

Evaluation report

Traffic flow for bike couriers
City of Zwolle

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Short description

The Schwung app was launched in the city of Zwolle. This app interacts with the traffic lights and gives priority to cyclists. In this pilot “The Schwung app for bike couriers”, by an extension of the existing app, absolute priority is given to bike couriers with the aim to make them move faster through the city and to allow them to deliver more packages in the same amount of time. In this BITS pilot, the app tracks ones route and interacts with the traffic lights when the cyclist is approaching the traffic lights. The app extension for couriers allows couriers to be seen at 60 meters when approaching the traffic light. The app for regular cyclist allows to be seen at 20 meters. The light automatically turns green when the bike courier arrives which is not necessarily the case for regular cyclists. By giving absolute priority to the couriers, the aim is to attract more cargo bikes to the inner city and less delivery vans.

Type of ITS

Schwung app which interacts with traffic lights. Pilot with added courier priority done with seven traffic light. All traffic lights in Zwolle have regular bike priority.

Timeline

In Spring 2022 the Schwung app was launched in the city of Zwolle. At seven intersections a bicycle priority module has also been added. This bicycle priority has been made available for a pilot exclusively to Cycloon bicycle couriers. Using the Schwung app, bicycle couriers can get a priority intervention at the intersections shown on the map below. The couriers were contacted and started cycling with the (regular) cyclist priority app, but without the added courier priority in the beginning of April. After a week of testing, the bike couriers were given the added bike courier priority and this continuously 24 hours 7 days per week. After a month of cycling with priority, the bike couriers were asked to participate in a survey asking for their experiences.

FIGURE 1: MAP OF ZWOLLE WITH THE SEVEN INTERSECTIONS CONNECTED TO THE SCHWUNG APP FOR BIKE COURIERS



Source: Memo Zwolle

Hypothesis

The hypothesis is that the use of the app allows bike couriers to save time when delivering packages and by this the overall hypothesis is that by giving cargo bikes priority, clean city logistics will be promoted and more cargo bikes and less freight vehicles will be entering the (inner) city.

Data sources

To evaluate the pilot, the impact of giving priority to couriers is analysed by answering three questions:

1. How many times do couriers pass by the traffic lights and ask for priority?
2. What is the effect for couriers and other traffic participants?
3. How satisfied are the couriers about the app?

To answer these questions, three types of data have been collected:

1. Statistics from Schwung app
2. User experiences of the couriers (survey, n=19)
3. Report of a meeting with the project managers about the evaluation of the pilot

Analysis

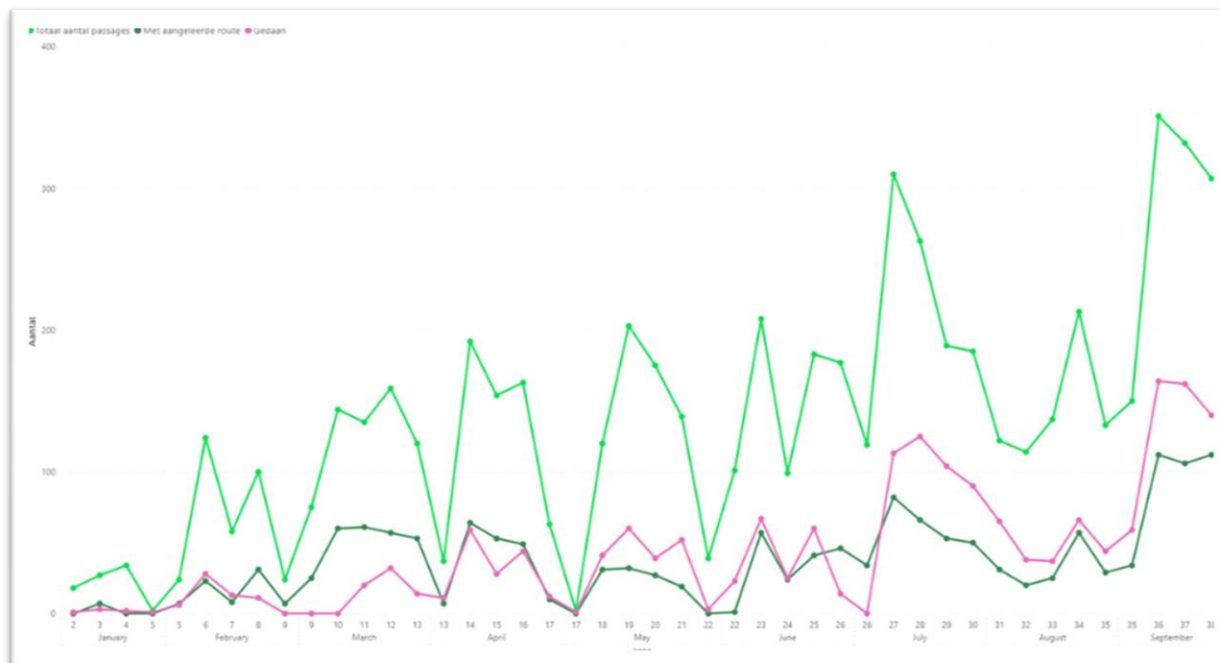
Three data sources

1. Statistics from the Schwung app: increase of overall number of passages and requests for green light

Schwung was installed on all crossroads with bicycle traffic during the months July and August. On seven crossroads the courier bicycle priority module was installed and given exclusively to the couriers of Cycloon, a courier company specialized in clean and green deliveries. Overall, 30 bike couriers participated to the pilot. Bicycle couriers who want to make use of the priority intervention should download the Schwung app. Subsequently, in consultation with Cycloon and the municipality of Zwolle, some (mobile) telephone numbers were added to the system. These telephone numbers are necessary to distinguish between normal Schwung users (any citizen in Zwolle) and Schwung users who are entitled to a priority intervention (Cycloon bike couriers). The management of this group of telephone numbers lies with the municipality of Zwolle. In week 37 and 38 of the Schwung pilot full priority has been given to bicycle couriers. This ensures that approaching bicycle couriers can cut off the other traffic at an intersection and therefore get green faster themselves. The table beneath shows results of the pre- and post-intervention. Measurements show that the overall number of passages recorded by the Schwung apps increased strongly during week 37 and 38 of the pilot. In the table beneath we notice that the number of passages more than doubled when comparing between pre- and postintervention. While in week 36 (before the intervention) 150 passages has been registered by the apps, in week 37 it concerns 332. The same is true for the explicit green requests. While in week 36 around 80 green requests has been registered, in week 37 there are 162. Based on these data we can conclude that the intervention does have a positive impact on the use of the Schwung app in general and of the extension in particular. We note that the BITS-survey shows that for the citizens of Zwolle there is a positive link between the presence of an app that limits waiting time at traffic lights on

the one hand and the motivation to cycle on the other. An increase in use of the Schwung app therefore can be in a certain way a proxy for an increase in cyclists. We come back to this.

FIGURE 2: INCREASING NUMBER OF SCHWUNG USERS DURING THE WEEKS OF THE INTERVENTION



The light green line=number of overall Schwung users

The fuchsia line=number of green requests by bike couriers

The dark green line=number of Schwung users that follow an automatic taught cycling route

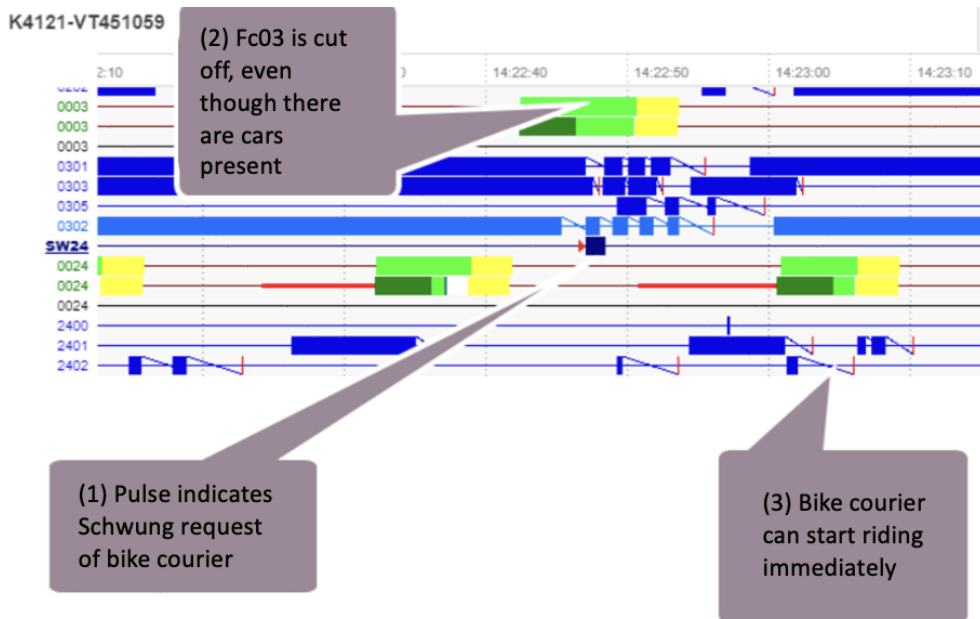
Source: Memo Zwolle

2. Statistics from Schwung app: Time advantage couriers

The pilot phase shows that bicycle couriers at traffic lights do have an advantage when Schwung is used. The number of bicycle couriers who used Schwung in the pilot is, however, too small to address the other effects on for example the overall traffic flow.

We can look at an example of an analysis described in the Memo Zwolle concerning the time that is saved by the bike courier using the Schwung app. On the 14th of September around 14:22 a Schwung bicycle courier intervention has been made on K4121 Hortensiastraat-Marsweg. The route of the bicycle courier goes over fc24 from the Hortensialaan to the Leo Majorlaan. During the procedure, fc03 (left in the direction of the Leo Marjoorlaan to the Marsweg) is green. This green phase is cut off to make room for the approaching bicycle courier. In the figure below you can see that the Schwung bicycle courier makes an application during the green of fc03 (1). At the time of the application, the green of fc03 will be limited even though there is still traffic (2). The bicycle courier can drive straight through. In this example, there is no waiting time for the bicycle courier. At K4121 Hortensiastraat-Marsweg, the usual waiting time for a cyclist without Schwung is around 10 to 20 seconds. **A bicycle courier must wait considerably less and, in this case, gains 10 to 20 seconds.**

FIGURE 3: TRAFFIC SITUATION AT INTERSECTION CONNECTED TO THE SCHWUNG APP FOR BIKE COURIERS



Source: Memo Zwolle

However, the Memo also mentions the effect on the other traffic users. In this example, car traffic on fc03 is truncated. The usual green time of fc03 is around 15 seconds. Due to the intervention of the bicycle courier, this is only 8 seconds. Therefore, fewer vehicles drive off and some vehicles remain standing (oversaturation).

Based on this overall analysis of various similar cases, however no major reasons (e.g. potential unwanted side effects) were found to disable the priority of bicycle couriers. It was therefore decided by the project manager to keep the functionality active beyond the pilot phase. **As the number of bicycle couriers will increase in the future, the effect of the intervention on other traffic will become clearer. It is therefore important to monitor further developments.**

3. Survey: do the couriers appreciate the app?

After a month of cycling with priority, the couriers were asked to participate to a survey asking about their experiences. Ultimately 19 couriers participated to the survey. Eight questions have been asked to evaluate the functioning and appreciation of the app. A first question concerns how satisfied, on a scale of 0 to 10, the couriers are with the app. We find an average appreciation of 6,7. On the second question concerning the user friendliness of the app we find an average score of 7,4. On a third question on the added value of the app to have a nice bicycle ride the average score is 6,4. Overall, the appreciation of the app is not overwhelming but still largely more positive than negative. The fourth and fifth question ask about whether the courier notices a difference and whether the app helps delivering packages faster. **Half of the couriers does not notice a difference and says the app does not add to decrease the delivery time.** The other half is rather positive and notices a very small still significant difference. A large majority of couriers would however recommend the app. Only five couriers answer negatively or neutral on this second last question. The reasons for still recommending the app concerns the fact that it is a good idea and that “alle beetjes helpen” or in English “all small bits help”. When asked about suggestions to improve the app they argue:

- that more traffic lights should be connected to the app,
- that it would be interesting to hear a feedback sound when passing a traffic light that is connected to the app,
- to get access to a map of the traffic lights that are connected,
- to get an overview at the end of the ride of the time saved by using the app.

Overall, all the couriers find it an excellent idea but say that there is still a lot of room for improvement.

The app could be especially interesting in busier and complex city environments. Zwolle is a very cycling friendly city in which the app maybe does not make a huge difference. However, when more traffic lights could be connected, it would possibly help to choose for cargo bikes instead of motorised vehicles. Based on this limited sample, we may conclude that there is limited but positive effect of the system on speed for the couriers.

Impact

While in itself the pilot can be evaluated moderately positive based on the effects on speed and flow of the bike couriers during participation in traffic, it was unclear what the effects were on other traffic participants. Also, its potential to increase green/clean bike courier traffic in the city at the expense of more polluting deliveries remains unclear and may depend on the extension of the pilot to other courier companies (currently only one company has access to the system).

No direct effect on cycling uptake or CO₂ reduction can be assessed because the app users were already cycling, but eventually bike couriers might get a competitive advantage compared to other couriers with delivery vans, which might lead to a (small) shift from delivery vans to bike couriers. It should be mentioned that, based on the BITS-survey, the majority of the citizens of Zwolle (54.6%) indicate that an app that decreases the waiting time as a result of stop lights would probably of definitely encourage them to cycle more. **The introduction of the Schwung app** – oriented at the general population – **might as such have a more profound effect on some overall BITS goals like uptake on cycling and CO₂ reduction, however this observation lies beyond the scope of this specific pilot.**

Experiences project managers

While it was planned to collect objective data on waiting times for couriers and other traffic participants to obtain a deeper and objective understanding of the pilot effects, the amount of Schwung bike couriers was not sufficiently high to evaluate whether a significant change occurred in waiting times. Once more use is made of the bicycle courier functionality, the effects on other traffic will also become clear. Depending on the outcomes, the form of priority can be adjusted.

Those that used the app had a high level of priority at het traffic controller. If in future research the amount of Schwung couriers will increase the level of priority at the traffic controllers must be recalculated to make sure other road users and their stops/waiting time will not significantly decline.

The Schwung app with the bike messenger functionality must be activated before departure. Unlike the regular Schwung app, 'Schwung bicycle couriers' is activated only when a manual action is taken. This additional action that must be made by Schwung bicycle couriers to activate the Schwung bicycle courier functionality is a barrier on usage. Indeed, as a function of user convenience, it cannot be intended that the Schwung bicycle couriers app must be opened and activated for every bike trip. Moreover, the app automatically shuts down if the cyclist stops for a long time. With a courier service, there is a chance these stops will occur. To avoid this, research needs to be done on the functionality of the app and when it can

turn itself on. If bicycle couriers have to continuously re-activate the app, this is a barrier that may inhibit the use of the app.

Conclusions

The swung-app pilot can be considered a successful experiment and this for at least three reasons. The statistics collected by the app show that the pilot strongly coincides with an increased use of the Schwung app. The number of passages registered by the apps more than doubled. Secondly, the different analyses of the waiting time at the seven intersections during the pilot phase, shows that the bike couriers objectively gain time using the Schwung app. Other traffic users have to wait longer which possibly can lead to congestion problems and possibly an increase of CO₂. However, the scale of the intervention was too small to make conclusions about the impact on the overall traffic flow in Zwolle. Thirdly, looking at the survey administered among the bike couriers we notice that a large majority of all couriers would recommend the use of the app. Notwithstanding, they also say that there is still a lot of room for improvement. More traffic lights should be connected to the app to make a real difference. The motivation to make use of cargo bikes could further be supported by integrating more feedback in the app as for example an overview of the time saved due to the app. Especially in busy and complex traffic environments the swung-app for bike couriers could give a competitive advantages to bike couriers compared to motorized vehicles and thereby in the end reduce CO₂.

Lessons learned

A first lesson learned concerns the scale that a pilot must reach to convince people of the impact it has. The potential of the Schwung app is strongly underscored by its users. However, they equally claim that to really have an impact, more and preferably all traffic lights should be connected to the app. To have an impact on the motivation to choose for a cargo bike over a motorized vehicle, a critical level of participating intersections should be reached. Almost half of the bike couriers state that they did not notice any difference. The time that is gained by activating the app must reach to a point that is really experienced by the couriers. The bike couriers give the suggestion to add a summary of the amount of time saved to the Schwung app. A second lesson learned has to do with perverse effects that can emerge when doing an intervention in favour of cyclists. Giving priority to bike couriers to move faster through the traffic, can lead to congestion problems and thereby to an increase of CO₂ at certain locations in the city. These possible negative effects should also be included when designing the pilot. However at the current moment there is not enough data to see more clearly on this subject. Again we could say that the scale of the pilot is too small. It does not allow to discuss the impact of the pilot on the overall traffic flow in Zwolle. Therefore, a future monitoring of possible negative effects is important.

Bibliography

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