Evaluation report

Parking referral system for bikes
City of Bruges
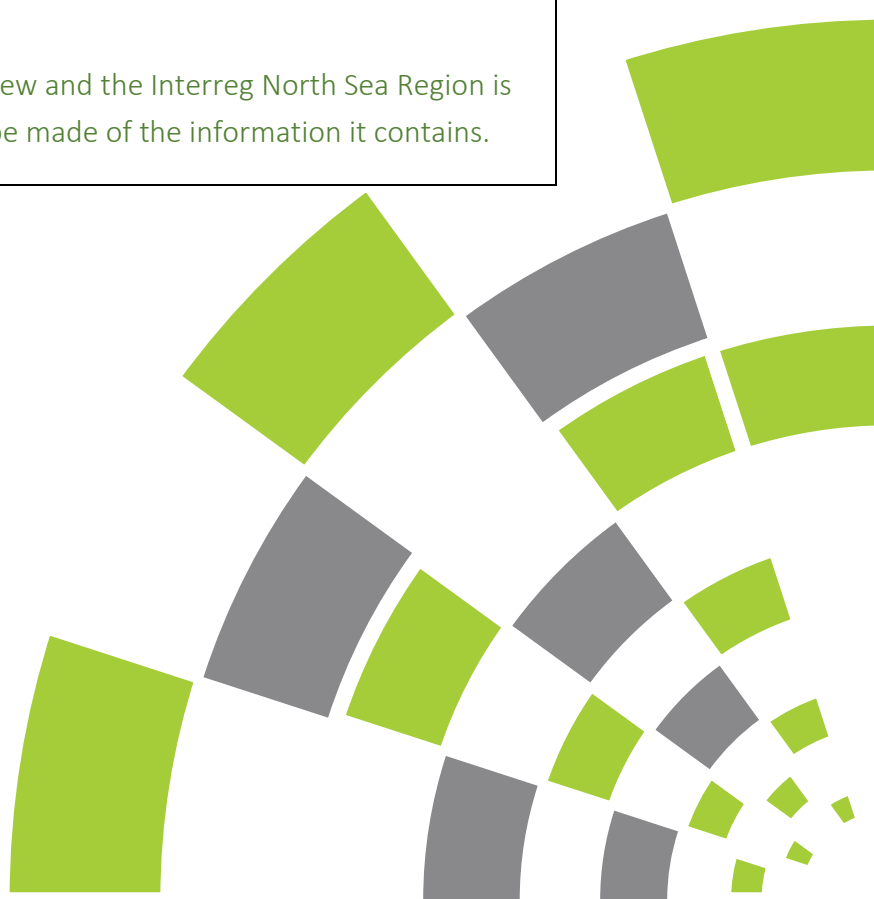
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Short description

The parking referral system for bikes (PRSB) was installed in two underground parking facilities in the centre of Bruges, i.e. at 't Zand and Concertgebouw. In the parking, the amount of parked vehicles are monitored continuously by optical sensors. Above the ground, LED screens are installed, which gives the people passing by an overview of the available parking spots in the parking facility. Since both parking facilities are close to each other, the LED screens also show the number of available spots of the other parking lot.

Type of ITS

Parking referral system
The company providing the technology is Abel Sensors. The total budget spent for the installation and maintenance of the system is situated between 75.000 euro and 100.000 euro (incl. VAT).

Timeline

In July 2021, the parking referral system for bikes was officially opened. Between the end of November 2021 and the end of January 2022 a survey among users collected data on their use and satisfaction. Data on occupancy rates and the amount of orphan bikes was collected continuously.

Hypothesis

The PRSB had three goals: (1) to help users find a parking spot faster, (2) to give the government an indication of occupancy of the parking facilities and (3) to identify the amount of orphan bikes in the parking facilities. With this pilot, the government hoped to attract more cyclists in the city and to have more bicycles parked in the underground parking facilities.

Data sources

- o Occupancy rates of the parking facilities before installation of the PRSB
- o Occupancy rates of the parking facilities once the PRSB was installed
- o Data on the amount of orphan bikes once the PRSB was installed
- o User satisfaction opinions collected via a survey
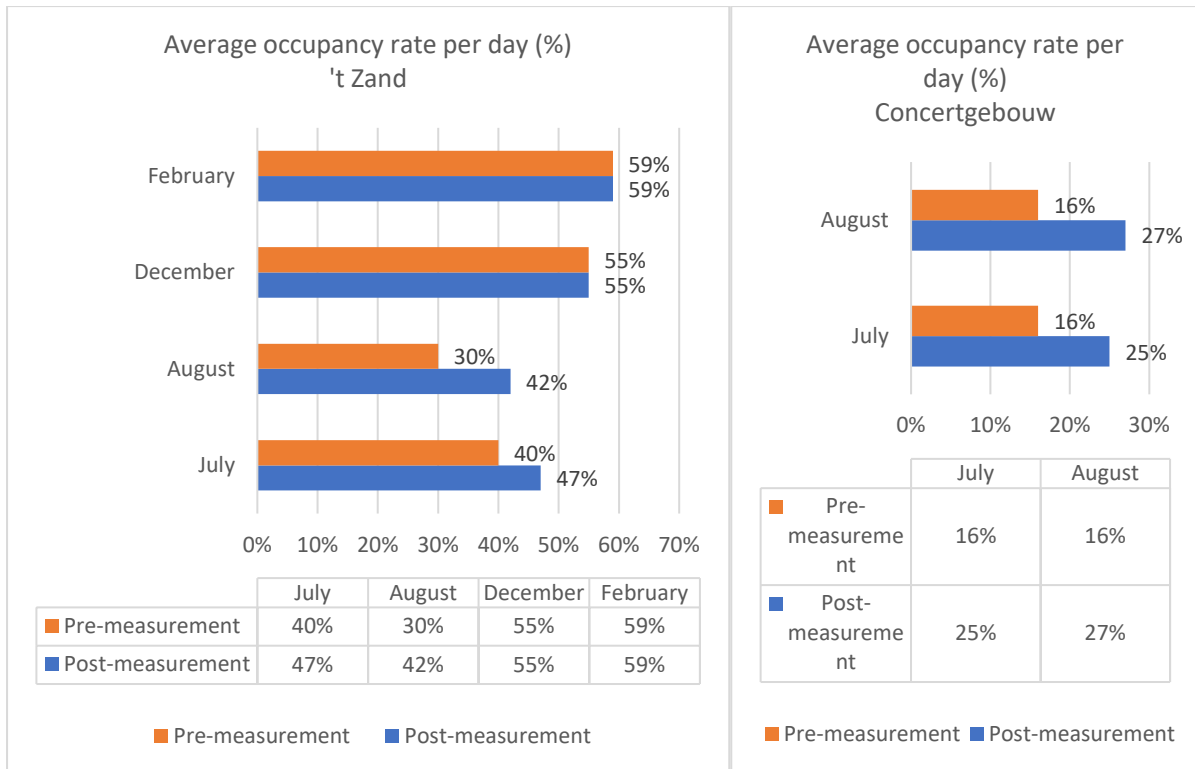- o Report of a meeting with project managers about the evaluation of the pilot

Analysis

Report of the pilot

Between July 2019 and February 2020 some limited data on the amount of parked bikes at both parking facilities ('t Zand and Concertgebouw) was collected. Generally, these data, collected before the installation of the PRSB, reveal the **occupancy rates of the parking facilities** at some selected points in time (i.e. 12 registrations during summer 2019 at 't Zand and Concertgebouw and 5 during winter 2019 at 't Zand).
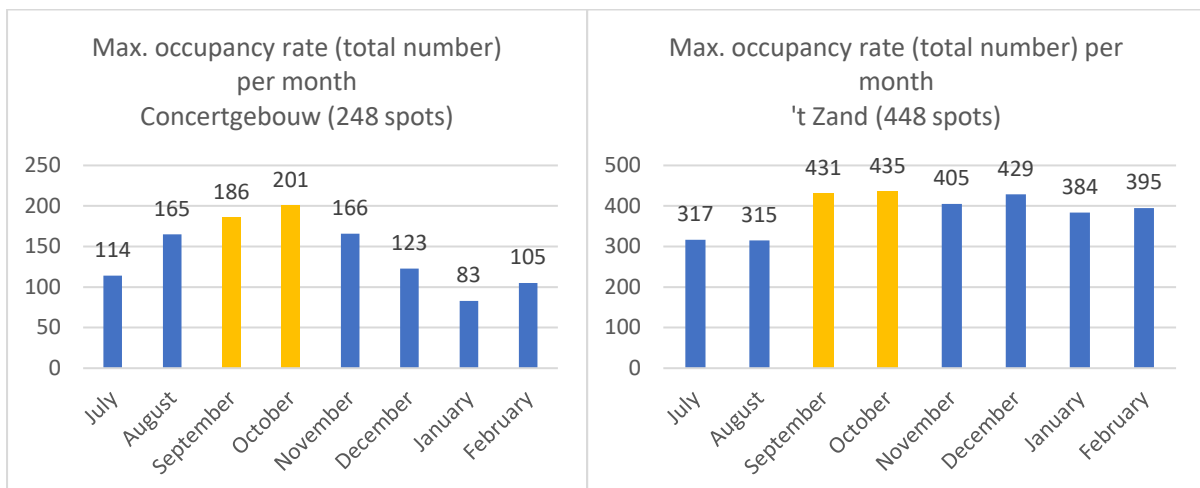
Following a complicated administrative and governmental process, the parking referral system was installed on June 23rd 2021. On the 7th of July, a press release was held and the PRSB was officially opened. From then on, cyclists in Bruges could spot the following screens at the entrance of the parking facility. Since its installation, the occupancy rates of both parking facilities are measured continuously. To make comparisons, the same time periods were selected as with the baseline measurement in 2019/2020, respectively July, August, December and February 2021 at 't Zand and July and August 2021 at Concertgebouw. However, due to the limited number of registrations in the baseline measurements and the unforeseen COVID-19 pandemic in between the two measurement periods, it is still important to be careful in drawing conclusions.


When comparing the numbers of the first (July 2019 – February 2020) and the second (July 2021 – February 2022) data collection period, the **average occupancy rate** (%) per day shows an increase at both parking facilities since the installation of the parking referral system, with the most outspoken positive trend observed at the parking facility Concertgebouw. Comparing the pre- and post-measurements at 't Zand, it is a surprise that, generally, the average occupancy rates are the highest during winter months. Of course, given the location of the parking bike facilities, we may assume that commuters who drive to work or school are on holidays in July and August which may help to declare the lower numbers during summer months.

Average occupancy rate per day (%) 't Zand

	July	August	December	February
Pre-measurement	40%	30%	55%	59%
Post-measurement	47%	42%	55%	59%

Average occupancy rate per day (%) Concertgebouw

|	July	August
Pre-measurement	16%	16%
Post-measurement	25%	27%

An overview of the average occupancy rates of the parking facilities once the PRSB was installed further shows that both underground parking facilities were used continuously, and mostly during September, and October 2021. There was a very small increase in occupancy rates during these two months, with the increase most outspoken at the parking facility Concertgebouw. An additional note here is that there might have been the influence of the weather conditions and the COVID-19 restrictions, which may have resulted in a small decrease in the use of the parking facility from November onwards.

Max. occupancy rate (total number) per month Concertgebouw (248 spots)

July	August	September	October	November	December	January	February
114	165	186	201	166	123	83	105

Max. occupancy rate (total number) per month 't Zand (448 spots)

| July	August	September	October	November	December	January	February
317	315	431	435	405	429	384	395

Overall, the average occupancy rates of the parking facilities show an interesting difference between weekdays and weekend. Using a random week in the month September as an example (13/9-19/9), the average occupancy rates show a similar trend on weekdays and in the weekend at the parking facility Concertgebouw, except on Sunday. This is different from what is observed at 't Zand. The parking facility 't Zand is mostly used on weekdays with a clear reduction during weekends.
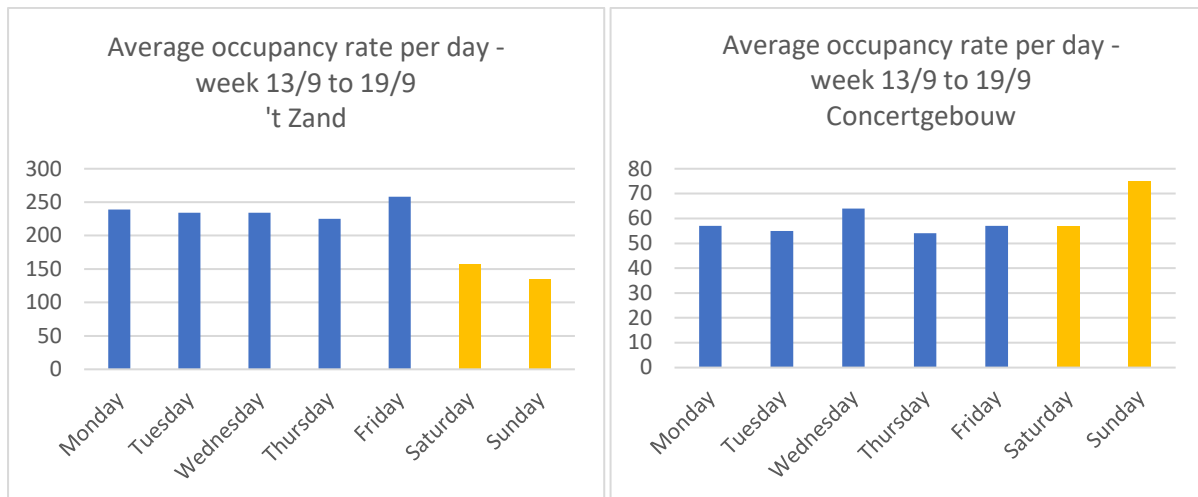

If we zoom in on the occupancy rates during one day, data shows that the overall utilization pattern of the parking facilities is the highest between 06h00 in the morning and 18h00 in the evening which may correspond with the use of the parking spots by commuters driving to work, school or to leisure activities (e.g. shopping) nearby the parking facility. Not surprisingly, the utilization patterns change on Wednesday afternoon (e.g. when school is out) and during the weekend (e.g. when visiting local cafés and restaurants or cultural activities). The average occupancy rate per time block at parking facility 't Zand is used as an illustration.
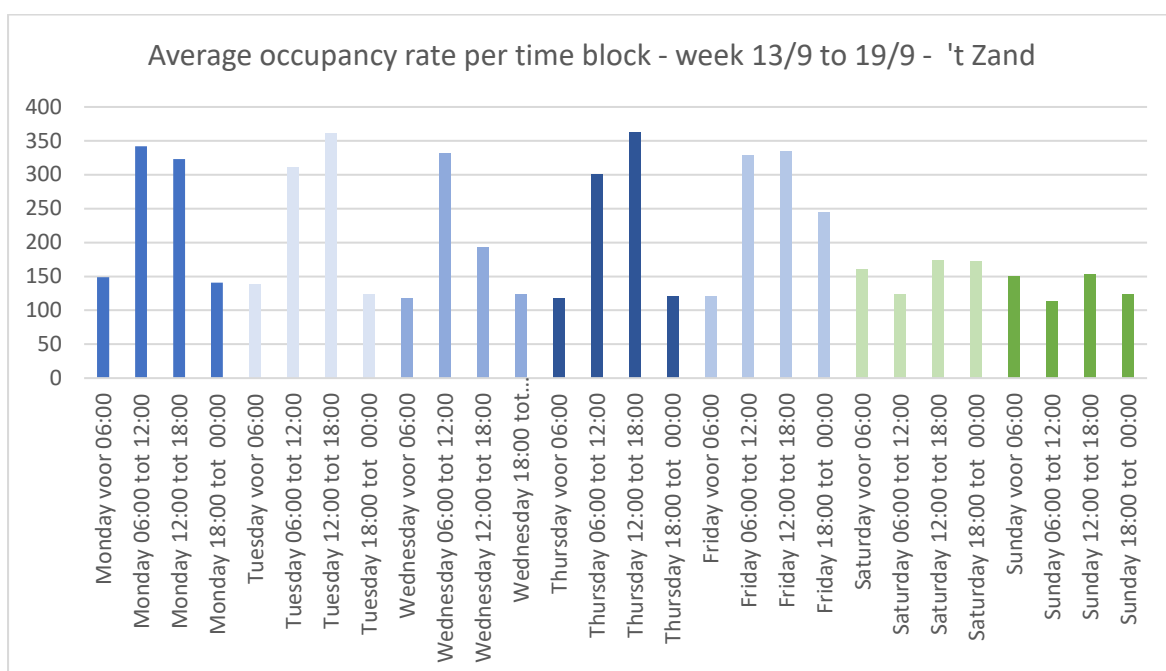
The **average storage time of the bikes** in the parking facilities has also been registered in the database. This type of data can be selected for the past week or month, or even for a selected time period. This registration makes clear that the average storage time of the bikes in both parking facilities is 1 day or, in rare cases, 2 days (which accounts for max. 1% of the cases in the illustration below).
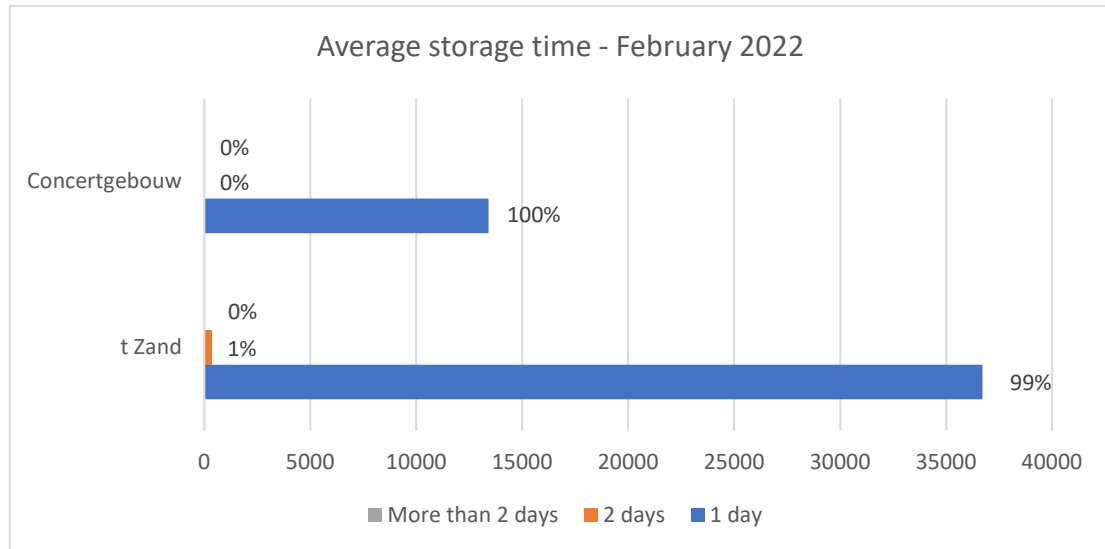
Furthermore, another benefit of the database is that real time data shows where **orphan bikes** can be found and the amount of time a particular bike is already parked in the underground parking. For instance, at any given point in time, the database displays the actual number of bikes that are parked at the facility for more than 1 week, more than 2 weeks, 3 weeks, even up to more than 1 year. This allows the city to take action and remove/recycle the orphan bikes systematically.
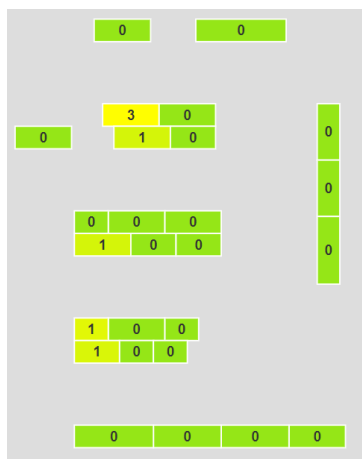
Example: 7 bikes parked more than 1 week (16/03/2022)
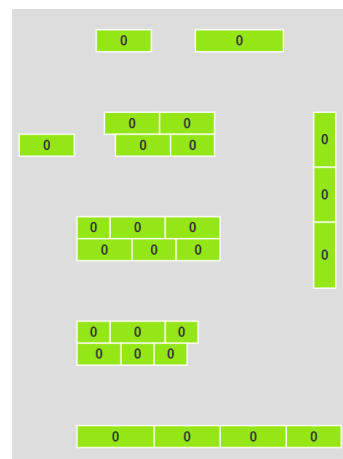
Example: 0 bikes are parked more than 2 weeks (16/03/2022)

Next to the database, data has been collected among the users of the parking facilities through a **short survey** between November 2021 and January 2022. The survey was launched online through a website link and social media on November 25th 2021. In addition, in January 2022, a poster and QR-code was used in both parking facilities to recruit more participants. This resulted in 1 extra response.

In total 44 users of the parking referral system in Bruges participated in the survey. If we look at the profile of these surveyed participants, these are mainly occasional users of the parking facilities in the city of Bruges. More than 60% of the participants indicate to use the parking facilities at 't Zand and Concertgebouw or other parking facilities at least 1 to 3 times per month. Interestingly, the LED screens installed to give the people passing by an overview of the available parking spots in the parking facility are noticed by half of the participants (21 out of 44). Furthermore, about 20% of the survey participants indicated that the LED screens are directive in their **choice of parking facility**. Also, about 66% of the survey participants agreed upon the added value of the parking referral system for bikes and even suggested to expand the system to other parking facilities by adding also more signs and LED-screens in the city centre (similar to the parking referral system for cars). The impact of the parking referral system on actual cycling behaviour seems to be limited. About 91% of the participants indicated that the system **does not change their cycling behaviour** as they will continue to cycle as often as before. Only 4 participants (9%) notified that the system actually stimulates them to cycle more often. Two of them indicated that the system could stimulate them to replace the car by bike. The open feedback question was answered by 18 participants and revealed some additional -mainly infrastructural- suggestions regarding this pilot. These participants emphasized their wish for lockers for electrical steps, and notified the slippery entrance of the parking facility, the water infiltration at the parking facility, the bad functioning of the escalator, or the too restricted opening hours of the facilities.

Experiences project managers

A meeting with the project manager took place in December 2021. The project manager reacted very positive and satisfied with the pilot.

According to the project manager, the pilot definitely stimulated the **visibility of the (underground) parking** spots for bikes in the city centre. For instance, more people seemed to notice the underground parking spots and its entrance because of the big LED screens at the entrance of the parking facility. It is not clear to him to what extent the presentation of the occupancy rates on these screens also played a role. Nevertheless, based on the occupancy rates and some observations of an employee of the bicycle rent service located at the underground parking spot Concertgebouw, the project manager assumed that the **PRSB actually increases the use of this underground parking spot**. At the same time, another advantage of the pilot is that it allowed to **identify the amount of orphan bikes** quite easily. The available real-time data gives the government a clear indication of how many and where the orphan bikes are situated, so that they can handle the orphaned bikes and can work on how to recycle them. Before, dealing with the orphan bikes was a rather time-consuming job: after putting tags on bikes, it was required to run a follow-up after a few weeks in order to start the recycling process.

Finally, the pilot also stimulated discussions with the NMBS (National Railway Company of Belgium) about the implementation of a similar or more extensive (e.g. with indications of free or taken spots in the parking) system at the railway station in Bruges.

The project manager also shared some challenges/problems related to the parking referral system for bikes (PRSB). First of all, the implementation of the system faced some technical, practical issues such as lacking internet connection, problems with the registration of bikes, etc. However, the main issue with this pilot was related to administrative, bureaucratic processes. The selection of and the decision about the best provider of the parking referral system has been considered quite complex and time-consuming. In pursuing a provider, it is imperative that a project manager clearly outlines expectations in the tender. To do so, it is recommended to have enough technical expertise, to have an overview of what is new in the technology field and to inform himself about the experiences of other cities with similar technology. Also, the process of marking each bid against the agreed evaluation matrix takes plenty of time, as well as the process of getting a final approvement of the pilot by the city council.

Overall, the project manager is satisfied with this pilot and its results. He recognised the added value of this pilot and will definitely recommend this type of ITS to others.

Conclusions

Apart from the technical and administrative pitfalls, it is quite clear that the pilot has been successful in several ways. This type of intervention clearly supports the visibility of the two underground parking facilities in the city center. From the *users' perspective*, the added value of the system in creating more visibility is recognized and an extension to other parking facilities is even recommended. According to 20% of the survey participants, the choice of the parking facility is actually influenced by these LED screens. Also, if we look at the overall objectives of the pilot, we may assume that the parking referral system for bikes (PRSB) with LED-screens results in a higher usage of the parking facilities. Some observations as well as the average occupancy rate (%) per day showed an increase at both parking facilities. Overall, taking into account pre- and post-measurements, the number of users increased with about 6,5% which may be an indication of higher cycling use. Also, two of the survey participants indicated that the system actually stimulates them to replace the car by bike. This may be a small but relevant indication of a 'modal shift' meaning that a certain reduction of CO_2 emission can be expected.

For *policy-makers*, the parking referral system has an added value in making it easier to detect orphan bikes and to collect permanent information about the occupancy rate of the parking facilities. As such, the collected data may e.g. help to develop targeted actions to the users of the PRSB, as it is known when each parking facility is used the most (e.g. weekdays versus weekend).

To conclude, in the light of the BITS-project goals[1], we may conclude that the main goals of this pilot are reached partially. While it is clearly more convenient for cyclists to use the parking, the PRSB does not really impact on the take-up of cycling nor on the cycling motivations of the current users of the parking referral system.

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[1] an increase in cycling use with 10% and a reduction of CO_2 emission with 9% within target groups due to the implementation of ITS solutions