answer from the sample is on a scale between 0-10. Fill in the data into the grey column in the table.

2. Social Capital
For the social capital, the tool provides 6 indicators, seen in the table below.

29	Social capital	Safety	Safety in the neighbourhood
30	Social capital	Social cohesion	Neighbourhood social cohesion level
31	Social capital	Citizenship	Perceived citizenship
32	Social capital	Organizational learning	Trust in cooperating stakeholders
33	Social capital	Inclusiveness	Perceived inclusiveness

Safety
The tool assumes that the activities of the company can give a more safer feeling for people. The broad question is: *How much do you feel safe in the neighbourhood thanks to the NLC?* It will be measured by the perception of the people, by asking a question with an answer on a scale between 0-10. The data input is in the grey column of the tool.

Social cohesion
The social cohesion can be measured by scaling the perception of society about the social cohesion after the activities from the company is done. The broad question is: *How much does the NLC*

contribute to the neighbourhood social cohesion?

Citizenship

To measure the stocks of citizenship, the behaviour and feeling of the people in the neighbourhood is measured. The broad question is: *How much does the NLC makes you feel a citizen of the Spijkerkwartier?*

Organizational learning

To improve the human capital of neighbourhood, the NLC held some workshops, also named the Living Lab. This tool will measure the impact by scaling the perception of neighbourhood by asking certain questions. The broad question is: *How much do stakeholders trust each other due to the Living Lab of NLC?*

Inclusiveness

The tool will measure the perception of the neighbourhood on the inclusiveness impact that by the NLC activities. The broad question is: *How inclusive do you think is the neighbourhood due to the NLC activities?*

3. Human Capital

The table below shows the indicators of the stocks education, health, wellbeing and inspiration. There are four indicators, which are: citizens' awareness of environmental issues, physical health, mental health, happiness and inspiration.

Citizens awareness of environmental issues	How aware are you about current environmental issues thanks to the NLC?
Physical health	How much does the NLC contribute to the wellbeing of your physical health?
Mental health	How much does the NLC contribute to the wellbeing of your mental health?
Happiness	How much does the NLC contributes to your happiness?
Inspiration	How much do you feel inspired by the NLC activities and goals?

Education

For the education stock, the tool provides the questions related to the environmental issues. So, to measure the environmental awareness, the user can use a survey. The broad question is: *How aware you about current environmental issues thanks to the NLC?*

Health

There are two aspects that should be measured: mental health and physical health. Examples of broad questions are:
1. *How much does the NLC contribute to the wellbeing of your mental health?*
2. *How much does the NLC contribute to the wellbeing of your physical health?*

Wellbeing

Wellbeing will be measured by the perception of happiness while living in the neighbourhood which is supported by the NLC activities. The broad question is: *How much does the NLC contribute to your happiness?*

Inspiration

The next stock is inspiration, which contributes to the human capital. It scales the perception on how much inspiration people in the society have had by seeing for example the vertical planting or other activities that has been done by the company. The broad question is: *How much do you feel inspired by the NLC activities and goals?*
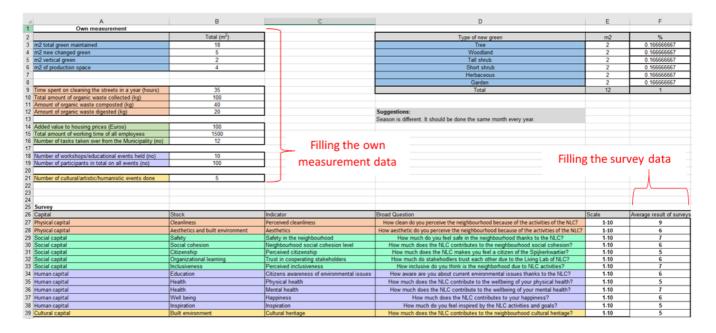
4. Cultural Capital

Cultural heritage	How much does the NLC contributes to the neighbourhood cultural heritage?

The last capital of the survey is Cultural capital, with the indicator Cultural heritage. The example of the broad question is: *How much does the NLC contributes to the neighbourhood cultural heritage?*

Filling the data in each year

This is the table based on the years. The figure below is the year 1 sheet. This excel provides some sheets for each year. . When gathering data for year 1, put it in year 1 sheet, for measuring data in year 2, put in in the Year 2 Sheet, etc.

1. **Year 1**

	A	B	C	D	E	F
1	Own measurement					
2		Total (m²)		Type of new green	m2	%
3	m2 total green maintained	18		Tree	2	0.166666667
4	m2 new changed green	5		Woodland	2	0.166666667
5	m2 vertical green	2		Tall shrub	2	0.166666667
6	m2 of production space	4		Short shrub	2	0.166666667
7				Herbaceous	2	0.166666667
8				Garden	2	0.166666667
9	Time spent on cleaning the streets in a year (hours)	35		Total	12	1
10	Total amount of organic waste collected (kg)	100				
11	Amount of organic waste composted (kg)	40				
12	Amount of organic waste digested (kg)	20		Suggestions:		
13				Season is different. It should be done the same month every year.		
14	Added value to housing prices (Euros)	100				
15	Total amount of working time of all employees	1500				
16	Number of tasks taken over from the Municipality (no)	12				
17						
18	Number of workshops/educational events held (no)	10				
19	Number of participants in total on all events (no)	100				
20						
21	Number of cultural/artistic/humanistic events done	5				
22						
23						
24						
25	Survey					
26	Capital	Stock	Indicator	Broad Question	Scale	Average result of surveys
27	Physical capital	Cleanliness	Perceived cleanliness	How clean do you perceive the neighbourhood because of the activities of the NLC?	1-10	9
28	Physical capital	Aesthetics and built environment	Aesthetics	How aesthetic do you perceive the neighbourhood because of the activities of the NLC?	1-10	6
29	Social capital	Safety	Safety in the neighbourhood	How much do you feel safe in the neighbourhood thanks to the NLC?	1-10	7
30	Social capital	Social cohesion	Neighbourhood social cohesion level	How much does the NLC contributes to the neighbourhood social cohesion?	1-10	6
31	Social capital	Citizenship	Perceived citizenship	How much does the NLC makes you feel a citizen of the Spijkerkwartier?	1-10	5
32	Social capital	Organizational learning	Trust in cooperating stakeholders	How much do stakehodlers trust each other due to the Living Lab of NLC?	1-10	6
33	Social capital	Inclusiveness	Perceived inclusiveness	How inclusive do you think is the neighborhood due to NLC activities?	1-10	7
34	Human capital	Education	Citizens awareness of environmental issues	How aware are you about current environmental issues thanks to the NLC?	1-10	6
35	Human capital	Health	Physical health	How much does the NLC contribute to the wellbeing of your physical health?	1-10	5
36	Human capital	Health	Mental health	How much does the NLC contribute to the wellbeing of your mental health?	1-10	7
37	Human capital	Well being	Happiness	How much does the NLC contributes to your happiness?	1-10	6
38	Human capital	Inspiration	Inspiration	How much do you feel inspired by the NLC activities and goals?	1-10	5
39	Cultural capital	Built environment	Cultural heritage	How much does the NLC contributes to the neighbourhood cultural heritage?	1-10	5

Where exactly should the data be filled in?

The table below shows the grey columns where the user can put in the data of their own measurements.

Total (m²)
24.00
5
2
4
35
100
40
20
100
1500
12
10
100
5

The table below shows the grey column where the user can put in the data on how many m2 new plants have been planted. The excel also provides a distinction between the type of plants.

m2	%
1	0.166666667
1	0.166666667
1	0.166666667
1	0.166666667
1	0.166666667
1	0.166666667
6	1

This following table contains the type of new green planted. The user can fill in the amount (m2) in the grey areas, specified on the type of the plants.

Type of new green	m2	%
Tree	0	#DIV/0!
Woodland	0	#DIV/0!
Tall shrub	0	#DIV/0!
Short shrub	0	#DIV/0!
Herbaceous	0	#DIV/0!
Garden	0	#DIV/0!
Total	0	#DIV/0!

3. Data Analysis (Capitals and Hexagram)

In this chapter, we will explain how the data can be interpreted and analysed, after all of the data of the year has been filled out in the excel sheet.

There are seven different sheets showing the results of the assessment, named 'Natural Capital', 'Physical Capital', 'Human Capital', 'Economic Capital', 'Social Capital', 'Cultural Capital' and 'Hexagram'. The 'Capital' sheets are calculating the values for the growth of each capital by calculating Stocks and Indicators. The 'Hexagram' sheet summarises the capital growths in a table and presents visualizations of the results. Due to time constraints we weren't able to obtain significant data for some real measures and goals. The ones that are missing are labelled with the sign " - " in order to show the lack of data. This was only the indicators for the Urban Heat Island.

3.1 Natural Capital

The table below shows the sheet 'Natural Capital'. The table is divided vertically into 2 parts and horizontally into 3 parts. Please note that the numbers presented in this Handbook are just examples and used to make the understanding of calculations easier.

'This page is done. Missing: indicators for cooling. For references scroll right									
Indicators	**Base**	**Y1**	**Y2**	**Y3**	**Thresholds**	**E(Y1)**	**E(Y2)**	**E(Y3)**	**E(Y10)**
Retained rainwater in all planted urban green (L/m2/yr)	38,70	116,10	102,10	134,50		100,00	200,00	250,00	400,00
Saved energy by greened buildings in total	-	-	-	-					
Carbon capturing (kg/m2/yr)	40,90	122,70	122,70	163,60		100,00	150,00	200,00	300,00
Fine particle capturing (kg/m2/yr)	12,48	37,44	37,44	49,92		20,00	30,00	40,00	50,00
Biodiversity (m2)	6,00	18,00	18,00	24,00		10,00	20,00	30,00	40,00
Stocks	**Base**	**Y1**	**Y2**	**Y3**	**Thresholds**	**E(Y1)**	**E(Y2)**	**E(Y3)**	**E(Y10)**
Rainwater retention	38,70	116,10	102,10	134,50		100,00	200,00	250,00	400,00
Air quality	40,90	122,70	122,70	163,60		100,00	150,00	200,00	300,00
Air quality	12,48	37,44	37,44	49,92		20,00	30,00	40,00	50,00
Biodiversity	6,00	18,00	18,00	24,00		10,00	20,00	30,00	40,00
Rainwater retention	Base index	3,00	2,64	3,48	Base index	2,58	5,17	6,46	10,34
Air quality	Base index	3,00	3,00	4,00	Base index	2,02	3,04	4,05	5,67
Biodiversity	Base index	3,00	3,00	4,00	Base index	1,67	3,33	5,00	6,67
Rainwater retention	Rolling index	3,00	0,88	1,32	Rolling index	2,58	2,00	1,25	1,60
Air quality	Rolling index	3,00	1,00	1,33	Rolling index	2,02	1,50	1,33	1,38
Biodiversity	Rolling index	3,00	1,00	1,33	Rolling index	1,67	2,00	1,50	1,33
Capital		**Y1**	**Y2**	**Y3**	**Thresholds**	**E(Y1)**	**E(Y2)**	**E(Y3)**	**E(Y10)**
Natural Capital	Base index	3,00	2,82	3,74	Base index	2,30	4,10	5,25	8,00
Natural Capital	Rolling index	3,00	0,94	1,33	Rolling index	2,30	1,75	1,29	1,49

Vertically on the left side (columns A-E) represents the reality and in the following chapters they will be referred to as 'Real Measures'. Measurements are automatically filled out in this part from the sheets 'Base Year' and 'Year 1,2, 3' and the data which is calculated here is based on the measurements and the surveys the NLC conducts. On the right side (columns G-K) goals or expectations are presented and will be referred to as 'Goals'. The grey cells of the Tool should be filled in here by the company and the values should be representing the company's goals for the first, second, third and tenth years (E(Y1), E(Y2), E(Y3), E(Y10)), respectively.

Horizontally, the table is divided into Indicators, Stocks and Capital. The table calculates the indicators (absolute values) from the data given in the 'Base Year' and 'Year 1,2 and 3' in the Tool. After, the absolute stocks are calculated and so are the base and rolling indices. The base index is Base index = Value of Year X / Value of Base Year. Therefore, the base index always shows the growth of a certain stock in a certain year compared to the Base Year. The rolling index is Rolling index = Value of Year X / Value of Year (X-1). Therefore, the rolling index always shows the growth of a certain stock in a certain year compared to the previous year.

3.1.1 Indicators of Natural Capital

For each indicator, the value of Year 1 is interpreted. For the calculations of the indicators the following table has been used. This table is included in the Tool on the sheet 'Natural Capital'!Z2:AF5.

	Tree	Woodland	Tall shrub	Short shrub	Herbaceous	Garden
PM10	3,97	2,69	2,05	2,05	0,9	0,82
Carbon	10,64	15,62	7,79	5,61	0,17	1,07
Retention	8,4	8,7	7,3	7,3	8	6
Cooling	1	1	1	1	0,5	0,5

Source: M. L. Derkzen: Changing Roles of Urban Green Space 2017
(https://research.vu.nl/ws/portalfiles/portal/45004571)

Real Measures
The values of Year 1 are interpreted.
Retained Rainwater in all planted urban green: Cell C3 has the value of 116.10. This means that the amount of retained water in the urban green planted by the NLC is 116.1 liters.
Cooling by planted green area in total: -
Carbon capturing of planted urban green: Cell C5 has the value of 122.7. This means that the amount of captured carbon by the urban green planted by the NLC is 122.7 kgs.
Fine particle (PM10 - fine particles under the diameter of 10 nanometer) capturing by urban green: Cell C6 has the value of 37.44. This means that the amount of fine particles (PM10) by the urban green planted by the NLC is 122.7 kgs.
Biodiversity: Cell C7 has the value of 6.00. This means that the NLC has planted 6 m2 of urban green in the Base Year which is supposed to increase biodiversity.

Goals
Cells H3:K7 are to be filled out by the company. E(Y1) represents the goals of the company for each indicator for Year 1 and E(Y10) represents the goals/expectations of the NLC for each indicator for Year 10.

3.1.2 Stocks of Natural Capital

Underneath the indicators, the stocks are calculated. In the first part the absolute stocks are presented which - in this case - do not differ from the indicators. Each stock is influenced by 1 or more indicators and when the stock is influenced by more indicators, the average of the change of indicators is calculated to see the change in the stock. At the Natural Capital every stock is influenced only by 1 indicator therefore, all stocks have the same absolute value as the indicators.

Real Measures
For each real measure stock the value of Year 1 is interpreted.
Rainwater Retention: Cell C10 has the value of 116.1. This means that the amount of retained water in the urban green planted by the NLC is 116.1 liters.
Air Quality (C): Cell C11 has the value of 122.7. This means that the amount of captured carbon by the urban green planted by the NLC is 122.7 kgs.
Air Quality (PM10): Cell C12 has the value of 37.44. This means that the amount of fine particles (PM10) by the urban green planted by the NLC is 122.7 kgs.
Biodiversity: Cell C13 has the value of 18.00. This means that the the urban green planted by the NLc is 18 m2 in Year 1 which is supposed to increase biodiversity.

Goals
For the expected values, the excel works similarly as it does for the indicators. The goals for Year 10 are described.
Rainwater Retention: Cell K10 has the value of 400.00. This means that the amount of retained water in the urban green planted by the NLC is planned to be 400 liters in (throughout) Year 10.
Urban Heat Island: -
Air Quality (C): Cell K11 has the value of 300.00. This means that the amount of captured carbon by the urban green planted by the NLC is planned to be 300 kgs in (throughout) Year 10.
Air Quality (PM10): Cell K12 has the value of 50.00. This means that the amount of fine particles (PM10) by the urban green planted by the NLC is planned to reach 50 kgs in (throughout) Year 10.

Biodiversity: Cell K13 has the value of 40.00. This means that the NLC is planning to plant 40 m2 of urban green in Year 10 which is supposed to increase biodiversity.

Underneath the absolute values of the stocks, the base indices are calculated. Base index = Value of Year X / Value of Base Year. Therefore, the base index always shows the growth of a certain stock in a certain year compared to the Base Year.

Real Measures
The base indices of Year 1 are interpreted.
Rainwater Retention: Cell C15 has the value of 3.00. This means that the amount of retained water in the urban green planted by the NLC has grown by 200% from the Bases Year to Year 1. Similarly, the amount of retained water in the urban green planted by the NLC became 3 times bigger in Year 1 than it was in the Base Year.
Air Quality: The Base index of Air Quality is influenced by two stocks: the carbon and the fine particle capturing. Cell C16 has the value of 3.00 and this is the mean average of the change in stocks of carbon and fine particle capturing from the Base Year to Year 1. This means that the captured carbon and fine particles (pollution) have grown by 200% from the Base Year to Year 1. Similarly, the amount captured pollution in the urban green planted by the NLC became 3 times bigger in Year 1 than it was in the Base Year.
Biodiversity: Cell C17 has the value of 3.00. This means that the Biodiversity stock of the NLC has became 3 times bigger in Year 1 than it was in the Base Year.

Goals
The base indices of Year 10 are interpreted.
Rainwater Retention: Cell K15 has the value of 10.34. This means that the amount of retained water in the urban green planted by the NLC is planned to grow by 934% from the Bases Year to Year 10. (10.34-1 = 9.34 = 934%) Similarly, the amount of retained water in the urban green planted by the NLC is planned to become 10.34 times bigger in Year 10 than it was in the Base Year.
Air Quality: The Base index of Air Quality is influenced by two stocks: the carbon and the fine particle capturing. Cell C16 has the value of 5.67 and this is the mean average of the change in stocks of carbon and fine particle capturing from the Base Year to Year 1. This means that the captured carbon and fine particles (pollution) have grown by 467% from the Base Year to Year 1. Similarly, the amount captured pollution in the urban green planted by the NLC became 5.67 times bigger in Year 10 than it was in the Base Year.
Biodiversity: Cell K17 has the value of 6.67. This means that the Biodiversity stock of the NLC is planned to become 3 times bigger in Year 10 than it was in the Base Year.

Obviously, in the first year the Base index is equal to the Rolling index.

Real Measures
The rolling indices of Year 2 are interpreted.
Rainwater Retention: Cell D19 has the value of 0.88. This means that the amount of retained water in the urban green planted by the NLC has decreased by 12% from the Year 1 to Year 2 (0.88-1= -0.12= -12%).
Air Quality: The Rolling index of Air Quality is influenced by two stocks: the carbon and the fine particle capturing. Cell D20 has the value of 1 and this is the mean average of the change in stocks of carbon and fine particle capturing from Year 1 to Year 2. This means that the captured carbon and fine particles (pollution) have stayed exactly the same from Year 1 to Year 2.
Biodiversity: Cell D21 has the value of 3.00. This means that the the Biodiversity stock created by the NLC has increased by 200% from Year 1 to Year 2.

Goals

The rolling indices of Year 2 are interpreted.

Rainwater Retention: Cell I19 has the value of 2.00. This means that the goals about the amount of retained water in the urban green planted by the NLC is doubled from the Year 1 to Year 2.

Urban Heat Island: -

Air Quality: The Rolling index of Air Quality is influenced by two stocks: the carbon and the fine particle capturing. Cell I20 has the value of 1.50 and this is the mean average of the change in the goals about stocks of carbon and fine particle capturing from Year 1 to Year 2. Therefore, it means that the goal of the NLC about air quality has increased by 50% from Year 1 to Year 2 (1.50-1 = 0.5 = 50%).

Biodiversity: Cell I21 has the value of 2.00. This means that the goals about the biodiversity stock created by the NLC is planned to become 2 times bigger in Year 2 than it was in Year 1.

3.1.3 Capital Growth

The growth of Natural Capital is measured by the Base and the Rolling indices. *For practical reasons the indices of Year 2 are interpreted.*

Base index: Cell D24 has the value of 2.82. This means that the Natural Capital of the Spijkerkwartier has became 2.82 times bigger in Year 2 than it was in the Base Year due to the activities of the NLC. Similarly, the Natural Capital of the Spijkerkwartier has grown 182% from the Base Year to Year 2 thanks to the NLC. (2.82-1 = 1.82 =182%)

Rolling index: Cell D25 has the value of 0.94. This means that the Natural Capital of the Spijkerkwartier has became 0.94 times smaller in Year 2 than it was in Year 1 due to the activities of the NLC. Similarly, the Natural Capital of the Spijkerkwartier has decreased by 6% from the Base Year to Year 2 thanks to the NLC. (0.94-1 = -0.06 = -6%)

3.2 Physical Capital

The table below shows the sheet Physical Capital'. The table is divided vertically into 2 parts and horizontally into 3 parts. For understanding this division please see 3.1 Natural Capital, first paragraph. Please note that the numbers presented in this Handbook are just examples and used to make the understanding of calculations easier. From this part on (Physical Capital), the Indicators and the Stocks will be interpreted and for Base and Rolling indices we refer back to the Natural Capital part.

This page is done.									
Indicators	**Base**	**Y1**	**Y2**	**Y3**	**Thresholds**	**E(Y1)**	**E(Y2)**	**E(Y3)**	**E(Y10)**
Cleanliness	30,00	35,00	35,00	35,00		40,00	50,00	50,00	70,00
Perceived cleanliness	4,00	9,00	9,00	9,00		4,00	5,00	6,00	8,00
Aesthetics	4,00	6,00	6,00	6,00		4,00	5,00	6,00	8,00
Organic waste for digestion (fraction)	0,30	0,20	0,20	0,20		0,50	0,60	0,70	0,80
Organic waste to compost (fraction)	0,20	0,40	0,40	0,40		0,50	0,40	0,30	0,20
Production space	1,00	4,00	4,00	4,00		1,00	2,00	3,00	100,00
Green space	6,00	18,00	18,00	24,00		20,00	30,00	50,00	200,00
Stocks	**Base**	**Y1**	**Y2**	**Y3**	**Thresholds**	**E(Y1)**	**E(Y2)**	**E(Y3)**	**E(Y10)**
Cleanliness	30,00	35,00	35,00	35,00		40,00	50,00	50,00	70,00
Cleanliness (Perceived)	4,00	9,00	9,00	9,00		4,00	5,00	6,00	8,00
Aesthetics and built environment	4,00	6,00	6,00	6,00		4,00	5,00	6,00	8,00
Circular material use	0,50	0,60	0,60	0,60		1,00	1,00	1,00	1,00
Land use	0,17	0,22	0,22	0,17		0,05	0,07	0,06	0,50
Cleanliness	Base index	1,71	1,71	1,71	Base index	1,17	1,46	1,58	2,17
Aesthetics and built environment	Base index	1,50	1,50	1,50	Base index	1,00	1,25	1,50	2,00
Circular material use	Base index	1,20	1,20	1,20	Base index	2,00	2,00	2,00	2,00
Land use	Base index	1,33	1,33	1,00	Base index	0,30	0,40	0,36	3,00
Cleanliness	Rolling index	1,71	1,00	1,00	Rolling index (Y5/Y0, Y10/Y5, Y50/Y10)	1,17	1,25	1,10	1,37
Aesthetics and built environment	Rolling index	1,50	1,00	1,00	Rolling index (Y5/Y0, Y10/Y5, Y50/Y10)	1,00	1,25	1,20	1,33
Cirscular material use	Rolling index	1,20	1,00	1,00	Rolling index (Y5/Y0, Y10/Y5, Y50/Y10)	2,00	1,00	1,00	1,00
Land use	Rolling index	1,33	1,00	0,75	Rolling index (Y5/Y0, Y10/Y5, Y50/Y10)	0,30	1,33	0,90	8,33
Capital	**Base**	**Y1**	**Y2**	**Y3**	**Thresholds**	**E(Y1)**	**E(Y2)**	**E(Y3)**	**E(Y10)**
Physical Capital	Base index	1,44	1,44	1,35	Base index	1,12	1,28	1,36	2,29
Physical capital	Rolling index	1,44	1,00	0,94	Rolling index	1,12	1,21	1,05	3,01

Real Measures

For each indicator the value of Year 1 is interpreted.

Cleanliness: Cell C3 has the value of 35.00. This means that the time spent on cleaning the neighbourhood by the NLC has been 35 hours in Year 1.

Perceived cleanliness: Cell C4 has the value of 9. This means that the neighbourhood perceives the cleanliness of the area 9 on a scale from 1-10 due to the activities of the NLC in Year 1.

Aesthetics: Cell C5 has the value of 6. This means that the neighbourhood perceives the aesthetics of the area 6 on a scale from 1-10 due to the activities of the NLC in Year 1.

Organic waste for digestion (fraction): Cell C6 has the value of 0.20. This means that 20% of the organic waste collected by the NLC is digested in (throughout) Year 1.

Organic waste for composting (fraction): Cell C7 has the value of 0.40. This means that 40% of the organic waste collected by the NLC is composted in (throughout) Year 1.

Production space: Cell C8 has the value of 4.00. This means that that NLC has created 4 m2 of production space in Year 1.

Green space:Cell C9 has the value of 18.00. This means that that NLC has created 18 m2 of green space in Year 1. Production space is also included in the green space.

Goals

Cells H3:K9 are to be filled out by the company. E(Y1) represents the goals of the company for each indicator for Year 1 and E(Y10) represents the goals/expectations of the NLC for each indicator for Year 10.

3.2.2 Stocks of Physical Capital

Underneath the indicators, the stocks are calculated. In the first part the absolute stocks are presented. Each stock is influenced by 1 or more indicators and when the stock is influenced by more indicators, the average of the change in indicators is calculated to see the change in the stock. At the Natural Capital every stock is influenced only by 1 indicator therefore, all stocks have the same absolute value as the indicators.

Real Measures

For each stock the value of Year 1 is interpreted.

Cleanliness: Cell C12 has the value of 35.00. This means that the time spent on cleaning the neighbourhood by the NLC has been 35 hours in Year 1.

Cleanliness (Perceived): Cell C13 has the value of 9. This means that the neighbourhood perceives the cleanliness of the area 9 on a scale from 1-10 due to the activities of the NLC in Year 1.

Aesthetics: Cell C14 has the value of 6. This means that the neighbourhood perceives the aesthetics of the area 6 on a scale from 1-10 due to the activities of the NLC in Year 1.

Circular material use: Cell C15 has the value of 0.60. This means that 60% of the organic waste collected by the NLC is reused in (throughout) Year 1.

Land use: Cell C16 has the value of 0.22. This means that that NLC used 22% of the planted green space as production space in Year 1.

Goals

The goals of Year 10 (E(Y10) are interpreted.

Cleanliness: Cell K12 has the value of 70.00. This means that the time spent on cleaning the neighbourhood by the NLC is planned to be 70 hours in Year 10.

Cleanliness (Perceived): Cell K13 has the value of 8. This means that according to the NLC's plans the neighbourhood will perceive the cleanliness of the area 8 on a scale from 1-10 due to the activities of the NLC in Year 10.

Aesthetics: Cell K14 has the value of 8. This means that according to the plans of the NLC the neighbourhood will perceive the aesthetics of the area 8 on a scale from 1-10 due to the activities of the NLC in Year 10.

Circular material use: Cell K15 has the value of 1.00. This means that 100% of the organic waste collected by the NLC is planned to be reused in (throughout) Year 10.

Land use: Cell K16 has the value of 0.05. This means that that NLC plans to use 5% of the planted green space as production space in Year 10.

Underneath the absolute values of the stocks, the base indices are calculated.

Base index = Value of Year X / Value of Base Year. Therefore, the base index always shows the growth of a certain stock in a certain year compared to the Base Year.

Real Measures

For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Base indices, paragraph Real Measures and follow the same logic.

Goals

For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Base indices, paragraph Goals and follow the same logic.

Real Measures

For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Rolling indices, paragraph Real Measures and follow the same logic.

Goals

For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Rolling indices, paragraph Goals and follow the same logic.

3.2.3 Capital Growth

The growth of Physical Capital is measured by the Base and the Rolling indices. *For practical reasons the indices of Year 2 are interpreted.*

Base index: Cell D29 has the value of 1.44. This means that the Physical Capital of the Spijkerkwartier has became 1.44 times bigger in Year 2 than it was in the Base Year due to the activities of the NLC. Similarly, the Physical Capital of the Spijkerkwartier has grown 44% from the Base Year to Year 2 thanks to the NLC. (1.44-1 = 0.44 = 44%)

Rolling index: Cell D30 has the value of 1.00. This means that the Physical Capital of the Spijkerkwartier remained the same in Year 2 than it was in Year 1 due to the activities of the NLC.

3.3 Human Capital

The table below shows the sheet 'Human Capital'. The table is divided vertically into 2 parts and horizontally into 3 parts. For understanding this division please see 3.1 Natural Capital, first paragraph. Please note that the numbers presented in this Handbook are just examples and used to make the understanding of calculations easier.

	A	B	C	D	E	F	G	H	I	J	K
1	This page is done. Nothing missing										
2	**Indicators**	**Base**	**Y1**	**Y2**	**Y3**		**Thresholds**	**E(Y1)**	**E(Y2)**	**E(Y3)**	**E(Y10)**
3	Number of workshops held by the NLC	9,00	10,00	10,00	10,00			7,00	8,00	9,00	10,00
4	Citizens awareness of environmental issues	4,00	6,00	6,00	6,00			7,00	8,00	9,00	10,00
5	Physical health	4,00	5,00	5,00	5,00			7,00	8,00	9,00	10,00
6	Mental health	4,00	7,00	7,00	7,00			7,00	8,00	9,00	10,00
7	Happiness	4,00	6,00	6,00	6,00			7,00	8,00	9,00	10,00
8	Inspiration	4,00	5,00	5,00	5,00			7,00	8,00	9,00	10,00
9											
10	**Stocks**	**Base**	**Y1**	**Y2**	**Y3**		**Thresholds**	**E(Y1)**	**E(Y2)**	**E(Y3)**	**E(Y10)**
11	Education (workshop)	9,00	10,00	10,00	10,00			7,00	8,00	9,00	10,00
12	Education (awareness)	4,00	6,00	6,00	6,00			7,00	8,00	9,00	10,00
13	Health	4,00	6,00	6,00	6,00			7,00	8,00	9,00	10,00
14	Well being	4,00	6,00	6,00	6,00			7,00	8,00	9,00	10,00
15	Inspiration	4,00	5,00	5,00	5,00			7,00	8,00	9,00	10,00
16											
17	Education	Base index	1,31	1,31	1,31		Base index	1,26	1,44	1,63	1,81
18	Health	Base index	1,50	1,50	1,50		Base index	1,75	2,00	2,25	2,50
19	Well being	Base index	1,50	1,50	1,50		Base index	1,75	2,00	2,25	2,50
20	Inspiration	Base index	1,25	1,25	1,25		Base index	1,75	2,00	2,25	2,50
21											
22	Education	Rolling index	1,31	1,00	1,00		Rolling index	1,26	1,14	1,13	1,11
23	Health	Rolling index	1,50	1,00	1,00		Rolling index	1,75	1,14	1,13	1,11
24	Well being	Rolling index	1,50	1,00	1,00		Rolling index	1,75	1,14	1,13	1,11
25	Inspiration	Rolling index	1,25	1,00	1,00		Rolling index	1,75	1,14	1,13	1,11
26											
27	**Capital**	**Base**	**Y1**	**Y2**	**Y3**		**Thresholds**	**E(Y1)**	**E(Y2)**	**E(Y3)**	**E(Y10)**
28	Human Capital	Base index	1,39	1,39	1,39		Base index	1,63	1,86	2,09	
29	Human Capital	Rolling index	1,39	1,00	1,00		Rolling index	1,63	1,14	1,13	

3.2.1 Indicators of Human Capital

Real Measures
For each indicator the value of Year 1 is interpreted.
Number of workshops organized by the NLC: Cell C3 has the value of 10.00. This means that the NLC has organized 10 workshops in Year 1.
Citizens' awareness of environmental issues: Cell C4 has the value of 6.00. This means that the neighbourhood is aware of environmental issues 6 on a scale from 1-10 due to the activities of the NLC, in Year 1.
Physical health: Cell C5 has the value of 5.00. This means that the neighbourhood feels physically healthy 5 on a scale from 1-10 due to the activities of the NLC in Year 1.
Metal health: Cell C6 has the value of 7.00. This means that the neighbourhood feels mentally healthy 7 on a scale from 1-10 due to the activities of the NLC in Year 1.
Happiness: Cell C7 has the value of 6.00. This means that the neighbourhood feels happy 6 on a scale from 1-10 due to the activities of the NLC in Year 1.
Inspiration: Cell C8 has the value of 5.00. This means that the neighbourhood feels inspired 6 on a scale from 1-10 due to the activities of the NLC in Year 1.

Goals
Cells H3:K8 are to be filled out by the company. E(Y1) represents the goals of the company for each indicator for Year 1 and E(Y10) represents the goals/expectations of the NLC for each indicator for Year 10.

3.2.2 Stocks of Physical Capital

Underneath the indicators, the stocks are calculated. In the first part the absolute stocks are presented. Each stock is influenced by 1 or more indicators and when the stock is influenced by more indicators, the average of the change in indicators is calculated to see the change in the stock.

Real Measures
For each stock the value of Year 1 is interpreted.
Education (workshops): Cell C11 has the value of 10.00. This means that the NLC has organized 10 workshops in Year 1 and therefore, created the stock of 10.

Education (awareness): Cell C12 has the value of 6.00. This means that the neighbourhood is aware of environmental issues 6 on a scale from 1-10 due to the activities of the NLC, in Year 1 and therefore, created a stock of 6.

Health: Cell C13 has the value of 6.00. This means that the neighbourhood feels healthy 5 on a scale from 1-10 due to the activities of the NLC in Year 1 and therefore, created a stock of 6.

Well-being: Cell C14 has the value of 6.00. This means that the neighbourhood feels happy 6 on a scale from 1-10 due to the activities of the NLC in Year 1 and therefore, created a stock of 6.

Inspiration: Cell C15 has the value of 5.00. This means that the neighbourhood feels inspired 6 on a scale from 1-10 due to the activities of the NLC in Year 1 and therefore, created a stock of 5.

Goals
The goals of Year 10 (E(Y10) are interpreted.
Education (workshops): Cell K11 has the value of 10.00. This means that the NLC is planning to organize 10 workshops in Year 10 and therefore, create the stock of 10.

Education (awareness): Cell K12 has the value of 10.00. This means that the neighbourhood is planned to be aware of environmental issues 10 on a scale from 1-10 due to the activities of the NLC, in Year 10 and therefore, create a stock of 10.

Health: Cell K13 has the value of 10.00. This means that the neighbourhood is planned to feel healthy 10 on a scale from 1-10 due to the activities of the NLC in Year 10 and therefore, create a stock of 10.

Well-being: Cell K14 has the value of 10.00. This means that the neighbourhood is planned to feel happy 10 on a scale from 1-10 due to the activities of the NLC in Year 10 and therefore, create a stock of 10.

Inspiration: Cell K15 has the value of 10.00. This means that the neighbourhood is planned to feel inspired 10 on a scale from 1-10 due to the activities of the NLC in Year 10 and therefore, create a stock of 10.

Base indices

Underneath the absolute values of the stocks, the base indices are calculated.
 Base index = Value of Year X / Value of Base Year. Therefore, the base index always shows the growth of a certain stock in a certain year compared to the Base Year.

Real Measures
For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Base indices, paragraph Real Measures and follow the same logic.

Goals
For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Base indices, paragraph Goals and follow the same logic.

Rolling indices

Real Measures
For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Rolling indices, paragraph Real Measures and follow the same logic.

Goals
For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Rolling indices, paragraph Goals and follow the same logic.

3.2.3 Capital Growth

The growth of Human Capital is measured by the Base and the Rolling indices. *For practical reasons the indices of Year 2 are interpreted.*

Base index: Cell D28 has the value of 1.39. This means that the Human Capital of the Spijkerkwartier has became 1.39 times bigger in Year 2 than it was in the Base Year due to the activities of the NLC. Similarly, the Human Capital of the Spijkerkwartier has grown 39% from the Base Year to Year 2 thanks to the NLC. (1.39-1 = 0.39 =39%)

Rolling index: Cell D29 has the value of 1.00. This means that the Human Capital of the Spijkerkwartier remained the same in Year 2 than it was in Year 1 due to the activities of the NLC.

3.4 Economic Capital

The table below shows the sheet Economic Capital' of the Tool. The table is divided vertically into 2 parts and horizontally into 3 parts. For understanding this division please see 3.1 Natural Capital, first paragraph. Please note that the numbers presented in this Handbook are just examples and used to make the understanding of calculations easier.

	A	B	C	D	E	F	G	H	I	J	K
1	This page is done.										
2	Indicators	Base	Y1	Y2	Y3		Thresholds	E(Y1)	E(Y2)	E(Y3)	E(Y10)
3	Employees' total amount of work	1000,00	1500,00	1500,00	1500,00			1500,00	1700,00	1800,00	2500,00
4	Tasks taken over from the municipality	10,00	12,00	12,00	12,00			15,00	17,00	15,00	20,00
5	Price of houses in the neighbourhood influenced by NLC	15,00	50,00	50,00	50,00			100,00	110,00	150,00	200,00
6											
7	Stock	Base	Y1	Y2	Y3		Thresholds	E(Y1)	E(Y2)	E(Y3)	E(Y10)
8	Job creation	1000,00	1500,00	1500,00	1500,00			1500,00	1700,00	1800,00	2500,00
9	Business	10,00	12,00	12,00	12,00			15,00	17,00	15,00	20,00
10	Housing price	15,00	50,00	50,00	50,00			100,00	110,00	150,00	200,00
11											
12	Job creation	Base index	1,50	1,50	1,50		Base index	1,50	1,70	1,80	2,50
13	Business	Base index	1,20	1,20	1,20		Base index	1,50	1,70	1,50	2,00
14	Housing price	Base index	3,33	3,33	3,33		Base index	6,67	7,33	10,00	13,33
15											
16	Job creation	Rolling index	1,50	1,00	1,00		Rolling index	1,50	1,13	1,06	1,39
17	Business	Rolling index	1,20	1,00	1,00		Rolling index	1,50	1,13	0,88	1,33
18	Housing price	Rolling index	3,33	1,00	1,00		Rolling index	6,67	1,10	1,36	1,33
19											
20	Capital	Base	Y1	Y2	Y3		Thresholds	E(Y1)	E(Y2)	E(Y3)	E(Y10)
21	Economic Capital	Base index	2,01	2,01	2,01		Base index	3,22	3,58	4,43	5,94
22	Economic Capital	Rolling index	2,01	1,00	1,00		Rolling index	3,22	1,12	1,10	1,35

3.2.1 Indicators of Economic Capital

Real Measures
For each indicator the value of Year 1 is interpreted.
Employees' total amount of work: Cell C3 has the value of 1500.00. This means that the employees worked 1500 hours in total in the company in (throughout) Year 1.
Tasks taken over from the municipality: Cell C4 has the value of 12.00. This means that in Year 1 the NLC has 12 tasks which was originally done by the Municipality.
Price of houses in the neighbourhood influenced by NLC: Cell C5 has the value of 50.00. This means that the NLC has influenced the housing prices positively by 50 Euros according to the residents perception in Year 1.

Goals
Cells H3:K5 are to be filled out by the company. E(Y1) represents the goals of the company for each indicator for Year 1 and E(Y10) represents the goals/expectations of the NLC for each indicator for Year 10.

3.2.2 Stocks of Economic Capital

Underneath the indicators, the stocks are calculated. In the first part the absolute stocks are presented. Here, (at Economic Capital), each stock is influenced by 1 or more indicators.

Real Measures
For each stock the value of Year 1 is interpreted.

Job creation: Cell C8 has the value of 1500.00. This means that the employees worked 1500 hours in total in the company in (throughout) Year 1 and that created the stock of 1500 in the neighbourhood.

Business: Cell C9 has the value of 12.00. This means that in Year 1 the NLC has 12 tasks which was originally done by the Municipality and therefore, created a stock of 12 in business.

Housing prices: Cell C10 has the value of 50.00. This means that the NLC has influenced the housing prices positively by 50 Euros according to the residents perception in Year 1 and therefore, created the stock of 50 in housing price.

Goals
The goals of Year 10 (E(Y10)) are interpreted.
Job creation: Cell K8 has the value of 2500.00. This means that the employees are planned to work 2500 hours in total in the company in (throughout) Year 10.

Business: Cell K9 has the value of 20.00. This means that in Year 10 the NLC plans to have 20 tasks which was originally done by the Municipality.

Housing prices: Cell K10 has the value of 200.00. This means that the NLC is planning to influence the housing prices positively by 200 Euros according to the residents' perception in Year 10.

Base indices

Underneath the absolute values of the stocks, the base indices are calculated.
Base index = Value of Year X / Value of Base Year. Therefore, the base index always shows the growth of a certain stock in a certain year compared to the Base Year.

Real Measures
For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Base indices, paragraph Real Measures and follow the same logic.

Goals
For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Base indices, paragraph Goals and follow the same logic.

Rolling indices

Real Measures
For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Rolling indices, paragraph Real Measures and follow the same logic.

Goals
For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Rolling indices, paragraph Goals and follow the same logic.

3.2.3 Capital Growth

The growth of Economic Capital is measured by the Base and the Rolling indices. *For practical reasons the indices of Year 2 are interpreted.*

Base index: Cell D21 has the value of 2.01. This means that the Economic Capital of the Spijkerkwartier has became 2.01 times bigger in Year 2 than it was in the Base Year due to the activities of the NLC. Similarly, the Economic Capital of the Spijkerkwartier has grown 101% from the Base Year to Year 2 thanks to the NLC. (2.01-1 = 1.01 = 101%)

Rolling index: Cell D22 has the value of 1.00. This means that the Economic Capital of the Spijkerkwartier remained the same in Year 2 than it was in Year 1 due to the activities of the NLC.

3.5 Social Capital

The table below shows the sheet 'Social Capital' of the Tool. The table is divided vertically into 2 parts and horizontally into 3 parts. For understanding this division please see 3.1 Natural Capital, first paragraph. Please note that the numbers presented in this Handbook are just examples and used to make the understanding of calculations easier.

	A	B	C	D	E	F	G	H	I	J	K
1	This page is done.										
2	**Indicators**	**Base**	**Y1**	**Y2**	**Y3**		**Thresholds**	**E(Y1)**	**E(Y2)**	**E(Y3)**	**E(Y10)**
3	Safety in the neighbourhood	4,00	7,00	7,00	7,00			7,00	8,00	9,00	10,00
4	Neighbourhood cohesion level	4,00	6,00	6,00	6,00			7,00	8,00	9,00	10,00
5	Citizens participation to neighbourhood events organised by the NLC	90,00	100,00	100,00	100,00			78,00	100,00	110,00	120,00
6	Perceived citizenship	4,00	5,00	5,00	5,00			7,00	8,00	9,00	10,00
7	Perceived inclusiveness	4,00	7,00	7,00	7,00			7,00	8,00	9,00	10,00
8	Trust in cooperating stakeholders	4,00	6,00	6,00	6,00			7,00	8,00	9,00	10,00
9											
10	**Stock**	**Base**	**Y1**	**Y2**	**Y3**		**Thresholds**	**E(Y1)**	**E(Y2)**	**E(Y3)**	**E(Y10)**
11	Safety	4,00	7,00	7,00	7,00			7,00	8,00	9,00	10,00
12	Social cohesion	4,00	6,00	6,00	6,00			7,00	8,00	9,00	10,00
13	Citizenship	90,00	100,00	100,00	100,00			78,00	100,00	110,00	120,00
14	Citizenship (perceived)	4,00	5,00	5,00	5,00			7,00	8,00	9,00	10,00
15	Inclusiveness	4,00	7,00	7,00	7,00			7,00	8,00	9,00	10,00
16	Organizational learning	4,00	6,00	6,00	6,00			7,00	8,00	9,00	10,00
17											
18	Safety	Base index	1,75	1,75	1,75		Base index	1,75	2,00	2,25	2,50
19	Social cohesion	Base index	1,50	1,50	1,50		Base index	1,75	2,00	2,25	2,50
20	Citizenship	Base index	1,25	1,25	1,25		Base index	1,31	1,56	1,74	1,92
21	Inclusiveness	Base index	1,75	1,75	1,75		Base index	1,75	2,00	2,25	2,50
22	Organizational learning	Base index	1,50	1,50	1,50		Base index	1,75	2,00	2,25	2,50
23											
24	Safety	Rolling index	1,75	1,00	1,00		Rolling index	1,75	1,14	1,13	1,11
25	Social cohesion	Rolling index	1,50	1,00	1,00		Rolling index	1,75	1,14	1,13	1,11
26	Citizenship	Rolling index	1,25	1,00	1,00		Rolling index	1,31	1,21	1,11	1,10
27	Inclusiveness	Rolling index	1,75	1,00	1,00		Rolling index	1,75	1,14	1,13	1,11
28	Organizational learning	Rolling index	1,50	1,00	1,00		Rolling index	1,75	1,14	1,13	1,11
29											
30	**Capital**	**Base**	**Y1**	**Y2**	**Y3**		**Thresholds**	**E(Y1)**	**E(Y2)**	**E(Y3)**	**E(Y10)**
31	Social Capital	Base index	1,55	1,55	1,55		Base index	1,66	1,91	2,15	2,38
32	Social Capital	Rolling index	1,55	1,00	1,00		Rolling index	1,66	1,16	1,12	1,11

3.2.1 Indicators of Social Capital

Real Measures

For each indicator the value of Year 1 is interpreted.
Safety in the neighbourhood: Cell C3 has the value of 7.00. This means that the residents feel safe in the neighbourhood 7 on the scale from 1-10 in Year 1 due to the activities of the NLC.
neighbourhood cohesion: Cell C4 has the value of 6.00. This means that the residents perceive the neighbourhood coherence 6 on a scale from 1-10 in Year 1 due to the activities of the NLC.
Citizens participation to neighbourhood events organised by the NLC: Cell C5 has the value of 100.00. This means that the total number of participants on all events organized by the NLC has been 100 in Year 1.
Perceived citizenship: Cell C6 has the value of 5.00. This means that the residents feel citizens of the Spijkerkwartier 5 on a scale from 1-10 in Year 1 due to the activities of the NLC.
Perceived inclusiveness: Cell C7 has the value of 7.00. This means that the residents think that the Spijkerkwartier is inclusive on a level of 7 on the scale from 1-10 in Year 1 due to the activities of the NLC.
Trust in cooperating stakeholders: Cell C8 has the value of 6.00. This means that the stakeholders of the NLC trust each other on a level of 6 on a scale from 1-10 in Year 1 due to the Living Lab and other activities of the NLC.

Goals
Cells H3:K8 are to be filled out by the company. E(Y1) represents the goals of the company for each indicator for Year 1 and E(Y10) represents the goals/expectations of the NLC for each indicator for Year 10.

Underneath the indicators, the stocks are calculated. In the first part the absolute stocks are presented. Each stock is influenced by 1 or more indicators. Where the stock is influenced by only one indicator, the stock is equal to the indicator. If the stock is influenced by multiple indicators, the stock is the average of the values of the indicators. At the Social Capital, all the stocks are influenced by only one indicator.

Real Measures

For each stock the value of Year 1 is interpreted.

Safety: Cell C11 has the value of 7.00. This means that the residents feel safe in the neighbourhood on a level of 7 on the scale from 1-10 in Year 1 due to the activities of the NLC and therefore a stock of 7 is created.

Social cohesion: Cell C12 has the value of 6.00. This means that the residents perceive the neighbourhood coherence 6 on a scale from 1-10 in Year 1 due to the activities of the NLC and therefore, a stock of 6 is created.

Citizenship: Cell C13 has the value of 100.00. This means that the total number of participants on all events organized by the NLC has been 100 in Year 1 and therefore, a stock of 100 is created.

Citizenship (Perceived): Cell C14 has the value of 5.00. This means that the residents feel citizens of the Spijkerkwartier 5 on a scale from 1-10 in Year 1 due to the activities of the NLC and therefore a stock of 5 is created.

Inclusiveness: Cell C15 has the value of 7.00. This means that the residents think that the Spijkerkwartier is inclusive on a level of 7 on the scale from 1-10 in Year 1 due to the activities of the NLC and therefore, creates a stock of 7.

Organizational Learning: Cell C16 has the value of 6.00. This means that the stakeholders of the NLC trust each other on a level of 6 on a scale from 1-10 in Year 1 due to the Living Lab and other activities of the NLC and therefore, a stock of 6 is created.

Goals

The goals of Year 10 (E(Y10)) are interpreted.

Safety: Cell K11 has the value of 10.00. This means that the residents are planned to feel safe in the neighbourhood on a level of 10 on the scale from 1-10 in Year 10 due to the activities of the NLC.

Social cohesion: Cell K12 has the value of 10.00. This means that the residents are planned to perceive the neighbourhood coherence 10 on a scale from 1-10 in Year 10 due to the activities of the NLC.

Citizenship: Cell K13 has the value of 120.00. This means that the total number of participants on all events organized by the NLC is planned to be 120 in Year 10.

Citizenship (Perceived): Cell K14 has the value of 10.00. This means that the residents are planned to feel citizens of the Spijkerkwartier 5 on a scale from 1-10 in Year 10 due to the activities of the NLC.

Inclusiveness: Cell K15 has the value of 10.00. This means that the NLC plans that the residents think that the Spijkerkwartier is inclusive on a level of 10 on the scale from 1-10 in Year 10 due to the activities of the NLC.

Organizational Learning: Cell K16 has the value of 10.00. This means that the stakeholders of the NLC are planned to trust each other on a level of 10 on a scale from 1-10 in Year 10 due to the Living Lab and other activities of the NLC.

Base indices

Underneath the absolute values of the stocks, the base indices are calculated.

Base index = Value of Year X / Value of Base Year. Therefore, the base index always shows the growth of a certain stock in a certain year compared to the Base Year.

Real Measures

For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Base indices, paragraph Real Measures and follow the same logic.

Goals

For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Base indices, paragraph Goals and follow the same logic.

Rolling indices

Real Measures

For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Rolling indices, paragraph Real Measures and follow the same logic.

Goals

For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Rolling indices, paragraph Goals and follow the same logic.

3.2.3 Capital Growth

The growth of Social Capital is measured by the Base and the Rolling indices. *For practical reasons the indices of Year 2 are interpreted.*

Base index: Cell D31 has the value of 1.55. This means that the Social Capital of the Spijkerkwartier has became 1.55 times bigger in Year 2 than it was in the Base Year due to the activities of the NLC. Similarly, the Social Capital of the Spijkerkwartier has grown 55% from the Base Year to Year 2 thanks to the NLC. (1.55-1 = 0.55 = 55%)

Rolling index: Cell D32 has the value of 1.00. This means that the Social Capital of the Spijkerkwartier remained the same in Year 2 than it was in Year 1 due to the activities of the NLC.

3.6 Cultural Capital

The table below shows the sheet 'Cultural Capital' of the Tool. The table is divided vertically into 2 parts and horizontally into 3 parts. For understanding this division please see 3.1 Natural Capital, first paragraph. Please note that the numbers presented in this Handbook are just examples and used to make the understanding of calculations easier.

	A	B	C	D	E	F	G	H	I	J	K
1	this page is done										
2	**Indicators**	**Base**	**Y1**	**Y2**	**Y3**		**Thresholds**	**E(Y1)**	**E(Y2)**	**E(Y3)**	**E(Y10)**
3	Number of cultural/artistic/humanistic events done	3,00	5,00	5,00	5,00			5,00	6,00	7,00	10,00
4	Cultural heritage	4,00	5,00	5,00	5,00			7,00	8,00	9,00	10,00
5											
6	**Stock**	**Base**	**Y1**	**Y2**	**Y3**		**Thresholds**	**E(Y1)**	**E(Y2)**	**E(Y3)**	**E(Y10)**
7	Cultural vitality	3,00	5,00	5,00	5,00			5,00	6,00	7,00	10,00
8	Built environment	4,00	5,00	5,00	5,00			7,00	8,00	9,00	10,00
9											
10	Cultural vitality	Base index	1,67	1,67	1,67		Base index	1,67	2,00	2,33	3,33
11	Built environment	Base index	1,25	1,25	1,25		Base index	1,75	2,00	2,25	2,50
12											
13	Cultural vitality	Rolling index	1,67	1,00	1,00		Rolling index	1,67	1,20	1,17	1,43
14	Built environment	Rolling index	1,25	1,00	1,00		Rolling index	1,75	1,14	1,13	1,11
15											
16	**Capital**		**Y1**	**Y2**	**Y3**		**Thresholds**	**E(Y1)**	**E(Y2)**	**E(Y3)**	**E(Y10)**
17	Cultural Capital	Base index	1,46	1,46	1,46		Base index	1,71	2,00	2,29	2,92
18	Cultural Capital	Rolling index	1,46	1,00	1,00		Rolling index	1,71	1,17	1,15	1,27

3.2.1 Indicators of Cultural Capital

Real Measures

For each indicator the value of Year 1 is interpreted.

Number of cultural/artistic/humanistic events done: Cell C3 has the value of 5.00. This means that the NLC has organized 5 cultural, artistic or humanistic events (differing from workshops) in Year 1.

Cultural heritage: Cell C4 has the value of 5.00. This means that the residents think that the NLC has contributed to the cultural heritage of the neighbourhood on a level of 5 on a scale from 1-10 in Year 1.

Goals
Cells H3:K4 are to be filled out by the company. E(Y1) represents the goals of the company for each indicator for Year 1 and E(Y10) represents the goals/expectations of the NLC for each indicator for Year 10.

3.2.2 Stocks of Cultural Capital

Underneath the indicators, the stocks are calculated. In the first part the absolute stocks are presented. Each stock is influenced by 1 or more indicators. Where the stock is influenced by only one indicator, the stock is equal to the indicator. If the stock is influenced by multiple indicators, the stock is the average of the values of the indicators. At the Cultural Capital, all the stocks are influenced by only one indicator.

Real Measures
For each stock the value of Year 1 is interpreted.
Cultural vitality: Cell C7 has the value of 5.00. This means that the NLC has organized 5 cultural, artistic or humanistic events (differing from workshops) in Year 1 and therefore, created a stock of 5 for cultural vitality.

Built environment: Cell C8 has the value of 5.00. This means that the residents think that the NLC has contributed to the cultural heritage of the neighbourhood on a level of 5 on a scale from 1-10 in Year 1 and therefore, created a stock of 5 for built environment.

Goals
The goals of Year 10 (E(Y10)) are interpreted.
Cultural vitality: Cell K7 has the value of 10.00. This means that the NLC is planning to organize 10 cultural, artistic or humanistic events (differing from workshops) in Year 10.

Built environment: Cell K8 has the value of 10.00. This means that the NLC plans to achieve that the residents think that the NLC has contributed to the cultural heritage of the neighbourhood on a level of 10 on a scale from 1-10 in Year 10.

Base indices

Underneath the absolute values of the stocks, the base indices are calculated.
Base index = Value of Year X / Value of Base Year. Therefore, the base index always shows the growth of a certain stock in a certain year compared to the Base Year.

Real Measures
For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Base indices, paragraph Real Measures and follow the same logic.

Goals
For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Base indices, paragraph Goals and follow the same logic.

Rolling indices

Real Measures
For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Rolling indices, paragraph Real Measures and follow the same logic.

Goals

For the interpretation of Base indices please see 3.1.2 Stocks of Natural Capital, part Rolling indices, paragraph Goals and follow the same logic.

3.2.3 Capital Growth

The growth of Cultural Capital is measured by the Base and the Rolling indices. *For practical reasons the indices of Year 2 are interpreted.*

Base index: Cell D17 has the value of 1.46. This means that the Cultural Capital of the Spijkerkwartier has became 1.46 times bigger in Year 2 than it was in the Base Year due to the activities of the NLC. Similarly, the Cultural Capital of the Spijkerkwartier has grown 46% from the Base Year to Year 2 thanks to the NLC. (1.46-1 = 0.46 = 46%)

Rolling index: Cell D18 has the value of 1.00. This means that the Cultural Capital of the Spijkerkwartier remained the same in Year 2 than it was in Year 1 due to the activities of the NLC.

3.7 Hexagram

The 'Hexagram' sheet concludes the results of each capital growth and makes it possible to create visuals for the indices. In this section the automatically created table will be introduced (3.7.1 Automatic data table) as well as one of the hexagrams (3.7.2 Visualization). The methodology how to create the hexagram will be explained (3.7.3 Creating new visualization) and opportunities of the Tool will be mentioned (3.7.4 Opportunities). All the values in the tables and figures are examples and do not represent the reality they only help understanding the interpretations and mechanisms behind the Tool.

3.7.1 Automatic data table

The Tool automatically creates the table presented in the figure below.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1		Base index							Rolling index						
2		Y1	Y2	Y3	E(Y1)	E(Y2)	E(Y3)	E(Y10)	Y1	Y2	Y3	E(Y1)	E(Y2)	E(Y3)	E(Y10)
3	Natural Capital	3,00	2,82	3,74	2,30	4,10	5,25	8,00	3,00	0,94	1,33	2,30	1,75	1,29	1,49
4	Physical Capital	1,44	1,44	1,35	1,12	1,28	1,36	2,29	1,44	1,00	0,94	1,12	1,21	1,05	3,01
5	Human Capital	1,39	1,39	1,39	1,63	1,86	2,09	0,00	1,39	1,00	1,00	1,63	1,14	1,13	0,00
6	Economic Capital	2,01	2,01	2,01	3,22	3,58	4,43	5,94	2,01	1,00	1,00	3,22	1,12	1,10	1,35
7	Social Capital	1,55	1,55	1,55	1,66	1,91	2,15	2,38	1,55	1,00	1,00	1,66	1,16	1,12	1,11
8	Cultural Capital	1,46	1,46	1,46	1,71	2,00	2,29	2,92	1,46	1,00	1,00	1,71	1,17	1,15	1,27

In column A the six capitals are listed. Next to them, the base indices can be found: in columns B-D the ones for real measurement in Year 1, 2 and 3. In columns E-H the base indices for for goals can be found. Here, we present example interpretations from both types of base indices. The other indices can be interpreted by following the same logic.

Cell C5 = 1.39 Base index of Human Capital in Year 2
The Human Capital of the NLC became 1.39 times bigger in Year 2 than it was in the Base Year.

Cell G7 = 2.15 Base index for goals of Social Capital in Year 3
The Social Capital of the NLC is planned to become 2.15 times bigger in Year 3 than it was in the Base Year.

The rolling indices are on the right side of the table. Columns I-J are the ones for the real measurements in Year 1, 2 and 3 and in columns L-O the rolling indices for the goals are presented for Year 1, 2, 3 and 10. Let's see two examples!
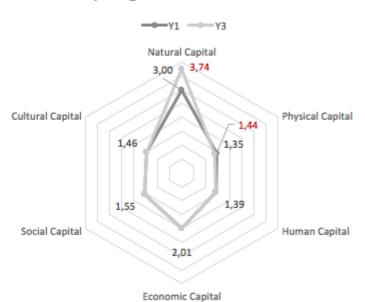
Cell K3 = 1.33 Rolling index of Natural Capital in Year 3
The Natural Capital of the NLC became 1.33 times bigger in Year 3 than it was in Year 2.

Cell N8=1.15 Rolling index for goals of Cultural Capital in Year 3
The expected Cultural Capital of the NLC is 1.15 times bigger in Year 3 than it is in Year 2.

3.7.2 Visualization

The visualization of the indices are done by the hexagrams. The hexagrams represent well the state of each capital and give a good visual impression on which capital has grown/is planned to grow faster. However, the order of different capitals on the hexagram result in a different hexagram. Also, the lines between data points on the hexagrams are for visual effect, has no influence on the output. In the following one hexagram will be explained. The interpretation of other hexagrams follow the same logic. The here introduced hexagram is presented in the figure below.

First and foremost, the Hexagram is a geometrical shape we use for visualizing our output: the (expected) growth of capitals. The reason for using the hexagram is to be able to compare the growth of capitals and to be able to compare growth of multiple years. There are certain capitals in each corner of the hexagram. The middle of the hexagram is 0. The scale of it is automatically defined by Microsoft Excel, which takes into account the highest value to create the scale. Therefore, the hexagram might not be the optimal visualization tool if there are big differences between capital growth values.

Figure X shows the growth of all capitals in Year 1 and 3 based on the Base indices. Each dot on the dark grey line represents the growth of the certain capital from the Base Year to Year 1. It can be concluded that on this figure the growth of Natural Capital in Year 1 (from the Base Year) is bigger than any other capital growth. On the light grey line the growth of each capital is presented, and this growth is the total growth from the Base Year to Year 3. The figure shows a decrease in total growth of the Natural Capital from Year 1 to Year 3 and a small increase in the total growth of the Physical Capital.

From these results the following conclusions can be made (and the list is obviously not full):

- Since the total growth of Natural Capital decreased from 3.74 to 3.00 it means that the NLC's Natural Capital on the neighbourhood actually decreased. How much? 3.00/3.74 = 0.80 The decrease therefore, is 20% (0.8-1 = -0.2 = -20%).
- The increase in the growth of the Physical capital in the current example shows that in Year 1 the Capital became 1.35 times bigger and than in Year 3 it became 1.44 times bigger than it was in the Base Year. This means that the growth was fast in the beginning and than slowed down. The growth between Year 3 and Year 1 is 1.44/1.35 = 1.06 or 6%.
- The growth for the rest of the capitals is same in our current example. So the growth of them is equal in Year 1 and in Year 3. This means that actually the capitals grew from the Base Year to Year 1 but then they stopped completely.

3.7.3 Creating new visualization

We know that there are many opportunities these indices and capitals can provide. The management of the NLC can decide which indicators are the most relevant for them and can create hexagrams for the comparison of any dataset. Here, this will be described. As before, all data is exemplary, does not represent reality.
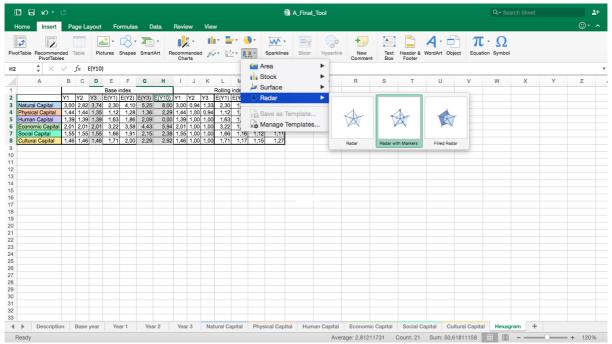
1) Select the data you would like to compare. In this case we are curious about how the company did in Year 3 compared to its expectations (goals) and we also want to see how it is doing compared to the goals of Year 10. Therefore the following tables are selected as presented in the following figure:
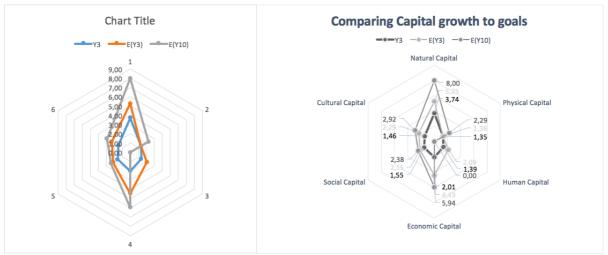   D2:D8
   G2:G8
   H2:H8

2) Go to 'Insert', click on 'Insert Area, Surface or Radar Chart' icon and select 'Radar with Markers'.

3) The appearing hexagram needs some fine tuning, that is according to personal/company preferences. In the following figure the automatically appearing and the fine tuned version is presented and below the differences are listed.

- Title changed
- Colors of lines and markers (dots) changed (only aesthetic reason)
- Scale deleted
- Data labels added for each data series
- Captions for corners added
- Number of gridlines decreased (only aesthetics)

3.7.4 Opportunities

Obviously there are multiple functions and opportunities in the dataset. Some of them are listed here. This list is useful for make the users of the Tool creative and think about other opportunities, it is far from full but according to our current knowledge and time it is extensive.

- Measure company performance in terms of indicators
- Measure company performance growth in terms of stocks and capitals
- Measure to which extent does the company achieve its goals set in indicators stocks or capitals
- Compare growth of several years (of capitals, stocks or indicators)
- Compare growths of different capitals

Further

- Setting capital growths fixed may allow the company to optimize inputs
- Set certain capitals and certain inputs fixed and optimize the growth of other capitals

4. Limitations and future research

There are several limitations that arose in building this tool. We suggest to do these measurements yearly, because of the seasonal differences. Doing measurements every six months will give biases towards the seasons (e.g. in winter, less people would like to have their garden changes) so the measurements can best be done every year in the same season. However, when the company does want to do measurements every six months, they can compare the data from the summer with the summer before that, and of the winter with the winter before that (or any other year they want to compare them to). This is something to keep in mind for the company. Moreover, as already stated earlier at the beginning of the data analysis, due to time constraints there are missing data. With a longer and deeper research, it is possible, for the enterprise, to develop the data needed and complete the tool.

A note for deeper research contains putting this data in a broader context. The tool can also be filled out by other companies and therefore it is possible to compare companies among their type of impact. Also the development of the company capitals can be compared to municipal data and it can be seen how the NLC or other companies evolve compared to the municipal region.

However, the tool has its limitations. These are as follows:
- No research found on Urban Heat Island effect even if the indicator is important for calculating Natural Capital
- The Tool is equipped for the following 3 years but is the structure and the goal/activities of the company changes the Tool might not be appropriate to analyze the company performance.
- The Tool is rigid in a sense that the indicators were found for the NLC and therefore the Methodology from the Research Paper can be followed to create new indicators for a different company.

Future research can be done also on optimizing the Tool for the NLC or generalizing it for multiple social-environmental enterprises. Also, input optimization is possible for the Tool and this would give a managerial tool for the users to be able to optimize their resources for a wished output.