Stakeholder engagement in Seville

Extract from the Demonstration Report

Seville, Spain

Contents

This text describes Seville's experience in stakeholder engagement in the creation of the CDW flow optimization tool, the awareness campaign on CDW dumping and the development of the city simulation platform, including the wellbeing monitoring tool. The sections come from Seville's CityLoops demonstration report available here.

Introduction

Seville has had three complementary demonstrations in CityLoops to make CDW handling more circular.

1. Quality assessment and procurement guidelines facilitated the use of recovered CDW from water infrastructure works.
2. Optimisation of municipal clean points supports citizens and small producers of CDW to deposit construction materials in a suitable site for further processing, thus avoiding dumping and landfilling of potentially recoverable materials.
3. Digital tools for both citizens and city managers support data-driven decision-making and analysis of the sustainability impacts of pilot projects and policies, to see what impacts these have on CDW generation and citizen wellbeing.

Stakeholder engagement activities took place during all demonstration actions. Overall, nine workshops and seminars/webinars have been organized by the CityLoops Seville Team for the decision-makers, procurement personnel, and other stakeholders of the construction- and demolition sector in Seville. In those workshops, the participants developed ideas and solutions for better upcycling of circular CDW management.

Preparation of Quality assessment of CDW Instrument: identification and engagement with stakeholders

Beginning of project. Feb 2020 Workshop with stakeholders presenting objectives of the tool. Participants: Lipasam, Emasesa, Aprocom, Idener, Corporación Tecnológica de Andalucia, Llopis, Martin Casillas, Aborgase, Universidad de Sevilla, Mercasevilla, Dpto. Parques y Jardines, Ayuntamiento de Sevilla, Junta de Andalucia. These stakeholders represent Landfills, local construction companies, and depts. of the municipality, consumer associations,

Stakeholder engagement (CLN) - A second Workshop was held last February 2022 through Microsoft Teams with local stakeholders and environmental and engineering departments of municipal companies presenting the project, demonstrating actions, and developing tools. In this meeting, the Collaborative Local Network was established setting biannual meetings and the commitment to collaborate in the guideline's development.

Development of digital tool: Optimisation of CDW flow

Functionalities of CDW platform for citizens

Stakeholder   Engagement   -   Demo   Report   Extract_Seville

- Forms for query: The citizen will provide data about its location and the type of waste placed in the "clean point". Using this data and the status of the clean points, the CDW CityLoops platform for citizens will suggest the most suitable "clean point".
- Map showing clean points and highlighting the most suitable one: A widget with a map (using OpenStreet Maps) will be presented to the citizens showing the current location of the "clean points" and after the results of the query, the most suitable one will be highlighted. At the same time, a route from the district origin to the proposed clean point will be suggested to the citizen based on OpenStreetMap.
- Dashboard showing the current status of the "clean points": Clean points have different containers for different types of waste (e.g., bricks, wood, steel…). A dashboard will show the fill levels of the containers and the timestamp of the presented data.
- Control panel: A set of buttons will be included in the application to clean the forms, do the query, and export information. Logos of the involved partners (Emasesa, Lipasam, Municipality of Seville, CityLoops project) will be included providing additional information.

Functionalities of CDW platform for managers.

- District representation of Seville Data: The city of Seville will be divided into a discrete representation of districts and overlapped over a real map of the city.
- Data request of each district: Each district will be represented by different social and economic aspects, and the waste generation will be described. The remaining areas must be classified as "urban soil", "urban land scheduled for development", "rural areas" or "natural ecosystem".
- Representation of the growth of the city: The growth of the city will be represented in a time-lapse showing in the last frame the projection of the next 3, 5, and 10 years according to the data provided by the manager through the platform.
- Location of potential future "clean points": Using the data provided by the managers and machine learning techniques, the platform will present the areas where "clean points" could be placed in the next few years, according to the previously decided criteria.
- **Stakeholders' identification. Public and private.**
- The platform for each use case within Seville will have two versions, one for managers and authorities and another for citizens. The platform version for citizens has only visualization capabilities and widgets using data provided by managers from Lipasam or results from the corresponding CityLoops platform for partners.
- Therefore, the applications for managers will consist, at least, of a data collection tool where managers will provide the data to power up the data-driven applications or the visualization widgets in the platforms for citizens. Additionally, the platforms for managers may have additional capabilities for decision support. The applications for citizens show interactive visualizations of the data provided by managers and will use the available widgets to get information about specific questions regarding CDW.

Preparation and procurement of awareness campaign

The abandonment of CDW in vacant lots and ditches, mainly in peripheral areas, is a problem from an environmental, landscape and cost point of view for its removal and cleaning for cities. In Seville, for this pilot action, 15 of the publicly owned plots that present a more serious situation of abandonment of CDW have been selected. The scope of the pilot is limited to publicly owned parcels due to the difficulty of contacting private owners.

In the design of the campaign, an attempt has been made to opt for a mixed model of physical and online actions, through billboards at points of abandonment, where the prohibition of this practice is emphasized, in addition to stressing that it is a crime that contravenes the ordinances premises and with an economic penalty. Likewise, it was considered appropriate to specify on said signage the possibility of using the Clean Points system managed by LIPASAM, under the conditions established by the Local Waste Management Ordinance.

For the digital part, the making of a video was devised, accompanied by a segmented marketing action to the population near the plots where posters were going to be placed. The message to be conveyed in the video is the same as that of the billboards, in addition to reinforcing the support of LIPASAM (the city's cleaning and waste management company) that it carries out in the area within its powers.

From a technical point of view, the recruitment required the campaign to comply with the following concepts:

- Complete creativity of the campaign.
- Design and production of 15 billboards with a support of total measurements of 500mm to the ground and 3000mm of free pole, of which 1500 wide x 1000 high will be used, leaving 2000mm free from the edge of the sign to the ground. Being composed of 2 tubes of 3500 40/40 x 1.5 mm galvanised, and 3 full-width reinforcement tubes of 30x20 mm galvanised, with assembly included in 15 locations. The material of the poster had to be done on the front, 1500 x 1000 mm in full colour, painted and laminated with turned ends and hidden screws, leaving the front smooth.
- Creation and dissemination of an online campaign in the areas of interest. In addition to informing about the prohibition to abandon CDW, the campaign would be used to inform about one of the tools to be developed in the CityLoops project, consisting of a web tool that will allow the citizen various functionalities, such as:
  - Know what type of construction and demolition waste can be deposited in the Collection Points.
  - Quantities admitted.
  - Find out which Clean Point is the nearest, etc.
  - Realisation of a Video-spot.

- The budget for the campaign was 9,000 €.

Launch and use of CDW optimization tool, by citizens and by city managers

Sep 2021

Started testing it several weeks ago with LIPASAM, refining the tools based on the feedback. Tested tool internally first, then LIPASAM in November 2021, in December 2021 start collab with EMASESA.

The main finding is that managers - final users - are important to develop a useful tool, need more feed-back from them to develop the tool better.

Nov 2021

Surveys in clean points (civic amenity sites), since 27th October 2021. In these surveys, which are voluntary, we are asking about the origin of the waste (who produces it, professional or general citizen, how much and where, in which ZIP code of the city). Surveys will stop taking place in February 2022.

Also, CDW characterizations from the waste collected in the clean points are carried out, with the idea of evaluating the applicability of these waste in construction works. The parameters expected to measure are:

3.2.- Identification of CDW flows		
3.2.1.- Control of origin. CDW flows		
RCD treatment plant verification		AOPJA (Agencia de Obra Pública de la Junta de Andalucía) Model
Compaction test. Normal proctor		UNE 103500
Compaction test. Modified Proctor	*	UNE 103501
Soil granulometric analysis		UNE 103101
Atterberg limits		UNE 103103 UNE 103104
Laboratory determination of the C.B.R. Index. of a floor		UNE 103502
Organic matter content in soils		UNE 103204
Content of soluble salts in soils		NLT-114

Gypsum content in soils		NLT-115
Free swell test in oedometer		UNE 103601
Soil collapse test	*	NLT-254
Relative density of soil particles		UNE 103302

We need to know if the main users leaving CDW at clean points are professionals or individuals, and also survey to see where the waste is generated. It could be interesting to see kind of hotspots on a map with the sites of CDW generation.

One feature of the tool for managers is that they can simulate future CDW generation points so that appropriate areas are allocated for future clean points. For example, if one city district is found to be a large generation area of CDW, we can plan to put another clean point near to it. This kind of simulation is done and used by city managers.

So far, the data used is historical data from 2015, about maintenance work in buildings, construction permits, economic data from the city - some machine learning methods to identify hotspots for CDW production. Want more data to get a more accurate tool.

Spring 2022: Then when OKed by managers it will also be deployed for citizens.

May 2022: Connection work between the database of the tool and the dataset from Lipasam is ongoing.

August 2022: Launched

Awareness campaign

1) Prevention of illegal dumping

One communication campaign target citizens/ SMEs - focused on prevention of illegal dumping. It will accompany the launch of the digital tools (tools 14, 15, 16), so that users are aware and encouraged to use the tool to improve their experience using the clean points.

A preliminary CDW illegal drop-off point identification analysis was conducted in early 2021. 15 significantly hot spots were identified. Of these points, part of them are private plots. Internally, it was decided to act only in those of public ownership. These points and the nearby residential areas were the target for the implementation of the communication actions.
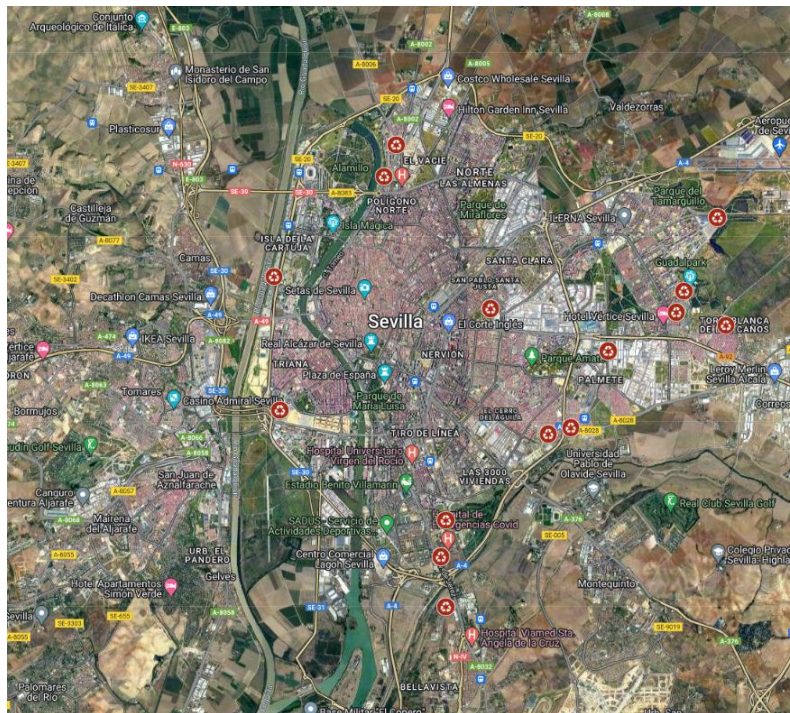
Illustration 1. Screenshot of illegal drop-off points selected for communication actions aimed to avoid illegal dumping.

In each selected point a billboard was installed. The aim of this was to warn of such non-compliance and to explain the alternatives to properly dispose of such waste. Complementing this action, a marketing campaign and social media is carried out.

The message of this campaign is clear: Avoid dumping mixed CDW in public area, and rather separately sort them and deliver to clean points for proper handling.

A promotional video is filmed and shared using social media where the Dept of Inspection in LIPASAM one of their responsibilities is monitoring CDW abandonment, and act as the protagonists in the video. Residents of neighbourhoods next to the billboard sites are also invited to participate in the video.

The video is used as a resource for the marketing campaign and social media. Also, this action is used to promote the digital tools developed during the project, related to CDW management. Citizens currently know the location of clean points via LIPASAM's website, but the added value of the digital tool is that it can calculate the closest clean point.

2) Correct segregation and management of CDW for large generators.

Activity is in the workshops with these companies (e.g., to show the QA tool of EMASESA), will also let them know about the correct separation and management of waste on sites. Not explicitly targeted in the communication campaign, though the message applies to anyone.

Development of wellbeing monitoring tool

Functionalities of WB platform for citizens

- Forms for query: The citizen will provide data about its location. The WB CityLoops platform for citizens will show the wellbeing indicators, circular indicators and composite indicators per district and city.
- Dropdown list: The citizen could select a district. The WB CityLoops platform for citizens will show the demonstration actions deployed and the estimated impact on the indicators.
- Map showing: A widget with a map (using OpenStreet Maps) will be presented to the citizens showing the city's current status regarding the indicators.
- Dashboard showing the current data on indicators: The dashboard will show the data on each indicator measurement.
- Control panel: A set of buttons will be included in the application to clean the forms, do the query, and export information. Logos of the involved partners (Emasesa, Lipasam, Municipality of Sevilla, CityLoops project) will be included providing additional information.

Functionalities of WB platform for managers.

- District representation of Seville Data: The city of Seville will be divided into a discrete representation of districts and overlapped over a real map of the city, including public infrastructures related to wellbeing.
- Data request of each district: Each district will be represented by different social and economic aspects, public infrastructure, and the potential demonstration actions from the CityLoops project.

- Evolution of the well-being indicators: Data about the evolution of the well-being indicators will be represented in a time-lapse, showing in the last frame the estimation in the next years according to the data provided by the manager through the platform.
- Evolution of the circular indicators: Data about the evolution of the circular indicators will be represented in a time-lapse showing in the last frame the estimation in the next years according to the data provided by the manager through the platform.
- Estimation of the well-being CityLoops indicators: Using the data provided by the managers, and the results from the analysis through the ML methods, the platform will present the indicators' values.

Stakeholders' identification. Public and private.

The platform for each use case within Seville has have two versions, one for managers and authorities and another for citizens.

The idea is that the platform version for citizens has only visualization capabilities and widgets using data provided by managers or results from the corresponding CityLoops platform for partners.

Therefore, the application for managers consists, at least, in a data collection tool where managers will provide the data to power up the data-driven applications or the visualization widgets in the platforms for citizens. Additionally, the platforms for managers may have additional capabilities for decision support. The applications for citizens show interactive visualizations of the data provided by managers and will use the available widgets to get information about specific questions regarding the wellbeing.

Development of city simulation platform, including integration of Seville's other digital tools

The city simulation platform has been developed by creating an HTML template in which all the interface elements have been included, including header, links to each of the applications and the logos of the companies involved in the development of the application.

In addition, a CSS file has been created to style the elements of the HTML template.

When the user enters the platform, they will see two sections below the page header. The first section presents three buttons (Figure 23). Each button takes the user to one of the application platforms (Construction and Demolition Waste, Organic Waste and Wellbeing).

Below the first section, there is another with the logos of the organisations involved in the application development. When the user clicks each logo, it will take them to the organisation web page.
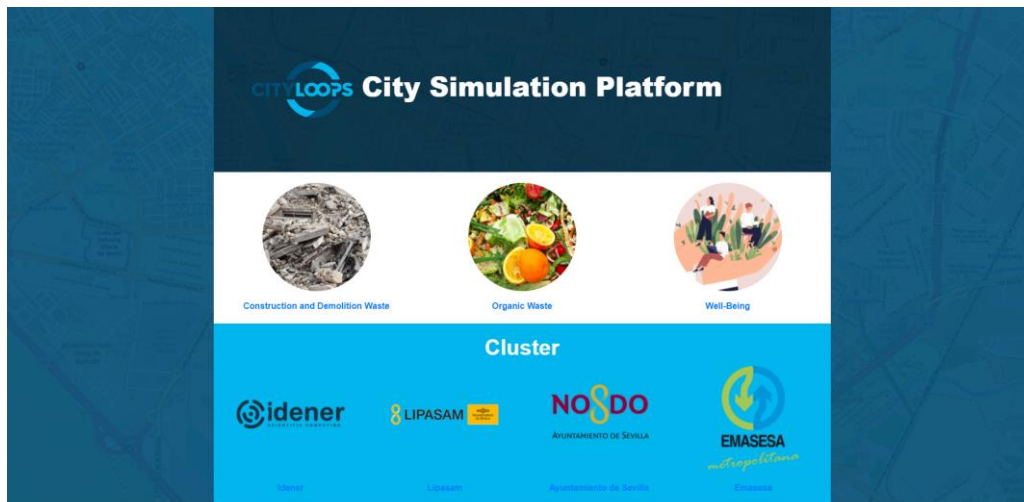
Figure 1 City Simulation Platform

CITY SIMULATION PLATFORM

Introduction to the instrument - what is it, who developed it, and how was it used in the demonstration action?

A "city simulation" has been performed to estimate the impact of specific actions and policies on specified indicators including an analysis of the current population satisfaction. The digital tools are not only focusing on CDW, but analysis carried out during the inception phase by the City Council of Seville, EMASESA and LIPASAM are covering other areas concerning wellbeing and population satisfaction, such as sustainable public transport, management of urban trees, the wastewater management in the urban environment, and the collection of others waste fractions keys to improve the circular economy. These initiatives will be measured and monitored using the digital tools mentioned in order to understand how they impact in the wellbeing of the city and citizens. Based on that, the tools will fuel data driven decision making, where the city can determine and prioritize potential actions to improve wellbeing and population satisfaction as well as the Sustainability Goals. A report will explain how the wellbeing is calculated and how the data can be used for decision making process.

<Link to instrument>

https://wb-app.idener.es/landing

Report explaining how wellbeing is calculated and how the data can be used for decision making processes

Wellbeing calculation

This section presents how the well-being value is calculated based on coefficients. This will be done in four steps:

- The first step consists of giving a coefficient to each column category (social, environmental, economic). The sum of this weight should be 1; therefore, a higher weight will represent that wellbeing is favoured by that group of columns. For example, a coefficient of 0.5 for social, 0.2 for environmental, and 0.3 for economic means that the columns within the social category have a greater impact than the economic and environmental categories. The following formula will give the weight of each column.

$$coeff_{social} + coeff_{\text{environmental}} + coeff_{economics} = 1 \qquad (2)$$

- Once this value has been defined, the next step is to give a weight to each column within the category. This weight will be given in a range from 0 to 10, whereby 0 means that it contributes nothing to wellbeing and 10 means that it contributes as much as possible to wellbeing within the weight of this category.

$$\sum_{i=1}^{N^{\underline{o}}\ of\ columns} coeff_{col_i} = 1 \qquad (3)$$

$$coeff_{soc\_col_i} = \frac{weight_{col_{social_i}}}{(N^{\underline{o}}\ of\ social\ cols)} * coeff_{social} \qquad (4)$$

$$coeff_{env\_col_i} = \frac{weight_{col_{env_i}}}{(N^{\underline{o}}\ of\ \text{environmental}\ cols)} * coeff_{\text{environmental}} \qquad (5)$$

$$coeff_{ecs\_col_i} = \frac{weight_{col_{economics_i}}}{(N^{\underline{o}}\ of\ economics\ cols)} * coeff_{economics} \qquad (6)$$

Where, $coeff_{soc\_col_i}$, $coeff_{env\_col_i}$, $coeff_{ecs\_col_i}$ are the coefficients that represent the importance of each column in well-being. $weight_{col_{social_i}}, weight_{col_{env_i}}, weight_{col_{economics_i}}$ are the weights defined by a user/researcher set to each column, ranging from 0 to 10, given the importance of each column based on scientific knowledge. $coeff_{social}$, $coeff_{environmental}, coeff_{economics}$ are another coefficient previously set by the user/researcher that represents the importance that each category affects to wellbeing. In case it is desired that all three categories affect the same, it is only necessary to enter the same value in all three categories.

- Once the coefficients representing the weight of each wellbeing column are obtained, the next step consists of multiplying this coefficient by the corresponding column. The value of this column has been previously normalised between 0 and 1 for columns that have a positive effect and between 0 and -1 for columns that have a negative impact. The following images show the dataset before/after this stage.

poblacion_ini	densidad_ini	poblacion_fin	densidad_fin	Hombres 0-4	Hombres 5-9	Hombres 10-14	Hombres 15-19	Hombres 20-24	Hombres 25-29	...	Mujeres TOTAL	Nucleo familiar con 0 Hijos	Nucleo familiar con 1 Hijos
0.004436	0.001115	0.004505	0.001145	0.010282	0.004779	0.034291	0.010094	0.010021	0.003361	...	0.003502	0.002271	0.000158
0.292211	0.155234	0.283969	0.153669	0.101475	0.134926	0.156627	0.153696	0.162422	0.235714	...	0.314498	0.499148	0.215064
0.421042	0.551409	0.414355	0.551440	0.232007	0.233824	0.221810	0.183002	0.218789	0.337815	...	0.430835	0.810733	0.264803
0.330280	0.650262	0.329715	0.656430	0.244524	0.208456	0.223973	0.210029	0.245929	0.263445	...	0.353773	0.483135	0.217117
0.796346	0.465435	0.801869	0.473183	0.653107	0.646324	0.645042	0.493650	0.722756	0.960924	...	0.810984	1.000000	0.712301

poblacion_ini	densidad_ini	poblacion_fin	densidad_fin	Hombres 0-4	Hombres 5-9	Hombres 10-14	Hombres 15-19	Hombres 20-24	Hombres 25-29	...	Mujeres TOTAL	Nucleo familiar con 0 Hijos	Nucleo familiar con 1 Hijos
0.000028	0.000035	0.000170	0.000072	0.000194	0.000030	0.000216	0.000063	0.000252	0.000021	...	0.000044	0.000043	0.000002
0.001838	0.004882	0.010716	0.009665	0.001915	0.000849	0.000985	0.000967	0.004086	0.001482	...	0.003956	0.009418	0.002705
0.002648	0.017340	0.015636	0.034682	0.004377	0.001471	0.001395	0.001151	0.005504	0.002125	...	0.005419	0.015297	0.003331
0.002077	0.020449	0.012442	0.041285	0.004614	0.001311	0.001409	0.001321	0.006187	0.001657	...	0.004450	0.009116	0.002731
0.005008	0.014636	0.030259	0.029760	0.012323	0.004065	0.004057	0.003105	0.018183	0.006044	...	0.010201	0.018868	0.008960

Figure 2. Dataset before/after of coefficient stage.

- Therefore, the wellbeing will be calculated as the sum of all columns that have been previously multiplied by the coefficient. An example of wellbeing with a random coefficient from 2015 to 2018 is presented in Figure 15.

	distritos	YEAR	Wellbeing
9	BELLAVISTA-LA PALMERA	2015	3.247853
5	TRIANA	2015	2.421800
4	SUR	2015	2.374561
3	CERRO-AMATE	2015	2.345181
7	SAN PABLO-SANTA JUSTA	2015	2.331161
2	NERVION	2015	2.327797
6	MACARENA-NORTE	2015	2.143142
8	ESTE	2015	1.947953
10	LOS REMEDIOS	2015	1.884126
1	MACARENA	2015	1.566865
0	CASCO ANTIGUO	2015	1.211274

distritos	YEAR	Wellbeing
CERRO-AMATE	2016	2.418423
SAN PABLO-SANTA JUSTA	2016	2.258636
TRIANA	2016	2.103519
ESTE	2016	1.971437
LOS REMEDIOS	2016	1.953766
CASCO ANTIGUO	2016	1.844854
SUR	2016	1.652235
BELLAVISTA-LA PALMERA	2016	1.635680
NERVION	2016	1.367414
MACARENA-NORTE	2016	1.358915
MACARENA	2016	0.961728

distritos	YEAR	Wellbeing
NERVION	2017	2.432851
MACARENA-NORTE	2017	2.108742
SAN PABLO-SANTA JUSTA	2017	2.047648
CASCO ANTIGUO	2017	1.972651
BELLAVISTA-LA PALMERA	2017	1.907864
CERRO-AMATE	2017	1.868422
SUR	2017	1.779018
ESTE	2017	1.685382
MACARENA	2017	1.491164
TRIANA	2017	1.456162
LOS REMEDIOS	2017	1.196412

distritos	YEAR	Wellbeing
SAN PABLO-SANTA JUSTA	2018	1.986750
NERVION	2018	1.983555
TRIANA	2018	1.870476
MACARENA-NORTE	2018	1.792111
MACARENA	2018	1.777882
CERRO-AMATE	2018	1.777646
LOS REMEDIOS	2018	1.559152
BELLAVISTA-LA PALMERA	2018	1.411626
ESTE	2018	1.341311
CASCO ANTIGUO	2018	1.297203
SUR	2018	1.174056

2. *Figure 3. Well-being examples from 2015 to 2018.*

Testing of the Well-being monitoring tool

The Well-being monitoring tool was launched before the summer of 2022 after a preliminary testing period by the managers of the Seville cluster. Several modifications have been developed after the preliminary testing process considering the suggestions from the members of the local cluster in Seville. Those modifications have the main objective to increase the user-friendliness of the tool for both managers and citizens.

The use from the citizens is focused on the visualization of the estimated indicators on the economy, social and environmental areas as well as the well-being indicator now. The use of managers is focused on monitoring the evolution of the indicators, increasing the dataset of the tool, and monitoring the predictions of the estimated indicators in future scenarios.

During demonstration action 2, we are implementing different modifications and new functionalities considering the suggestions from the local managers. These modifications and new functionalities are identified below:

- Internationalization (English & Spanish)
- Footer
- Hit count
- Citizen form result visual improvements
- "How we do it" modal in citizen form results
- Added graphs with Wellbeing scores from previous years in citizen form
- Highlighting selected districts in citizen form results
- Improved ML output (tables, graphs, WB score by district)
- Added custom fields to ML form

Impact – Stakeholder Engagement targets

Table 1. Impacts of demonstration action 1

Stakeholder Engagement - Demo Report Extract_Seville

Planned outcome	Intermediate outcome review
Strengthened awareness and knowledge of the improvement of CDW management among the main stakeholders and other socio-economic agents related to the bases of the circular economy.	Outcome achieved. A broad range of stakeholder outreach activities has been carried out in accordance with the plan.

Table 2. Impacts of demonstration action 2

Planned outcome	Intermediate outcome review
Increased knowledge of CDW management among citizens and small producers.	Outcome achieved. A broad range of stakeholder outreach activities has been carried out in accordance with the plan. Additionally, an awareness campaign and the CDW flow optimization tool were launched.

Table 3. Impacts of demonstration action 3

Planned outcome	Intermediate outcome review
Increased interest in the guidelines and tools among public companies and other stakeholders.	Outcome achieved. A broad range of stakeholder outreach activities has been carried out in accordance with the plan.
Increased participation of stakeholders in the assessment of the guidelines. Increased commitment of citizens to circularity.	Outcome reached. Results show an increased interest and commitment according to the number of visits to the IT tools.

CITYLOOPS

CityLoops is an EU-funded project focusing on construction and demolition waste (CDW), including soil, and bio-waste, where seven European cities are piloting solutions to be more circular.

Høje-Taastrup and Roskilde (Denmark), Mikkeli (Finland), Apeldoorn (the Netherlands), Bodø (Norway), Porto (Portugal) and Seville (Spain) are the seven cities implementing a series of demonstration actions on CDW and soil, and bio-waste, and developing and testing over 30 new tools and processes.

Alongside these, a sector-wide circularity assessment and an urban circularity assessment are to be carried out in each of the cities. The former, to optimise the demonstration activities, whereas the latter to enable cities to effectively integrate circularity into planning and decision making. Another two key aspects of CityLoops are stakeholder engagement and circular procurement.

CityLoops started in October 2019 and will run until September 2023.