D5.3 Description of the on-road driving trials for identifying safety tolerance zones and the performance of in-vehicle interventions.

Interview with Laurie Brown

Work package 5 elaborates on the experiments carried out in the i-DREAMS project. Earlier we already talked with Graham Hancox (Loughborough University) about best practices in simulator and field trials which could serve as a basis for our own i-DREAMS tests (D5.1 interview). And Bart De Vos (DriveSimSolutions) explained to us how we approached the simulator trials in deliverable interview D5.2. In this D5.3 interview, we will put the spotlight on the field trials and we will talk with Laurie Brown (Loughborough University) about what the goal was of these field trials and how we approached them.

Hello Laurie, nice to meet you. You were one of the authors of D5.3 that elaborated on the field trials. Why exactly did we carry out those field trials in our i-DREAMS project?

Laurie: *"Field trials are actually part of the product development cycle and they are usually done in the final stages. In many cases, field trials are the first time the technology is handed over to people outside of the development team. In our case, we already extensively tested the i-DREAMS equipment in the simulator and we carried out pilot tests in the field in each of the five participating countries. So, before we rolled out the actual field trials, we already received feedback on the technology. Rolling it out over the different test sites across Europe (UK, Belgium, Germany, Greece and Portugal) and focusing on both private and professional drivers for different transport modes, actually meant that we were taking it up a notch. It gave us the potential to generate large quantities of data. Via big-data analysis we have the opportunity to strengthen the case of the technology by improving it where possible."*

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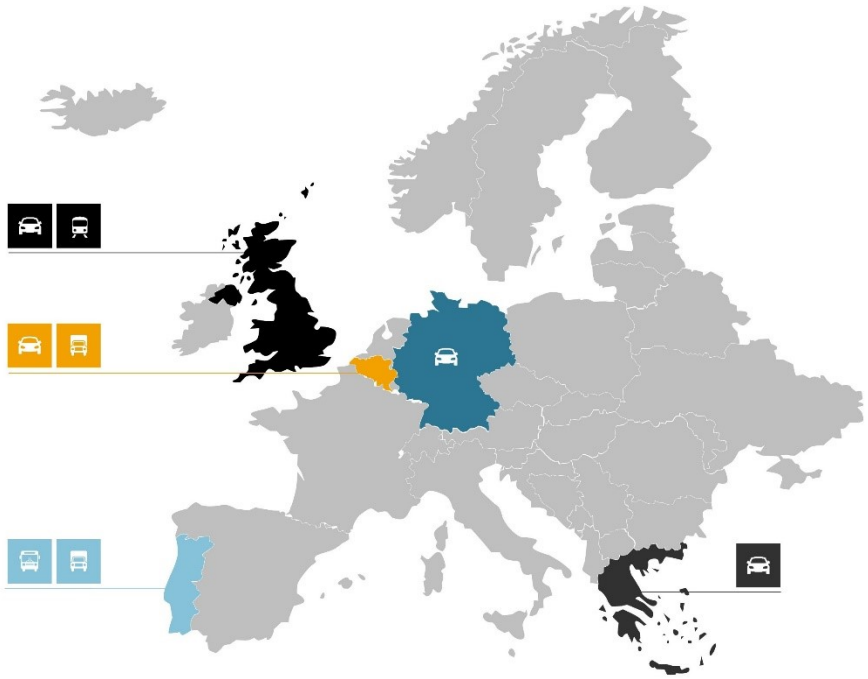

Figure 1: Field trials in 5 European countries

Testing technology in traffic in 4 different modes and in 5 different countries sounds a bit like a mission impossible to me. How do you start with this?

Laurie: *"It is not easy indeed, but not impossible either. Let me first explain in general the different steps. To increase the chance to end up with scientifically sound results, we harmonised the process over the test sites as much as possible. This deliverable is actually the result of that effort, giving clear guidelines for all test sites to follow. Of course, we first start with recruitment of participants in each country. We tried to streamline that approach and formulated inclusion criteria to make sure that participants met the necessary criteria. Then there is the installation of the equipment and the briefing of the participants, the follow-up of the participants during the 18-weeks of the actual trials, the de-installation and the debriefing. Throughout this process it is of course the goal to learn as much as possible on how the systems works, if it does what we want it to do (improve driver safety), how the drivers experience it, what problems they encounter, what reflections they have about it, etc. To make sure the results from the different test sites can be compared, we developed some supporting material like an example timeline, an outline of procedures (e.g. for how to handle participant drop-out, incentivisation, etc.), a detailed guidebook which serves as a reference manual for field trial planning and a user manual for participants. All of this is described in deliverable D5.3."*

I will start at the beginning, with the recruitment. How do you search for the correct participants?

Laurie: *"Since we were a bit worried that we couldn't find enough participants, we did not put all our eggs in one basket, but we explored multiple strategies. Some partners had their own recruitment database with lists of possible participants from other experiments who had previously indicated an interest in participating in other studies as well. Of course, there were also our personal contacts, such as relatives, acquaintances, friends, colleagues who volunteered to participate, although we tried to keep the number of participants via this route as low as possible. We also launched recruitment campaigns to find participants. On the one hand we aimed for driver and vehicle organisations that operate as a platform to exchange information and interests of their members. In that respect, we addressed representatives of local driver or vehicle organisations to help us spread our call for participants. On the other hand, we addressed the general media via press releases,*

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but also social media via short recruitment videos and posters to present our project and our need for participants. In Belgium for example that appeared to be a very successful recruitment strategy. In 24 hours after appearing in national media, over 300 people expressed their interest in participating. Similarly, for Loughborough in the UK, advertising in just the local online newspaper resulted in over 150 people expressing their interest. Vehicle fleets, like buses and trucks[1], were recruited differently. Recruitment there was primarily based on contacts with companies, where fleet managers would recruit their drivers on our behalf."

You explained earlier that participants were required to meet specific inclusion criteria. What were those criteria?

Laurie: *"I will explain it for the car drivers to illustrate it. Car drivers are tested in Belgium, Germany, the UK and Greece. About 50 in each country. Participant selection criteria across these four car trials were consistent. We aimed for a spread of participants across 4 age groups with a minimum of 40% per gender split and a driving experience of about 10.000 km/year across different road types (urban, rural, motorway). At least 20% of mileage should be covered in each type. For commercial vehicle testing (bus and truck) there was also a consistent but less stringent requirement, which was having at least 6 months of driving experience. Participants were also required to have an Android smartphone (version 6 or higher) to run the i-DREAMS app. But later we were able drop this criterium, since our technicians also developed an iOS version of the app. Furthermore, we also took practicalities in mind. We tried to recruit participants within a 1-hour travel radius from the field trial base to ease the (de)installations and to solve technical problems as efficiently as possible. And lastly, we selected a bit on vehicle brands and types, as some brands and types are easier to install than others. CardioID provided a list of preferential cars and we took that into account as much as possible. Although we tried to harmonise everything as much as possible over the test sites, there were some differences here and there. One of those differences was the payment of incentives. It was agreed to not incentivize professional drivers, since their participation would occur during working hours. Private drivers did receive some form of incentive. For most countries, every private car driver received €250 after completing the full trajectory: €50 at the start, €75 halfway through and €125 after deinstallation of the vehicle and after completion of the exit survey."*

Then after the recruitment, what was the next step?

Laurie: *"After distributing our call for participants, recruitment was actually not done yet. Once drivers expressed an interest in participating, they received an initial screening questionnaire, to check for compliance with the inclusion criteria. Where we needed, a more detailed follow-up survey or a follow-up phone call allowed for a final selection decision to be made. The selected participants where then allocated into two groups."*

[1] Eventually, field trials were not carried out for train and tram, but participants were recruited for rail simulator trials and focus groups.

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Why two groups?

Laurie: *"For most countries, we actually carried out the trials in two waves. In a first wave, about 25 drivers started their participation. So first, we installed their cars, then they started their 18 weeks of driving around with the i-DREAMS technology. Throughout those 18 weeks we tried to collect as much information as possible in the form of driving data, but also user input and feedback via surveys. After 18 weeks the technology was deinstalled from the vehicles, checked and repaired where necessary and then reinstalled again in the vehicles of the second wave participants. Mostly, it was a matter of being practical. We simply did not have enough budget to foresee enough technology for each participant to start at the same time. In that respect, working in two waves was also a nice solution and also gave us the opportunity to assess drivers during more varied seasonal conditions. Furthermore, there was the opportunity to learn from the first wave of participants, resolve any issues, and make small adjustments to the technology or trial protocols where needed."*

Ok, then about the actual participation. How was that organised?

Laurie: *"Each participant was invited to come to the field trial base to have the technology installed. Installations took about 3 hours and were executed by certified Mobileye installers. During those 3 hours, participants were briefed about what was to be expected throughout their participation, administrative formalities were handled and the entry questionnaire was completed by the participant. After that the trial started.*

As mentioned before, the entire experiment took 18 weeks. Those 18 weeks were cut into four phases. In phase 1, we monitored driving behaviour via our technology during 4 weeks, without any form of intervention. This way a baseline measurement of driving behaviour was obtained, which can be compared to driving behaviour after receiving interventions. In phase 2, which again took 4 weeks, we introduced the real-time interventions, offered via the in-vehicle warning system when unsafe traffic situations or behaviours were detected. After that, in phase 3, we added the first set of post-trip intervention features again during 4 weeks. The goal of these post-trip features was to provide virtual coaching to the drivers via the smartphone app to further improve driving performances. Then in the last 6 weeks, which is phase 4, another set of post-trip gamification app features was launched. The difference in phase 4 lies in the fact that drivers are rewarded or receive benefits when they keep applying safe driving behaviour. Research has indicated that gamification features extend user retention up to 10 weeks (or more) and lead to a more robust and sustainable behavioural change.

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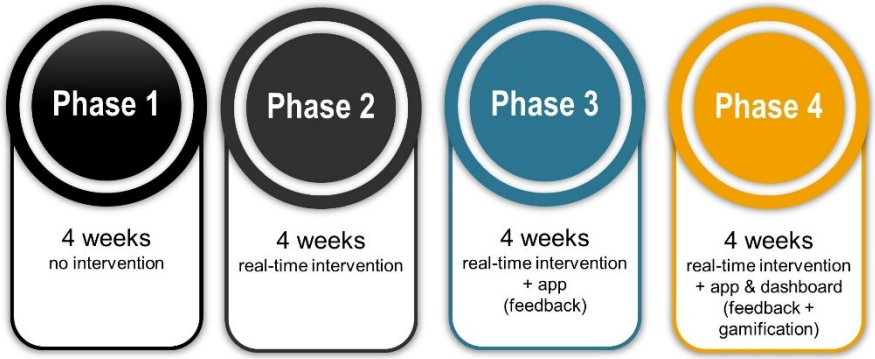

Figure 2: Four phases of the field trials

Throughout these 18 weeks, pro-active communication from the trial team to the participants was planned, preparing them for each phase transition and informing them on what is to be expected.

After these 18 weeks, participants are invited again to the field trial base to have the technology deinstalled. Participants were debriefed, again administrative formalities were handled and the exit questionnaire was completed, which automatically triggered the payment of the participation incentive."

Were there participants that dropped out along the way?

Laurie: *"There were a few, but the drop-out rate was actually very low for this type of trial. Reasons for dropping out for example was someone who found a new job. He had to return his company car to his employer, so we had to deinstall the technology sooner than originally planned."*

Where these participants replaced?

Laurie: *"It depended on when they dropped out. A project-wide drop-out strategy was devised for cars. This was required as there are multiple phases to the trial as well as multiple waves. It therefore would not always be possible to replace a participant for logistical reasons, as doing so could have a knock-on effect on the installation timing for the second group and overall trial period running length. We therefore decided that participants who have driven three weeks or more during the real-time intervention phase (thus phase 2) or anytime thereafter and who drop out, will not be replaced. In the latter case, enough data will be considered to have been collected to do meaningful analyses. Participants that drop out sooner, so before the start of week 8, will be replaced. However, in practice this strategy was not really needed since there was so little drop-out, but it was a necessary part of the trial planning to have appropriate protocols ready"*

This brings me to my last question. How did you collect all the feedback from the drivers throughout the trials?

Laurie: *"We did that in several ways. Firstly of course via the different questionnaires. There were the obligatory entry and exit questionnaires, but during the 18 weeks of participation, we also launched a couple of very short user experience surveys. Besides that, we also had a help desk at each test site. Participants could call or email that helpdesk to report issues or problems or to ask questions. The helpdesk tried to provide answers to emails within 48 hours and reported each issue (and each solution) in a logbook.*

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Of course, if there was an urgent issue that required immediate attention, participants were instructed to call and they would be dealt with straight away Solving issues that were reported along the way, was of course very important. This required a well organised communication plan among all the partners involved. In order to share learning and experiences among field trial partners, regular online meetings were organised. And since most of the technical issues required assistance from CardioID to solve them, a centralised web back-office platform was developed. The back-office system allowed the creation of a ticket for each gateway requiring technical support, should any problem arise during the experiment. CardioID could then follow up on each issue individually."

Ok Laurie, this really provided a good insight in how the i-DREAMS field trials are approached and handled. Thank you!

Edith Donders

i-DREAMS DisCom manager

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Deliverable 5.3 is part of WP5:

4-stage, 5-country experiment

Download the report here

i-DREAMER in the spotlight

LAURIE BROWN

Graduated as *mathematician* in *2012*

Employed at *Loughborough University* since *2012*

Passionate about *reading, everything Disney, and my cats.*

Tasks in i-DREAMS: *Co-ordination of the car field trial at Loughborough. Lead on Deliverable 7.2 analysing the effectiveness of the real-time and post-trip interventions, and responsible for analysis of UK data for this WP.*