WECOUNT

WeCount: Citizens Observing UrbaN Transport

Deliverable D6.3: Innovation & Exploitation Strategy

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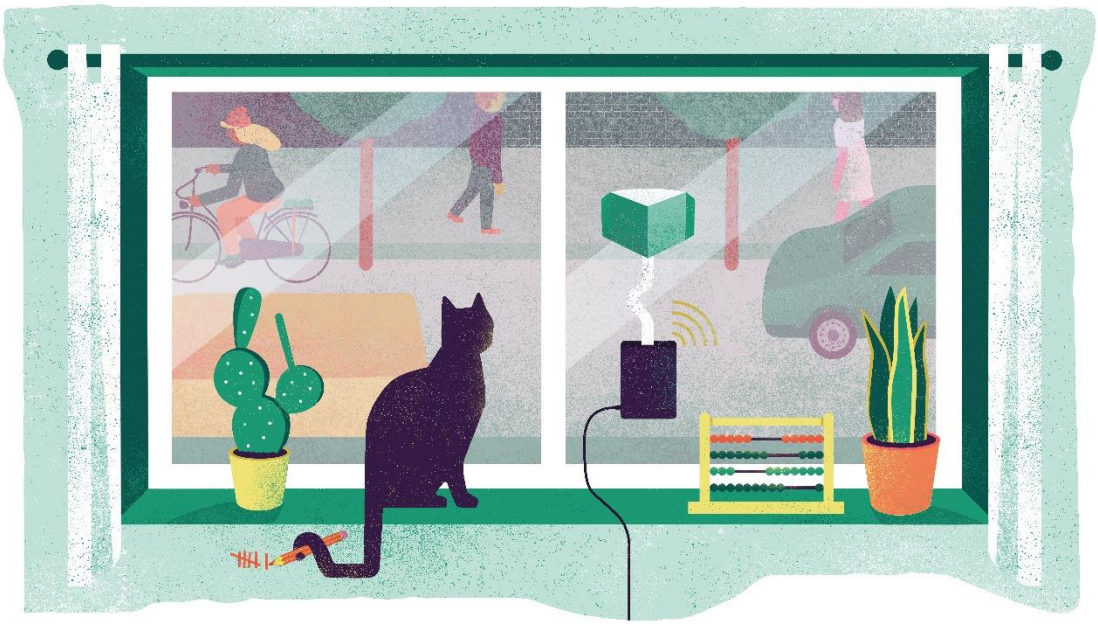

The WeCount Project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 872743

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1 Overview

1.1 Introduction

WeCount, Citizens Observing Urban Transport, is a Horizon 2020 funded project that is part of a Science with and for Society (SwafS) call (H2020-SwafS-2018-2020). WeCount is a Citizen Science project working in five cities in Europe to empower citizens to take a leading role in producing data, evidence, and knowledge around mobility in their neighbourhoods and at the street level.

The project applies participatory Citizen Science methods to collaboratively develop and deploy innovative, low-cost, automated traffic counting sensors (i.e. Telraam Sensor) and multi-stakeholder engagement mechanisms in five case studies in Leuven (BE), Madrid and Barcelona (ES), Cardiff (UK), Dublin (IE) and Ljubljana (SI). The five cases follow a similar, yet flexible, execution path, with Leuven & Madrid (and Barcelona) leading off and serving as a test case for the remaining three cases.

Following this approach, WeCount aims to quantify local road traffic (cars, trucks, active modes, and speed), produce scientific knowledge in the field of mobility and pollution, and co-design informed solutions to address a variety of road transport challenges. In addition, the project provides cost-effective data for local authorities on a much larger temporal and spatial scale than would be possible with traditional traffic counts, opening new opportunities for transportation policy and research.

This deliverable summarizes the project legacy and the post-project exploitation of the results.

1.2 WeCount exploitation project objectives

From its inception, the exploitation of WeCount results was included as a key objective. Project objective 3 (cfr. DoA), is **"to establish a durable ecosystem for citizen science traffic counting and related impacts"**. Specifically:

- Following an open science approach, to create an environment in which trained 'local citizen champions' can lead any local citizen science community (with central WeCount project team support) using low cost sensors to collate road transport data and related impact data (e.g. air pollution).
- Deliver a 'recipe & ingredients' model allowing local communities to make their own devices and start their own citizen science activities and nurture emerging communities outside the project who want to use the WeCount sensors & platform.
- To support a space where we co-create accessible resources and scalable solutions with a network of citizens and local communities.

To obtain this objective, we performed several project activities that generated exploitable results. We briefly highlight a few of the key activities and the deliverables that are produced as a result, to support the exploitation.

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1.2.1 WP2: Shaping, documenting and disseminating the WeCount citizen science ecosystem

On a project level, WP2 contributes with new knowledge and resources on citizen science methodology in the domain of mobility/traffic counting and ensure that the knowledge can reach different audiences. The tangible outcome is a set of curated contents (i.e. publications, videos, podcasts, photo-tutorials) targeting different audiences, ranging from the scientific community, innovators and companies working in the field of mobility, public policies and the public (local communities, families, students and teachers).

A key-output are curated contents to support and foster replicability of the citizen science interventions beyond WeCount, documented in ***D2.1 Infrastructuring local communities for citizen science interventions on mobility***. This deliverable presents and discusses the strategy used to nurture community champions and local communities in the five pilots. The final version includes the methods improved for running the second set of pilots.

These resources are published on the WeCount Zenodo page, together with other WeCount results.

1.2.2 TASK 3.3 Citizen participatory design and proactive learning

In the design of the sensor and the platform, a citizen participatory design process has been an important element to ensure a final product that can be used by mobility practitioners and citizens alike, post-project. These communities of users shaped the WeCount central data platform (T3.1) and sensor (T3.2) to form user-friendly activities/products/data relevant to the end users' needs. The final output is ***D3.2: Final WeCount platform and sensor kits.***

1.2.3 TASK 4.5: Legacy and reflection - policy interaction

The ultimate objective of each of the use cases, is to achieve policy change as a direct result of the citizen science activity. It is not sufficient to merely gather data and expect policy makers to solve the issues citizens are raising in the citizen science activity. Specific guidance and unremitting effort are needed for the impact on policy to materialise. There are two classic mistakes made in involving citizens in the policy development process we are avoiding in WeCount:

1. From local authority towards citizens: pseudo-participation in the policy development (i.e. when participation is nothing more than one-sided information sessions) and
2. From citizens towards the local authority: protest actions and provocative campaigns are good for raising awareness but can become counter-productive in actually solve the issues, when citizen action is too confrontational and polarizing.

In this task, the role of the project team was to close this gap and bring citizens and local authorities together, using the results of the citizen science activity as common ground. To start with, this involves continuous involvement of local authorities in the whole process of the use case, start to finish, preparing the city authorities on the expectations of the citizens and likewise prepare citizens for constructive dialogue with policy makers. ***The end result is regularly organized consultative groups, consisting of both citizens and local authorities that shape the policy, which endures beyond the project lifetime***. Such a consultation platform ensures that it raises citizens' concerns and creates policies that are supported bottom-up.

We also produced a set of impact stories that have been used throughout to demonstrate WeCount and replicable activities' impact, for example as published on the WeCount project website:

1.2.4 Task 5.5: Upscaling the M&E framework

The Monitoring & Evaluation (M&E) Framework is scaled to general guidelines for evaluating citizen science mobility projects and draw up best practice models for engagement and policy recommendations The framework, the KPIs and the methodology to measure these can be of interest to other Citizen Science mobility projects. In this task, we put together lessons learned and developed general guidelines for evaluating future Citizen Science mobility projects.

These general guidelines live beyond the end of the project and allow us to upscale the knowledge on monitoring and evaluation that was acquired during the project and bring it to a higher level. The guidelines are based on the results of M&E application during the different steps of the 5 citizen science pilots in WeCount.

We exchange our project's evaluation data with other open science projects with other relevant SwafS projects to share evaluation data and data arising from citizen science in the spirit of open science. ***D5.4: Final summative M&E project report.*** This includes a list of visuals which help communicate the messages and learnings in a more straight-forward way

1.2.5 Task 6.5 Exploitation of WeCount results

The WeCount consortium members develop an Innovation & Exploitation Strategy for the outcomes of the project and recommendations for their use after the project ends. The aim of the strategy is to identify the most efficient ways to guarantee the maximum visibility for the project and an optimal exploitation and deployment of project results for the take-up of WeCount tools and approaches across Europe and beyond. A central component of this strategy is the open access to the sensor data, in similar fashion as the Telraam-project via the platform www.telraam.net.

As indicated above, throughout the project, the essential part of the exploitation is the capacity and skills building activities, aimed at the deployment of WeCount. The WeCount approach to citizen science activities, as designed in WP2, is setup in such a way that local champions outside the five case studies in WeCount can easily start their own use case in their community, using the same platform and sensors (WP3). The exploitation thus focusses on finding and nurturing these local champions outside the project.

1.3 H2020 Exploitation framework

Projects funded with taxpayers' funds, should benefit the taxpayer and the fruits of the research should reach society as a whole. The exploitation strategy of WeCount follows the guidelines provided by the funding agency.[1] In the list below, we briefly touch upon this framework and how WeCount addresses each point.

- Link to the policy context: WeCount's output focuses on the improvement of local transportation planning and involving citizens in developing the policies.
- Exploitation and dissemination are planned from the project inception: as indicated in the previous section, WeCount included activities from the project inception phase with the objective to create exploitable results (i.e. data, engagement tools, sensor/platform, etc.)

[1] https://ec.europa.eu/research/participants/docs/h2020-funding-guide/grants/grant-management/dissemination-of-results_en.htm

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- Involve potential end-users and stakeholders: WeCount's core are the 5 pilot activities in Leuven, Madrid/Barcelona, Cardiff, Ljubljana and Dublin, engaging primarily with citizens, with local policy makers and the scientific community.
- Implement open access and open data management: WeCount realized a large open dataset with traffic data in the 5 pilots and in other sites (e.g. Liège (BE) and Manchester (UK)) where new volunteers outside the project scope have started to deploy Telraam-sensors. Project outputs are shared via the WeCount Zenodo community.
- The results of your project have advantages over the status quo: by using low-cost technology and involving citizens directly, WeCount democratizes the collection of traffic counting data, an essential element to build local transport policy.
- Aim to alleviate the barriers for the application of results: "detech" to achieve maximum inclusion is a central element in the development of the results of WeCount and will be a central theme throughout this report.
- Design the project with its after-life in mind: The WeCount objective and activities aim to establish a durable ecosystem for traffic-data collection in a citizen science setting.

The framework further provides guidance on defining exploitation, ranging from "making results available" to "making use of the results" in a wide variety of exploitation activities that cover societal, scientific and commercial exploitation options.

Figure 1: framework with examples of exploitation options.

In this report, we elaborate on the project's exploitable results, target audience/market that can make use of project results and we highlight a few specific example of promising exploitation of the results in various phases of implementation.

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2 WeCount exploitable outputs

WeCount outputs originate from the "foreground" created in the project. Foreground includes intellectual property rights (such as rights resulting from copyright protection, related rights, design rights, patent rights), similar forms of protections (i.e. sui generis right for databases) and unprotected knowhow (i.e. confidential material).

From this foreground, clearly defined results in the form of products and/or services can be distilled.

2.1 List of exploitable outputs

WeCount produced a large array of results. A non-exhaustive inventory of the Key Exploitable Results (KER) has been mapped with all the members of the Consortium and is summarised in the table below.

Table 1: WeCount exploitable results

Output	Exploitation opportunities	Potential users
The dataset of Telraam sensor data collected in WeCount in the 5 pilot cases and elsewhere	Traffic counting data is of high value for policy makers and mobility consultancies as it's a required element to build evidence-based policy. The exploitation potential of the existing dataset is both commercial and scientific, allowing to find insights that are both of commercial as well as scientific value	(small) Local authorities, NGO's, universities, mobility practitioners, private enterprises, NGOs
Telraam Sensor hardware & software	The improved Telraam sensor is a new technology to collect traffic counting data. There is an existing market for traffic counting data collection with sensors. The improved Telraam sensor is an addition to this market. The sensor can be used as-is or further improved.	Mobility practitioners, private enterprises, local authorities, NGOs.
Telraam software platform: a web-based platform to manage a group of users and a fleet of sensors	The open platform allows anyone, individuals as well as organizations, to set up traffic counting campaigns with Telraam-sensors, using the approach and tools developed in WeCount. The exploitation potential lies in the ability to set up a traffic counting campaign	Local authorities, NGO's, universities, mobility practitioners, private enterprises, individual citizens

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	with citizens for scientific or commercial purposes, using the platform to manage participants and sensors. The management platform facilitates third parties to setup citizen science-activities in similar fashion as WeCount	
The WeCount "cookbook of recipes" holds a myriad of engagement tools that can be of use for the organization of citizen engagement activities in the context of mobility	An adaptable toolkit for setting up situated citizen science interventions for sustainable mobility can find many applications. All resources can be used to support citizen science projects related to mobility, be it of a scientific or commercial nature, with the objective of collecting or working with data.	Citizen science practitioners, universities, local authorities,
The WeCount Policy Recommendations & Impact Stories: WeCount produced various policy briefs[2] ranging from the potential of using CS data for policy support as well as adapting citizen science to a post-covid world	The exploitation lies in providing empirical evidence that citizen science generated mobility data, provides added value, demonstrated with several example cases. Use of WeCount outputs in this respect will strengthen local authorities to realize policy interventions	Local and regional authorities - POLIS Members (Working Groups) - Targeted Communication - POLIS Conference
Educational material for schools in context of STEM-activities	In the WeCount pilots, several engagement activities involved interactions with schools, particularly in Cardiff and Dublin. The educational materials include elements to work with counting data (link with math) as well as awareness on traffic safety and can be implemented as a tool to monitor impact of school streets[3] a fairly new but increasingly popular concept. The materials developed provide a	Schools, NGO's, universities

[2] https://we-count.net/news/hybrid-citizen-engagement-approaches-to-deliver-citizen-led-project-results-in-times-of-a-pandemic-policy-brief-1

[3] For example, see: http://schoolstreets.org.uk/

	wide range of complexity and can thus find application for a large array of students from +/-8y-18y Project partner M21 is already engaging with (secondary) schools in Belgium, using the resources developed in WeCount, in spin-off activities outside the scope of WeCount.	
Project reports & Scientific publications	During the project we produced a high number of deliverables documenting the project activities and outcomes. The description of activities in the 5 pilot cases (D4.1-D4.3) as well as the accompanying evaluation reports (D5.1-D5.4) provide great insight and lessons to be learned on successful and less successful activities, providing learning material for the scientific community wanting to engage in similar citizen science activities.	Universities, knowledge institutes

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2.2 Target audiences

WeCount engaged with a broad range of stakeholders with different objectives. We approach the potential exploitation of the WeCount results also from the angle of the target groups and potential users. We distinguish between the actors in the quadruple helix: public bodies, in particular governmental entities and institutions (local, regional, national, international), private enterprise, either services or industry, knowledge centres such as universities and research institutes and finally civic society, the citizens and citizen advocacy groups.

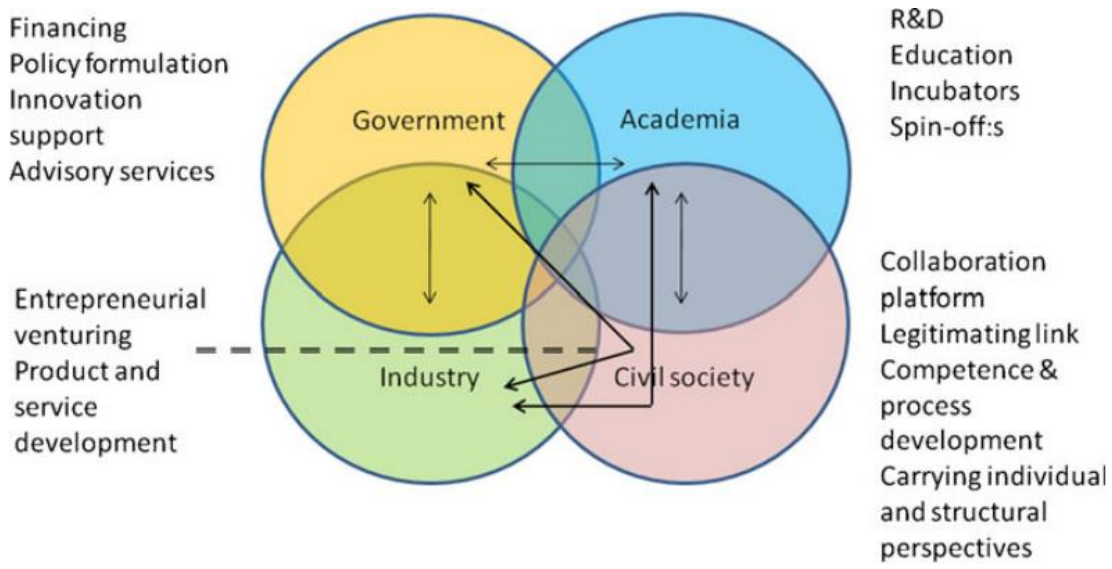

Figure 2 Quadruple Helix innovation system – source https://doi.org/10.1504%2FIJTM.2009.023374 & https://doi.org/10.1007/s13132-012-0098-3

Table below provides an overview of the exploitation potential from the viewpoint of the potential users.

Table 2: WeCount results - Target group mapping

Target group	Sub-group	Exploitation opportunities
Governmental	Local authorities & municipalities	The exploitation potential lies in the ability to set up a traffic counting campaign with citizens, with Telraam sensors to monitor local traffic in a low-cost way. Traffic counting data is typically available for main roads only, not for smaller residential roads. The WeCount approach can cover the blind-spot of small local roads which is of particular concern for local authorities. Consequently, as the Telraam-sensors can be deployed for a long period of time, it is possible to use the WeCount approach to analyse the impact of intervention and assess the need for potential interventions on local traffic and at the same time, involve local citizens in the policy

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		development process. Particular potential lies with smaller municipalities that don't have the means to organize traffic counting campaigns with more expensive automated sensors.
	Regional & national authorities	Regional and national authorities typically have some sort of traffic monitoring system in place, with automated sensors of floating car data. The WeCount approach with Telraam-sensors can complement the high-level monitoring systems. Regional authorities may be less inclined to deploy new sensors, but can use the existing database of counting data and/or the counting data from sensors deployed by local authorities, to monitor traffic in a larger region. Similarly, the impact of traffic on main & local roads of interventions on the main road network, under competence of regional of national authorities, can be monitored with sensor-network deployed in similar fashion as was done in WeCount Finally, a large network of Telraam sensors, allows for trend analysis, for example monitoring the rebound of mobility after the COVID-19 induced lockdowns, not only on car-traffic but also active modes. This is a particularly interesting opportunity we will discuss further in this report
Industry	Mobility service providers	As with other traffic counting solutions, a wide range of service providers exist in the market to offer mobility data collection services, mainly to governmental clients. Local authorities often lack expertise and skill to organize own traffic counting campaigns and thus rely on the private sector to perform these services for them. The WeCount-approach, collecting data with citizen with Telraam sensors can compete in this market. Services can range from a pure technical approach, collecting cold hard data, to a full inclusive, citizen-science approach with strong involvement of the citizens. We argue there is market potential for both approaches. In a later chapter, we will dive into this particular exploitation opportunity, as it is the most developed of all options, with TML, WeCount's leading partner, having setup a spin-off company to provide these services.
	Hardware developers	WeCount has demonstrated that an improved Telraam-sensor is a viable hardware solution to collect traffic data.

		The current sensor uses a Rasberry Pi as basic platform. A Raspberry Pi is small single-board computer developed by the Raspberry Pi Foundation[4]. The original goal of the kit was the promotion of teaching basic computer science in schools and in developing countries. The original model became more popular than anticipated, finding applications outside its target market for uses such as robotics, as was the case with Telraam. It is typically used by computer and electronic hobbyists, but also in professional hardware development as a platform for rapid prototyping. WeCount has created a prototype that can be considered a "Proof of Value" the industry can build on to develop a purpose-built device with a similar application, thus removing some of the obstacles inherent to using a generic platform such as the Raspberry Pi. We will explore this particular exploitation opportunity further below
Civic society	Private individuals	WeCount has created an approach and a set of tools that allow any citizen to connect to the Telraam platform. Already during the project, we can see WeCount is successful in generating attention from private individuals. About 30-40% of the users active in the Telraam-platform are so called "independent" users, i.e. users that have acquired their own sensors, not provided in the WeCount project or other funded projects. The WeCount platform will remain live and open on project completion, allowing any private citizen in the EU to acquire a Telraam traffic counting sensors and start collecting data.
	Citizen advocacy groups	Similarly to individual users, already during the project it is clear that WeCount attracted particular attention from local citizen advocacy groups. One example is the case of Leuven-based advocacy group demanding action from the local authority to tackle a concern of speeding. We produced an impact story of this particular case.[5] The WeCount project team has been approached by various advocacy groups during the project, with similar concerns. As with individual users, local citizen advocacy groups can use the WeCount tools and approach to generate evidence strengthening their cause with empirical evidence.

[4] https://www.raspberrypi.org/

[5] https://we-count.net/news/leuven-citizens-ensure-speed-compliance-with-the-help-of-low-cost-traffic-counting-sensor

	NGO's	NGO's can play an important role in empowering citizens to have their voices heard. While some individual citizens and/or citizen advocacy groups can take own initiative, using the WeCount results to pursue similar objective of change in local traffic management, some citizens lack skill and know-how to pursue this. NGO's with a mission of citizen empowerment can use the WeCount approach to empower vulnerable groups.
Academia	Universities	Universities will find a large array of exploitation opportunities within WeCount's results. We present a few in a non-exhaustive list below: • The WeCount traffic counting dataset provides a unique opportunity for trend analyses and correlation beyond the analysis done in the project itself. Further exploration of correlation between Air quality levels and traffic volumes is one obvious opportunity of great scientific interest; correlating weather patterns with active travel use is another. General mobility patterns can be extracted from the existing dataset. Exploitation is easy via the Telraam API: www.telraam-api.net, free to use by academia under CC-BY-NC license • Citizen science researchers can use WeCount as a use-case in the field of mobility. • The traffic counting dataset contains long timeseries of data with several million data points, providing an excellent resource for Machine Learning exercises. The dataset was used as such already by the KULeuven in a so-called Datathon.[6] • The 5 WeCount pilot cases have generated a useful dataset of citizen science participants, including socio-economic properties, engagement data and in depth interviews, providing an excellent resource for social science researchers. Other than purely using the dataset generated in WeCount, universities can play a role in the development (and even application) of the Telraam tools. In particular the use of machine vision and AI-on-edge techniques are not of a sufficiently high TRL for the private sector to already adopt and develop. Further research in both software and hardware (i.e. to enable nightly traffic counting) will be

[6] https://lstat.kuleuven.be/Datathon2020/data

		required, with a role for universities. At least in Belgium, there are 3 master students, building on WeCount and Telraam results to further research specific elements: • Data gap-filling using machine-learning (KUL-DTAI group[7]) • Mathematical clustering for object classification (KUL-DTAI group) • Exploring hardware improvements on the Telraam sensors (UGent- Department of Telecommunications and information processing[8])
	Primary/secondary school	Primary and secondary schools can re-use the educational material to work with counting data as well as awareness on traffic safety and active travel positive impacts on local mobility and air quality. The exploitation opportunity is a 1-on-1 fit as elaborated on the previous section, listing the WeCount results. All resources are published on Zenodo, for example, for primary schools, the resources are downloadable here: https://zenodo.org/record/5361919#.YTDPHI4zZaQ

We have now established the exploitation potential and potential users of the results from WeCount. It is not the goal of this report to document a detailed strategy of all the exploitation potential of the results. Therefore, in the next chapter, we highlight a few of the most promising ones in more detail and elaborate on the use-case, strategic approach, barriers to overcome, the status of the exploitation and next steps.

[7] https://dtai.cs.kuleuven.be/

[8] https://biblio.ugent.be/organization/TW07

3 Tangible exploitation activities

3.1 Telraam services

3.1.1 Scope

What became evident during the WeCount project, is that local authorities, particularly in Belgium, but also beyond, see the benefit of traffic counting campaigns, with Telraam sensors, together with citizens, as we have deployed and improved in 5 European cities during the WeCount project. TML, as Belgian partner and consortium leader was approached by municipalities of different size to support small-scale citizens science projects in their municipality.

TML has facilitated this, as an objective of the WeCount project, but due to high demand, as an SME, it was not possible for TML to carry this effort without further financial support. TML has consequently developed a service model, operating as a "citizen science service provider", helping local authorities replicating the WeCount cases in a large number of municipalities at smaller scale (typically 20-40 participants), as a paid service. These services are typically embedded in a larger service contract, either involving citizen engagement in context of changes to local transport policy and/or as a monitoring tool to collect data.

The service deviates from TML's typical activities and combines both technical know-how as well as citizen engagement expertise. Consequently TML & M21, the initiators of Telraam, decided to spin-off Telraam-related activities in a new Spin-off, building on the initial Telraam-project and WeCount.

The spin-off was created on 27/01/2021 under the name "Rear Window"[9]. The mission of this spin-off is to:

- Provide citizen science services for local authorities, using Telraam sensors in a WeCount-approach
- Maintain and develop the Telraam-platform to enable use by private individuals as well as third parties in a SaaS-model[10]
- Further develop the Telraam sensor technology: explore new sensing techniques, improve the software and the hardware of the sensor with the objective to further "detech" the sensing technology
- Further develop the Telraam platform: add new features to maximize citizen engagement (e.g. collect additional information from participating citizens on quality of life, street properties, other sensors,…) as well as technically (e.g. apply Machine Learning techniques to extract insights from the dataset)

3.1.2 Target audience/market

As indicated in the previous section, the spin-off company aims to fill a niche of low-cost, fine grained traffic counting by involving citizens in the data collection process. As such, we summarize Rear Window's value proposition as a device and a platform targeting:

[9] https://kbopub.economie.fgov.be/kbopub/toonondernemingps.html?ondernemingsnummer=762549266
[10] Sofware-as-a-Service: https://en.wikipedia.org/wiki/Software_as_a_service

- **local policymakers** who can source or organize counting campaigns much cheaper at higher quality (more counting locations) and, through cooperation with counting citizens, create support for local measures aimed at solving local mobility problems.
- **engaged citizens** to make the collection of objective traffic counting data affordable and thus cooperating directly in the improvement of local transport policy.
- **transport consultancies** providing tools to collect traffic counting data, serving a myriad of clients.

Telraam is targeting local authorities and transport consultancies serving local authorities, as end-clients, while the citizens are considered users. Telraam differentiates between sales to clients and engagement to users. In a first instance we focus on sales in Flanders, scaling up to Europe (and later, potentially, the world) via local transport consultancies in a licensing formula.

In terms of market size, we estimate (conservatively) from TML's experience in this market that local authorities spend about 1 € / inhabitant / year on purchasing/generating traffic counts, the majority of which focusing on monitoring traffic flow, "rat running" and adaptation of circulation plans. Extrapolating to EU, we expect the addressable market in EU for this type of service (traffic counting) is about 250M€.

3.1.3 Barriers

As the evaluation reports of WeCount have shown, the biggest bottleneck to fully exploit this potential, is the technology. As of now, from the earlier Telraam-projects and WeCount, we have a functional first version of the sensor and the platform, but both are not of sufficient quality to scale, mostly due to a lack in ease of use and reliability.

On the sensor side: the current sensor uses off-the-shelf hardware with a Raspberry-Pi based sensor with the camera-module and we use Python OpenCV software with background subtraction to detect moving objects.

Figure 3: current Telraam sensor hardware

The device is working but there are issues: loss of connectivity, cumbersome installation procedure, hardware-defects, bugs in the back-end. Depending on the selected methodology to validate results,

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the current device achieves a median accuracy of 80-85% for car counting in favorable conditions. In about 10-20% of the locations, the quality of the traffic counts is well below 70% which is unacceptable for the market. In detail:

- The hardware setup (i.e. casing) is **not professional**. The hardware casing is a standard Raspberry Pi casing and in particular the variable quality of the hinge of the camera mount leads to errors in the field of view and consequently faulty data. We now use a foldable cardboard as an anti-reflection system. The window mounting system consists of poor quality tape/velcro, leading to frequent drops of the camera. While these drawbacks may even appeal to a niche "makers/nerd" community, such a setup is insufficient for general deployment and unacceptable for professional clients (i.e. local authorities).
- The **software is unstable** requiring frequent resets by participants. Only about half of the deployed devices are truly "install and forget", requiring interventions by the citizen-owner to reset and/or re-install the software. Despite incremental improvements during WeCount, technical problems persist. Our assessment is this can only be resolved by starting from scratch.
- The **onboarding is complex** and error-prone; a connection switching network to an ad hoc wifi hotspot needs to be made by the participant to set wifi credentials for connectivity of the device.
- Most importantly, the **quality of the traffic counts** is variable insofar these have been verified and the quality of the counting is prone to environmental conditions. The distinction between cars and large vehicles is a known issue with the current approach and subject to large uncertainty. The quality of bicycle counting is poor due to misclassification, especially with groups of cyclists. While we are transparent about the quality of the traffic data, we find in particular from professional users and local authorities that quality levels of the current devices are insufficient to fully replace existing traffic counting techniques, thus limiting the market penetration with the current device. More robust and stable quality levels are required to build trust.

The issues above lead to **poor user retention** as participants get frustrated and will abandon efforts to keep the device active. Secondly, it generates an **(avoidable) load on the helpdesk** team to resolve technical issues. Most importantly, from a commercial point of view, **the quality of the counting data is insufficient** to build trust in the system among our potential clients, holding back sales.

On the platform side: The front-end platform is very basic with a summary map as a landing page and details at road-level when selecting individual road segments (see www.telraam.net). Some impression in screenshots below:

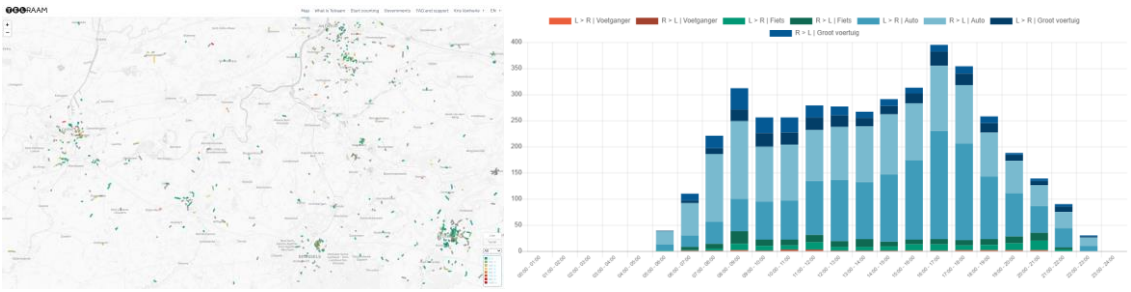

Figure 4 Impressions of the current Telraam platform

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There are issues with the existing platform: an infrastructure and architecture that is unfit to scale, limited dashboards & data analytics, limited user engagement mechanisms to keep participants involved, no network-specific dashboard (i.e. combining data of a subs-set of Telraam-devices to gain insight). In detail:

- Data processing consists of a relatively **simple post-processing** step deriving fairly simple indicators for traffic. The current setup does not detect anomalies (i.e. true data signals that point to an abnormal change in the traffic situation such as spike in traffic due to a diversion) nor artefacts (i.e. faulty data such as reduced traffic volume due to blocking of the camera field of view). These automatic detection algorithms are required to build trust in the system and improve reliability of the data.
- The platform currently **lacks any user engagement**; the potential of providing contextual information by users to clarify anomalies in the data is not exploitable with the current platform (i.e. allowing users to provide information on a short term road diversion to explain a spike in traffic volumes). Other opportunities to increase user engagement are ranking of streets and develop a badge system to reward active contributors.
- The cloud infrastructure needs to be revised to be more robust, stable and scalable to support a worldwide rollout and big data analysis.

While the above list of barriers paint a gloomy picture, the barriers were quickly identified during the WeCount project and attempts were made to alleviate the most urgent issues, already steps are made to overcome these barriers. We discuss this in the next section.

3.1.4 Status & outlook

The spin-off from project partners TML & M21 was created on 27/01/21. As of August 2021, Rear Window realized +/- 450.000€ of firm sales, mostly from Belgian governmental clients (local authorities) in +/- 30 small projects. Staff to perform these projects was sourced from founding partners TML and M21 and now amounts to 4FTE.

Even with the current limitations of the technology, as described in length in the previous section, the market for citizen science services, using the WeCount approach with Telraam sensors, is clearly materializing, at least in Belgium. There are seeds of similar emerging demand from countries of the other WeCount partners, for example the NGO "Possible"[11] in the UK via project partner UWE and some leads in Slovenia via project partner UL and municipalities in the Barcelona area via project partner IFC. There is hesitance among these potential clients due to the technology risk. Nonetheless, the market potential of these services is demonstrated.

On the technology side, the spin-off Rear window secured research funds from VLAIO[12] to build a new sensor with partners. More details can be found on the Telraam-blog.[13]

This research fund will allow the development of a new purpose-built sensor, to be launched in Q2 of 2022. As of August 2021, the project is underway, achieving the expected milestones with the first prototypes expected in Q3 2021.

To conclude, the spin-off Rear Window is part of the consortium for the soon to start H2020 Compair-project for which grant negotiations are underway (GAP-101036563). The project is due

[11] https://www.wearepossible.org/
[12] https://www.vlaio.be/nl
[13] https://telraam.net/en/blog/telraam-v2-announcement

to start in November 2021. The role of the spin-off in this project is to develop new API's for third party use of the Telraam sensor data.

3.2 WeCount Educational Pack

3.2.1 Scope

In the WeCount pilot cases, in particular in Cardiff and Dublin, the engagement activities with schools stood out as exemplars of high impact activities. The exploitation potential contains several layers:

1. The open source software and use of existing libraries (Python OpenCV) of the sensor, makes it an interesting resource to build further on in coding courses, in particular Python. Secondly, the hardware platform of the sensors (Raspberry Pi) is originally designed as a resource to promote teaching of basic computer science in schools.
2. The data generated from the sensors can be used as a real-world dataset in math/STEM courses, e.g. deriving mean/median, analyse typical profiles, trend analysis etc.. The level of difficulty is flexible depending on the age of the student.
3. Education Packs have been created for Key Stage 2 and Key Stage 3/4 (i.e. primary and secondary schools) allowing the teachers to work directly with students on activities linked to the WeCount materials (i.e. sensors, data sets etc) or more broadly on the issues of urban mobility, environment impacts and public health.
4. The hands-on tools generated in Dublin to allow local communities to extract insights from the data can be used in math/STEM courses.
5. The collected data can raise awareness on traffic safety near the school area and can be used in awareness campaigns of the school itself, targeting both students and parents on traffic safety near schools.
6. Maybe the most promising one, is to use sensors in a larger campaign to monitor the impact of school streets. School streets are temporally closed streets (for car traffic) during opening and closing time of the school, with the objective to increase safety at the school at these particularly busy times. School streets can cause resistance from the neighbourhood as during the time period of road closure, traffic is diverted to nearby streets. A small Telraam sensor network can monitor this impact and feed an open discussion between schools and the neighbourhood, bringing together people with different interest.

Project partners UCD, M21 and UWE are trialling these activities further in the scope of WeCount and new projects (i.e. M21 in a primary school in Heusden-Zolder, Belgium and UWE in Cardiff) and are producing generic educational packs for different types of schools.

We elaborate different teaching packages, based on the national attainment targets. These teaching packages will be ready to use for the teachers. The involved schools and teachers are asked to test and evaluate the packages.

3.2.2 Target audience/market

The main users are the schools, either primary (8y or older) or secondary schools. Also higher education and universities can be target groups of this exploitation opportunity. NGO's supporting schools can operate as a facilitator.

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3.2.3 Barriers

The barriers are similar to the ones described in the previous example. The sensor technology and platform aren't "finished" as a final product for it to be used as an off-the-shelf resource in teaching. At the least, support material needs to be further developed and ideally the sensor technology is further improved.

3.2.4 Status & outlook

WeCount partners are involved in various individual projects, listed below.

Heusden-Zolder (M21): a Telraam network of 8 devices has been rolled out in Heusden-Zolder, just before summer break. In the recruitment of people, the school was acting proactive. School selected and asked to be a candidate for a Telraam by going door-by-door. During summer break, teaching packages are being translated and linked to the Belgian attainment targets for primary schools. For each final attainment target, one or more teaching sheets for are developed.

Cardiff (UWE): The Cardiff use case created a strategic link with a local UK initiative called DETI (Digital Engineering technology & Innovation)[14] to create the WeCount Schools Education Packs. The materials evolved from and builds upon the school's packs created as part of the Horizon 2020 ClairCity Project (Ref: 689289) and are currently being rolled out and promoted across schools in Cardiff and Bristol. They are designed to allow the teachers to directly deliver the content independent of the WeCount / DETI team or alternatively can also be deliver for the teachers if required. The materials focus on a number of core skills and links to the curriculum such as STEM, Geography, Arts, English etc. They are legacy tools that will be available beyond the project lifetime and cover issues such as promotion of active travel, reduction of air pollution and carbon emissions, road safety etc.

Dublin (UCD): the Dublin use case highlighted the high potential impacts of the engagement activities in schools and also in local communities with a focus in increasing active travel and improving the related infrastructure around schools. As such, these engagement activities will continue beyond the lifetime of the project to collect more evidence to support policy developments both community and local authority led with the support of academia (UCD). The data will be used by schools to support their application for active travel infrastructure and traffic calming measures as part of the "Safe to school" and "School zones" applications.

UL sees potential in retaining a low-cost sensor and platform option. This option can be used as added value for organising student workshops with local communities for architecture, urban planning and transport planning projects. The results of the workshop based on the low-cost sensor option, in combination with the urban planning analysis, can contribute to the potential client's (local municipality/town council) desire for further cooperation. In this case, the final and improved Telraam device/service can be applied successfully.

[14] https://www.uwe.ac.uk/about/values-vision-strategy/partnerships/department-partnerships/engineering-design-and-mathematics/deti

3.3 Continuous mobility monitoring in context of Covid-19

3.3.1 Scope

The traffic counting dataset collected during WeCount, spans a period of early 2020 to end 2021, a unique time period in recent human history with respect to transport, due to the impacts of COVID-19 pandemic imposed restrictions. It is well documented that the pandemic has had a huge impact on our mobility. Starting in March 2020, national and local authorities throughout Europe and the rest of the world have taken drastic measures to reduce the spread of COVID-19. These measures include the closure of schools, businesses, shops, parks, public services in varying degrees.

When including Telraam-sensors that have been active before the WeCount pilots were initiated, the Telraam dataset spans a lengthy period of "normal" traffic before the pandemic and a long period during the pandemic, including lockdowns that have been lifted and re-instated at various stringency levels.

There have been various efforts to estimate the exact effect the COVID-19 measures have had and are having on our mobility. Moreover, observations of traffic data to understand the mobility patterns have even been used to assess the level of compliance to lockdown restrictions.[15]

National authorities have used traffic counting data from inductive loops or floating car data for travel times, to approximate the level of mobility impact.[16] Even "big tech" has spent quite some effort to contribute, for example google with its open-source COVID-19 Community Mobility Reports: https://www.google.com/covid19/mobility/

WeCount's results, and more specifically the historical dataset of counting data, can contribute to this monitoring and can add various unique properties:

- WeCount's dataset not only allows monitoring of car traffic, but also active travel (cycling & pedestrians)
- The dataset uses fine-grained dataset, allowing for analysing (hyper-)localized effects
- The datasets typically covers smaller, residential roads, while existing trackers rely on fixed measuring sites which are typically only available for main roads.

There is both societal and scientific exploitation to use the WeCount dataset for this purpose

3.3.2 Target audience/market

All parties in the quadruple helix can be considered users of this exploitations case:

- **Governments** are expected to track compliance of measures and assess the epidemiological risk. Mobility data is used as a proxy for both.
- **Industry** can use the dataset as is or enrich/link with other (propriety or non-propriety) data for enhanced insights and sell as services to governmental bodies
- **Civic society** can use the open data-set to raise awareness and build trust, much in the same way as Google is explicitly keeping its COVID-19 Community Mobility Reports open-source.

[15] E.g. https://www.imperial.ac.uk/news/197835/mobile-data-shows-high-compliance-with/ & https://venturebeat.com/2020/05/01/how-mobility-data-could-help-governments-track-lockdown-compliance/
[16] E.g.: https://www.verkeerscentrum.be/studies/impact-maatregelen-coronacrisis-20202021

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- **Academia** can further expand on the initial assessments we did during the project. The analysis performed with the dataset in the scope of WeCount has only scratched the surface. Much more potential lies in detailed analysis of impact on mobility patterns. Extracting these insights, requires careful study and in depth data analysis.

3.3.3 Barriers

General acceptance of a citizen science collected dataset and lack of awareness of its existence seem to be the 2 main barriers for exploitation opportunity. On the former, to overcome this barrier, we need to demonstrate that while uncertainty levels for individual sensors can be high, this is irrelevant when using a dataset from a large number of sensors for trend-analysis.

To overcome the lack of awareness on the existence of this dataset, dissemination of results from our own preliminary analysis performed in WeCount is key.

Citizen science data is still considered an unlikely source and not always taken seriously. Time is needed to build trust and demonstrate its capabilities for societal and scientific purposes.

3.3.4 Status & outlook

At the height of the lockdown, we published a range of articles, demonstrating the potential of the WeCount dataset to track COVID-19 impacts near-real time. The most important one with a large audience was an article in "Thinking Cities magazine": https://thinking-cities.h3bconnected.com/t-cities-july-2020/leuven-environment-health-in-transport/

In the article, we argue that citizen science provides additional insights to the continuous monitoring systems in context of COVID-19.

We further pushed in a specialist magazine 'NM Magazine": https://www.nm-magazine.nl/artikelen/burgerwetenschap-legt-mobiliteitsimpact-van-corona-bloot/

We organized a brief social media campaign via Twitter with weekly updates.

Although interest and attention were raised at the time (April-July 2020), systematic adoption of WeCount data for analysis did not yet materialize. A scientific paper is still under development and will further contribute to the credibility of the dataset as a useful resource for analysis.

To demonstrate its potential, on the next page is a trend analysis of the 4 modes of traffic that are collected with the Telraam sensors in WeCount, for a timeseries from mid-March 2020 to end June 2020, normalized to an index of a normal week pre-lockdown, using the full fleet of sensors for which data was available for the whole timeseries (i.e. several 100 sensors at the time). Reduction of traffic volumes of car and heavy vehicles is apparent. A rebound in active travel, specifically cycling is observable in April. As restrictions are gradually lifted, car traffic volumes gradually increased, to a maximum of 80% of pre-lockdown levels in June 2020, where the analysis ended.

It would be worthwhile to expand on this analysis, expand the time period considered and find possible explanation for the observed trends.

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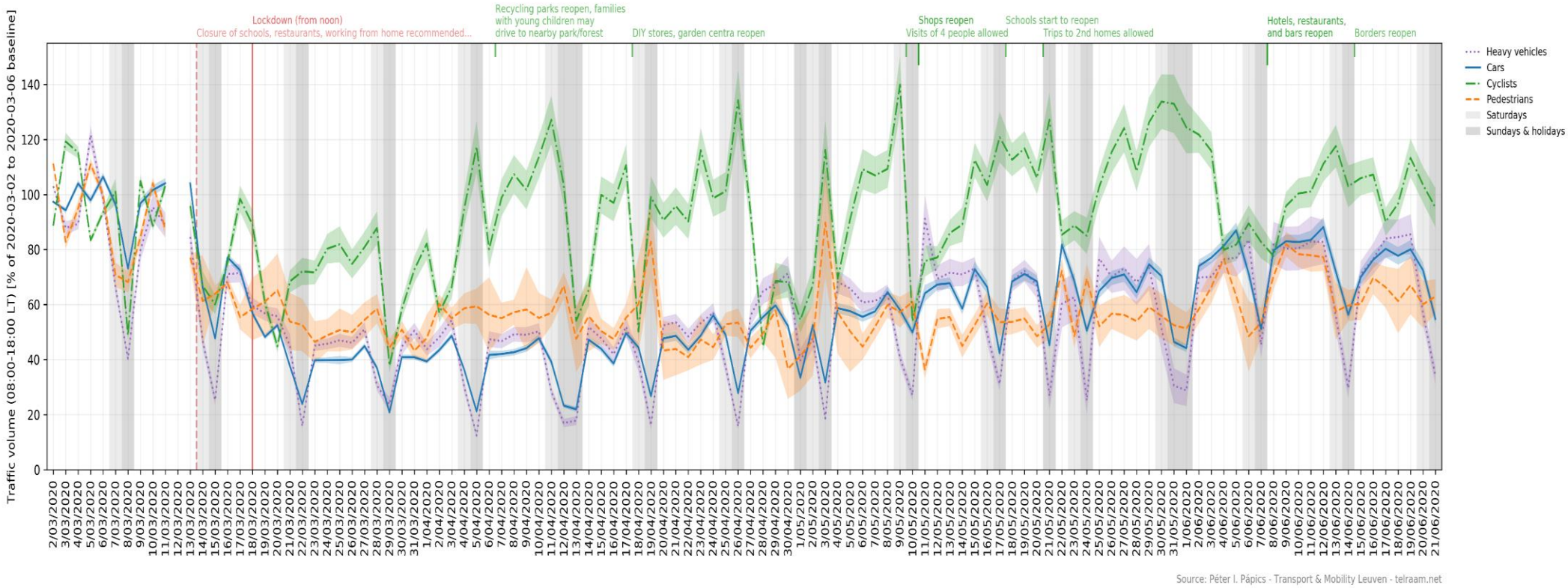

Figure 5: traffic trend analysis with Telraam during the various stages of the COVID-19 pandemic lockdown, including from sensors deployed in WeCount

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3.4 Smart-city monitoring network

3.4.1 Scope

The Telraam sensors will integrate into the existing smart city sensor networks in Dublin. The data from the sensors deployed in the Great Dublin Area (GDA) will be open to the smart city and transport sections of the four local authorities part of the GDA as part of the Smart Dublin programme.

3.4.2 Target audience/market

- Smart city and transport departments in the four local authorities part of the GDA
- Companies part of the Smart Dublin ecosystem
- Citizens in the four local authorities part of the GDA as part of institutional engagement and awareness raising activities
- Schools to support their application for active travel infrastructure and traffic calming measures as part of the "Safe to school" and "School zones" applications.

3.4.3 Barriers

The barriers are mostly related to the TRL of the technology and are similar to the ones discussed in length in section 3.1.3:

- The software is unstable requiring frequent resets by participants.
- The onboarding is complex and error-prone.
- The quality of the traffic counts.

3.4.4 Status & outlook

The activities with the smart city and transport sections of the four local authorities are progressing. UCD will showcase the potential of the sensors by providing the local authorities with some use cases and related data analysis as part of the preparation of a number of scientific publications.

The engagement activities around schools will continue beyond the lifetime of the project to collect more evidence to support policy developments both community and local authority led with the support of academia (UCD). The data will be used by schools to support their application for active travel infrastructure and traffic calming measures as part of the "Safe to school" and "School zones" applications.

UL sees development potential in the newly founded cycling city initiative in Novo mesto, which wants to focus the city development on cycling, and data analysis is an important part of this development. Another opportunity is to monitor traffic in Nova Gorica as part of the European Capital of Culture 2025. A smart city linked to data is one of the main goals of the initiative, and the potential is considerable, especially in combination with the low-cost and final Telraam variants. Activities are underway.

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4 Partner perspective

We've discussed the general exploitation potential of WeCount and explored several specific opportunities. In this section we take the perspective of the WeCount partners, explain what outputs individual partners will build on for exploitation.

4.1 Transport & Mobility Leuven NV (TML)

TML is the consortium leader of WeCount and brought in the experience of the Telraam pilot project. Transport & Mobility Leuven NV is an SME, spin-off from the university of Leuven and conducts applied research to support policy decisions. TML relies on quantitative research: modelling, statistical analyses, simulations, and prognoses. TML's core expertise is traffic modelling for policy support, relying on counting data to calibrate these models. To this end, TML typically acquires traffic counting data from external partners, using different techniques (tubes, manual counting, ANPR, floating car data,...). The observation that TML has to rely on third parties for (expensive) traffic counting data, while low cost techniques and citizen science activities are on the rise, has led to the birth of Telraam and WeCount, where TML involves citizen directly in the generation of useful traffic counting data, in an affordable way.

TML's ambitions for exploitation of WeCount's results can be summarized as the commercialization of Telraam-services as discussed in the previous section. TML's focus will be twofold:

- Focus 1: Further development of Telraam as a citizen science enabling technology via sensor development, expansion of platform features for engagement & data analysis.
- Focus 2: expanding "citizen science services" for partners by improving the Telraam management platform for third party use in a SaaS-model.

To this end, TML initiated the launch of a spin-off company "Rear Window", together with M21, the second initiating partner of Telraam.

4.2 University of the West of England (UWE)

UWE BRISTOL is one of Britain's most popular universities, with around 30,000 students and 3,500 staff. It is the largest provider of Higher Education in the South West of England, and makes a major contribution to the social and economic development of Bristol and the surrounding region.

The UWE team involved in WeCount focusses on the interlinkages between the transport / air pollution expertise combined with citizen engagement / science communication expertise from two specialist research groups, Air Quality Management Resource Centre and the Science Communication Unit, located with the Faculty of Environment and Technology.

WeCount exploitation ambitions of UWE can be summarized in the following key components:

- Peer-review scientific publications and presentations, building on
    - the sensor dataset with particular attention to correlation between Transport / AQ / Noise Data.
    - Analysis of Monitoring & Evaluation data of the participants

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- Repurpose of WeCount engagement materials for other projects in particular school's activity packs and citizen advocacy packs.
- Operate as a partner in further Telraam sensors deployment for the UK market, as soon as the technology (sensor & platform) is sufficiently robust.
- Use the findings of the Cardiff case to inform local policy e.g. Cardiff Healthy Neighborhood feasibility study and further maintain the established sensor network in Cardiff

4.3 University College Dublin (UCD)

The UCD Spatial Dynamics Lab's work lies at the intersection between cities and technologies. The Lab's goal is to build better cities through technology, innovation and citizen participation. The focus areas of the Lab are smart cities and in specific geospatial analysis and modelling of urban dynamics, which involves the development of GIS based models and decision support tools, to pre-empt the impacts resulting from the interactions between human population and the environment.

UCD's exploitation ambitions can be summarized in the following key components:

- Focus 1: include WeCount results in Environmental monitoring network in Dublin (maybe Ireland), which also includes air pollution and weather station (OPERANDUM project[17]) and maintain this network for research purposes i.e. scientific impact for monitoring and modelling
- Focus 2: Monitoring of school zone: use Telraam sensors to monitor interventions aiming to reduce speed near schools, using the engagement materials developed in WeCount

The network of sensors deployed in Dublin, linked with other sensors networks from other projects in UCD projects (such as iSCAPE[18]) provide an excellent platform to build further research in new national funding calls and Horizon Europe projects.

4.4 Ideas for Change (IFC)

Ideas for Change (IFC) is a consulting and research company (SME) that works in the fields of citizen science, innovation, business strategy and user-centred design. As part of its core business, IFC has developed frameworks to catalyse innovative solutions to social challenges through creative combinations of citizen participation, economics of open data and collaborative-distributed technologies and processes.

In WeCount, IFC oversaw of the citizen engagement approach designing the overall strategy, methods and support network for running citizen science pilots.

IFC's exploitation ambitions can be summarized in the following key components:

- IFC wants to sustain the relationships established as part of WeCount in Madrid and Barcelona and continue/extend the scope of the collaboration
- As key developers of the tools, IFC wants to apply and continuously refine the WeCount Engagement Toolkit: Publication on existing platforms, Adapt it to the new technology and Adapt it to new local contexts.

[17] https://www.operandum-project.eu/oal/ireland/
[18] https://www.iscapeproject.eu/

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- To provide "Policy masterclasses", using the WeCount results to demonstrate to policy makers that citizen science can contribute to policy development.

4.5 Mobiel 21 (M21)

Mobiel 21 is all about setting people in motion. Mobiel 21 is a non-profit organisation that inspires and activates people to deal with mobility in a sustainable and smart way. As an NGO Mobiel 21 develops and disseminates knowledge that helps organisations and policymakers to work together on effective behavioural change.

M21's exploitation ambitions can be summarized in the following key components:

- Focus 1: establish and deepen a "Telraam Community Platform", building on WeCount outputs and lessons learned. Via this Telraam Community Platform, we aim to (1), Empower the citizens in citizen science, (2) make an user-oriented mobility policy possible via a co-creative development of local mobility policy, (3) enable exchange and networking between involved citizens (4) monitor the impact of Telraam.

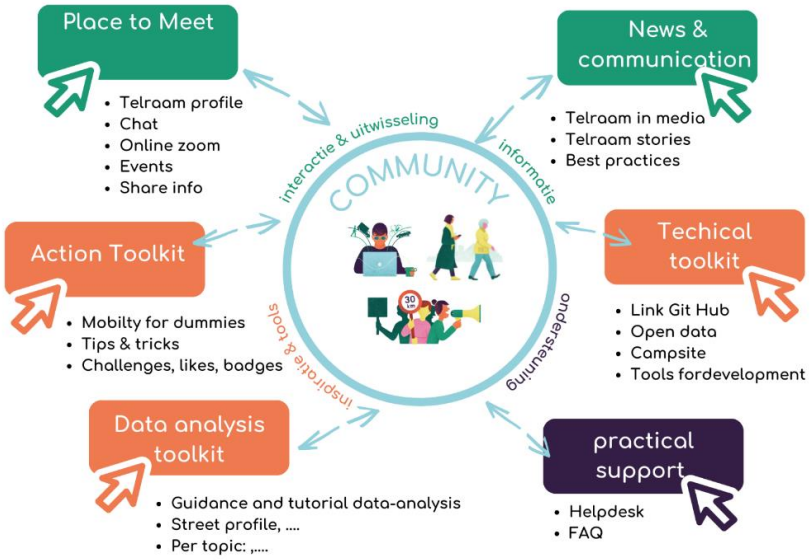

Figure 6: Telraam platform concept

- Focus 2: establish 'Raambabbel': Window chatting towards a sustainable neighbourhood, making Telraam data understandable for everyone, enabling participation by and for everyone and motivate different citizens to take action

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Figure 7: Telraam raambabbel concept

- Focus 3: projects with 'Primary' schools. Use Telraam & WeCount tools in projects with school to establish a school environment, with the involvement of children, school, parents and neighbours
- Focus 4: Mobiel 21 uses the WeCount Engagement Framework and Toolkit for other Citizen Science activities for example for PING If you care[19].

Apart from the above, M21 is also co-founder of the spin-off "Rear Window" as discussed in the section of TML

4.6 POLIS

POLIS has been a European network for dialogue and cooperation on innovative urban transport issues between cities and regions since 1989. It currently represents 90 cities, regions and transport authorities from all over Europe. POLIS' objective is to support European cities and regions to improve the quality of life of their citizens through innovative measures for sustainable urban transport. The network facilitates access to European initiatives and research programmes for its members, looking into solutions for urban and regional mobility through innovative governance approaches, in the field of health and environment, traffic management and intelligent transport systems, road safety, and social and economic access. POLIS events, publications and in-house expertise create opportunities for members to exchange experience and forge partnerships among themselves, with the industry and the research community, and to develop innovative policy-responsive transport solutions.

POLIS exploitation objectives focus on the potential of WeCount's results and methods for sustainable local mobility planning and management of its members, both European local authorities working on mobility planning, but also research institutes/centres working on the field.. The exploitation will mostly focus on:

- Focus 1: Policy Recommendations & Impact Stories: Presentation and promotion of WeCount's potential for bottom-up local policy development during exchanges with members, specific learning moments in Working Group meetings, and other events,
- Focus 2: Citizen engagement tools & methodologies as a viable policy development approach: Propose to the EC (DG MOVE) to prepare a citizen science SUMP[20] practitioners briefing, in cooperation with other citizen science/air quality projects.

[19] https://pingifyoucare.eu/

[20] Sustainable Urban Mobility Plan: https://ec.europa.eu/transport/themes/urban/urban-mobility/urban-mobility-actions/sustainable-urban_en

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4.7 University of Ljubljana (UL)

The University of Ljubljana (UL) is the oldest and largest higher education and scientific research institution in Slovenia. It contributes almost half of the research results of Slovenia. UL encourages interdisciplinary and multidisciplinary study, exchanges results of achievements in science and art with other universities and scientific research institutions, thus contributing to the Slovenian and global knowledge treasury. UL is the co-founder of the Slovenian Innovation Hub, which operates as a facilitator and promoter of development and research teams in the academic and business sphere and the Institute for Research and Innovation.

The Faculty of Architecture (FA), the unit involved as a partner in WeCount, is an educational and research institute focusing on innovative solutions related to the architecture and urbanism.

UL's exploitation ambitions can be summarized in the following key components:

- Focus 1: Work for local authorities, in particular Ljubljana, which hosted one of the WeCount pilots, to support a Telraam-network as a tool for traffic monitoring (scooters) and support local champions & citizen groups to maintain own Telraam-monitoring networks.
- Focus 2: On the technology side: Co-develop to enable LoRa connectivity. The ability to connect to a LoRaWAN network is highly desirable. The LoRaWAN specification is a Low Power, Wide Area (LPWA) networking protocol designed to wirelessly connect battery-powered "things" to Internet networks and targets key Internet-of-Things (IoT) requirements such as bidirectional communications, end-to-end security, mobility, and location services.

5 Intellectual property

This section deals with the handling of the Intellectual Property Rights (IPR) of the WeCount results. We establish what results are published as open-source resources and determine the IPR of each partner to protect the rights of the WeCount partners in any exploitation case.

Partner's exploitation perspectives and initially expressed exploitation interests are established in the previous sections. The exploitable results can have commercial/social/scientific significance and can be exploited as a stand-alone product or service or a combination of results established within the project. The IPR management followed a three-phase procedure:

Phase 1: The identification of exploitable results. This report serves as the summary of the Key Exploitable Results. Any other result, not discussed in this reports and not identified as a result, can have no claim of partner IPR and is fully open source.

Phase 2: The determination of IPR of the results. We establish, as a consortium, what results are considered open source and what results hold partner IPR. All WeCount partners, commit to a "by default" open-source mentality in the spirit of Open Science with respect to WeCount's results, to maximise the exploitation potential and not to hinder partners and third parties in their individual exploitation efforts.

We highlight in particular the WeCount sensor data which will be open via the Telraam API (https://telraam-api.net/) under a CC-BY-NC license, the citizen science engagement tools developed during the WeCount pilots, published on the WeCount Zenodo-page, and the software code of the Telraam sensor, published on GitHub (https://github.com/Telraam/Telraam-RPi)

A one-off exhaustive list of results claimed by individual partners is established prior to project completion. No further claims of IPR with respect to results from WeCount vis-à-vis other partners can be made apart from the exhaustive list that follows:

- For TML: Software code of the Telraam management platform (www.telraam.net), the database infrastructure, data processing algorithms in the back-end database and software code of the Telraam API

Phase 3: Partners exploitation ambitions. The WeCount partners state their intentions about use of the exploitable results of which this report is an extensive summary. As soon as the list of exploitable results was determined, partners express their individual contribution to background information, their individual contribution to the generated results, and finally, their intentions about each exploitable result.

The result of the above process is that background IP, as defined in the consortium agreement at the start of the project, will remain exclusive property of the contributing partner. The knowledge resulting from the results created in the project, will be shared among the partners without the obligation to compensate cost or share benefits and without the right to act on behalf of the other partners to enter into transactions with regard to any IP.

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6 Conclusion

WeCount generated a large array of exploitable results, relevant for all 4 actors in the quadruple helix. The sensor dataset, the citizen science engagement tools, the software of the hardware en software equipment used and the findings of the 5 cases all provide ample exploitation opportunities for government, industry, academia and civil society.

We have demonstrated that exploitation of the project results is ongoing in the scope of the project itself, with follow-up activity post-project already underway. In particular the commercial exploitation and further development of Telraam, but also the emerging side-project with schools and the potential of developing a "Telraam community platform" for mutual learning and interaction show great promise and are an important project legacy.

As the project enters its final stages, all partners have identified exploitation potential in line with their own mission and target audience. IPR arrangements have been established to maximize exploitation potential, societal, scientific and commercially.

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