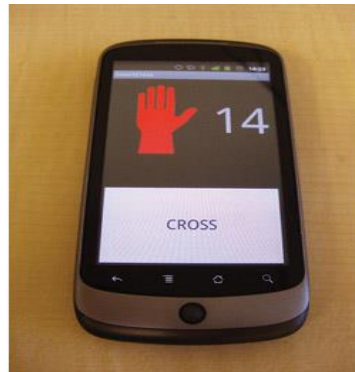




ACCESSIBLE PEDESTRIAN CROSSING SOLUTION

(Innovative pedestrian traffic signal crossing device)



SUMMARY

D3.2 GOOD PRACTICE CASE STUDY REPORT

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1. Background

Barcelona is active in tendering services and equipment to deliver the key actions contained in its Sustainable Urban Mobility Plan (SUMP)¹. This plan contains operational SUMP objectives in terms of mode share targets; for walking, a 10% increase is sought. Improving the accessibility of pedestrian crossings at road junctions (some 1,700 junctions are signal-controlled) is key to the implementation of this strategy. Like most of Europe, Barcelona has an ageing population and improving walking will also contribute to the SUMP goals of a more equitable mobility for all road users.



Barcelona City Council wishes to increase the safety and access of all pedestrians through the introduction of an innovative Pedestrian Crossing Signal (PCS) solution. These systems usually take the form of digital devices for communicating to pedestrians crossing at signal-controlled crossings via a “count down” of the seconds remaining for the pedestrian to cross.

The TRANSFORM project – which seeks to test and find ways of procuring innovation - was seen to be an appropriate means for examining new solutions for the following reasons:

- Demand articulated at the local (district) level by scheme developers and policy-makers
- There has been a lack of standardization of this topic at Pan-European level²

¹More information about the SUMP can be found at: <http://mobilitat.ajuntament.barcelona.cat/en>.

²None of the (142) standards published by CEN TC278 concern traffic signals and none of the 50 current work topics address Pedestrian Countdown Signals:

http://standards.cen.eu/dyn/www/f?p=204:22:0:::FSP_ORG_ID:6259&cs=1EA16FFFE1883E02CD366E9E7EADFA6F7

- Barcelona participates on traffic signal standards Working Group at national level – but little progress has been made to guide local initiatives to implement PCS.
- Some small PCS trials had been undertaken but had so far resulted in no further action
- Europe's cities have thus been slower to uptake this technology than their counterparts in North America, where initial trials have led to standards development
- Whilst the pilots that have so far been realized by European cities show positive impacts they also identify issues that still need to be addressed.
- Scope for introduction of innovative solutions in support of Smart City and policy outcomes related to modal shift
- Leadership support from the Director of Mobility Services

2. New approach to procurement

Forward Commitment Procurement (FCP) is a model which involves providing the market with advance information of future needs in outcome terms, early engagement and an agreement to launch a tendering procedure in the future to purchase a product or service that does not currently exist, at a specified future date provided it can be delivered to agreed performance levels and costs. FCP was used as a model for this pilot innovation procurement project.

2.1 Background research and understanding the current situation

The first step in the project was to undertake a review of how technology has been used to facilitate pedestrian crossing in different cities, in Europe and wider afield. This led to an initial appreciation of the complexity of the issues, for example in terms of resolving the different priorities afforded to different road users. It also identified other cities who could potentially be interested in a solution.

Canadian and US developments of pedestrian countdown crossings include standards that support a solution where the countdown time only concerns the clearance (UK “blackout”) phase. The review looked to understand how EU cities were responding to such initiatives and to alternatives that the technology offers (showing countdowns of the total green time, and even the red “don’t cross” time).

Audible signals, such as beeps or a rapid tick are also being incorporated at crossings in order to help blind or partially sighted pedestrians. San Francisco (US) has one of the most comprehensive Accessible Pedestrian Signal policies in the country, and has installed more than 1,000 audible devices, for example. Currently, little is documented about how audible signals are integrated with visual countdown displays.

The initial review also uncovered a trial of analogue display solution in Berlin. For various reasons (short clearance times and dynamic signal junction control, etc.), Barcelona wanted to explore an open invitation to innovation that could be open to this type of solution.



Berlin analogic display trial involving signal supply company SWARCO

In understanding the current situation, a number of internal meetings were held bringing together stakeholders such as the Traffic Signals Manager and policy-makers who had requested the implementation of a countdown system. This helped to articulate the unmet need and to identify procedural concerns regarding the new procurement approach.

The review stage specifically identified concerns arising from initial trials with PCS (about possible incompatibility of digital solutions for junctions operating under dynamic control)

This [review-consultation-networking work](#) enabled the project team to move forward with confidence as we understood the unmet need and could define with key stakeholders the PCS requirement.

One issue that arose was that a stakeholder meeting with end users within the frame of the ‘Mobility Pact’ (the established approach for consulting with mobility user representatives) had to be cancelled due to certain restrictions imposed on the Municipality in advance of elections. The team addressed this by involving user representatives at the market consultation workshop.

2.2 Identifying the Unmet Need and defining the Requirement

With the support of the TRANSFORM consortium this motivation was articulated as an **unmet need** for an innovative pedestrian road crossing information system that provides *all* pedestrians with accurate information on the time available to cross the road *from the start of the pedestrian crossing phase* without compromising traffic flow or the safety of any group of road user.

A first approach to defining the requirements to be met by the solution was also articulated thus:

- increases the safety and confidence of pedestrians when crossing roads
- is usable and accessible to all pedestrians
- will integrate seamlessly with current traffic control systems
- does not have a negative impact on traffic flow and punctuality of public transport
- Is resource and energy efficient
- conforms and is compliant with the relevant UNE standards
- has the potential for EU and global adoption
- is cost effective.

The team were careful to articulate the unmet need accurately and clearly and present the requirement in terms of outcomes (i.e. without presupposing the solution).

2.3 Market and stakeholder engagement

Once the unmet need had been defined and agreed internally by the key stakeholders, including the Director of Mobility Services and Traffic Signal Manager, the team prepared the ground to communicate this message to the market.

The team agreed to adopt three main market communication tools:

- publication of a PIN (Prior Information Notice)
- publication of a market sounding prospectus and
- holding a market-sounding workshop.

In March 2015, Barcelona Municipality published a Prior Information Notice (PIN) in the Official Journal of the European Union³ to provide advance notice and launch a period of market-

³<http://ted.europa.eu/udl?uri=TED:NOTICE:107738-2015:TEXT:EN:HTML>

sounding and consultation in advance of the formal tender process. The facilitator also invested time to identify and notify potential suppliers, wider supply chain, other cities and local stakeholders that the PIN had been published. The publication of the PIN was a new process and had only been used once before to launch market engagement process. This lack of familiarity led to some delays in obtaining the final go ahead.

The market sounding prospectus was written based upon the defined unmet need and an expansion of the initial literature review (exploiting the contacts and feedback from the networking and written responses received). The workshop was an opportunity for suppliers from all parts of the supply chain to find out more about the Municipality's initiative, the requirements, and to contribute to discussions regarding the finalisation of the specification and the procurement strategy. This dialogue aims to overcome the typical situation where suppliers respond to customer demand and where customers buy what is available (rather than asking for what they need) – a situation which leads to “more of the same”, without taking stock of potential opportunities for innovation.

In preparing the workshop, it was clear that we were targeting 2 main stakeholders (ITS integrator companies and traffic signal manufacturers) plus four complementary groups:

- research institutions
- technology developers (in this case organization involved in developing acoustic solutions based on Smartphone and derived technologies)
- neighbour municipalities
- local interest groups



LHS: TRANSFORM Market-sounding workshop “pack”: prospectus, survey form and participants register.



RHS: Mobility Services Director leading workshop

Important features of the workshop included a presentation from the Director of Mobility services, demonstrating the level of leadership and political support for the initiative, providing an opportunity for a representative of the Mobility Pact, in this case a representative of the interest group WALK, to present their perspective, and the opportunity for cross-fertilisation of ideas through small group workshop session.

There are two aspects of this process that are worth highlighting. The first concerns the effort that is required between internal departments of the local authority (in this case Barcelona Municipality) in order to publish a PIN. Procurement departments are not accustomed to the new approach of innovation procurement, and it takes time and effort for the department that has the unmet need to achieve the collaboration required to undertake this step of the procedure.

The second consideration is that various city networks can help to diffuse the initiative. This might be a simple forwarding of the link to the publication to their mailing database. In our

case the more pro-active networks – POLIS was particularly active in this case – presented the information to their Intelligent Transport Systems (ITS) working group. Contacts with London, Aalborg and Ghent were made in this way, and this helped when we developed options for the workshop programme.

A summary report of the workshop was produced which, together with further research and study, has clarified the technical findings. This, in turn, has helped to analyse the potential approaches possible, will be used to develop the Forward Plan (leading to tender contracting).

It was generally appreciated that this market-sounding initiative addresses a mobility topic that – historically – has not been given the attention / priority that it merits. A first reflection about the workshop participation (some 30 persons in total) was that a considerable number of ITS integrators attended; although only one signal manufacturer attended (of three that were invited) some of the participating ITS integrators have signal manufacturing origins. The involvement of the complementary stakeholders was highly beneficial. For example, neighbour municipalities contributed with their experiences of using PCS solutions and in giving experiences about the difficulties of catering for pedestrians at signal junctions operating under dynamic control (notably for tram priority).

The preparatory work to analyze the situation and define unmet need, engage with internal and external stakeholders and the background research the subject ahead of market sounding process generated a lot of new knowledge. This together with the outcomes of the sounding workshop and the 14 written replies that were obtained from the market sounding have created a firm foundation for a coherent and effective forward plan capable of delivering the desired outcomes. For example, there is a growing appreciation that a countdown solution that brings benefits to pedestrians can bring important benefits at a considerable number of junctions and that the signals operations policy needs to accommodate this along with other actions such as the dynamic junction control that is delivering improved priority to buses. Moreover, the project has helped to bring the different actions aimed at improving pedestrian crossing conditions into focus.

3. Findings from the market engagement process

A number of issues or barriers were uncovered through the process. These are summarised in this section along with the approach that is being proposed to proceed to procurement.

Analogue displays - No clear evidence of a promising solution with added value.

The market-sounding sought proposals for innovative solutions that might provide analogue displays as alternatives to digital countdown developments. Whilst the initial search suggested responses might be forthcoming, reservations were expressed at the workshop (both about the clutter that additional analogue information might lead to confusion and possibly create new safety risks - and regarding the visibility of analogue displays that get progressively smaller). The extent of digital deployment (case evidence from London and Terrassa) suggests that other cities would not be willing to adopt an analogue solution (re: Unmet Need).

A lack of EU and national standards

Europe has not included PCS in its standardization activity, and this oversight has probably been a barrier hindering PCS uptake. EU signals conform to various national standards in any case, such that national-level activities are needed. Pilots led by leading EU cities – London being a clear case in point⁴ - are analysed in the Case Study Report where it is noted that significant collaboration with national regulatory bodies is required to trial optimal designs that do not conform to existing regulations. In Spain signal regulations concerning the meaning of the clearance phase are under review, but there are also other barriers to consider.

A need for local re-configuration of clearance times

Barcelona does not currently operate clearance times based on crossing distances using standard walking speeds. Shorter clearance times are operated, and this is not conducive to implementing PCS; local re-configuration of signal phases based on standard walking speeds is a necessary pre-condition to prepare for PCS deployment.

PCS solutions induce traffic (especially two-wheelers) to initiate early starts

The pilot study in London reported “some evidence that vehicles started to move forward slightly in advance of the green phase, in particular motorcycles and cyclists”. As deployment has progressed TfL now consider there is no evidence that motorists (in particular P2Ws) are using the PCATS to predict when they will receive a green signal.

PCS solutions that work with dynamic signal control

Finding PCS solutions that work with dynamic signal control giving real-time priority for high-occupancy vehicles is one of the objectives of this study. Bus priority is also a key action of its SUMP, and Barcelona seeks a solution that will work at all its junctions in the same way. The only way London’s PCS can be affected by bus priority is that the whole pedestrian phase might be delayed (once demand was registered via push button) such that pedestrians have to wait longer than usual for the green man. PCS pedestrian stage are unaltered once started (i.e. always run to its full time, 6 seconds green man followed by whatever the countdown duration is (based on crossing distance)). In Barcelona signal cycle times are fixed for overall green-wave coordination. A junction under dynamic control, operating bus priority, has to find the extended green time for the bus within the times of the other phases in the same cycle. It would appear that this could be done by separating the bus and PCS pedestrian phases, such that a detected bus only affects traffic and conventional pedestrian phases – or a decision must be taken to negate the bus priority (as can happen with this form of control).

Multi-media Integration for pedestrians’ varied needs

PCS deployment caters for the “standard pedestrian” (even if those with special needs also appreciate it) whilst smart-phones offer the potential to offer individualized solutions that cater for pedestrians having “non-standard” crossing needs; the Smartphone display could show different information (derived-but-customized from the normalized reference dataset)

⁴As of end of June 2015 TfL has over 2300 individual PCATS units on-street at over 400 sites (source: TfL)

to that of the crossing signal. Other media (acoustic, tactile) could also be exploited. Hand-held devices, and headsets with linked to mobile apps, are being developed and tested⁵. All of this will become more feasible once PCS technology is more-widely deployed.

4. Learning

Appropriate **countdown solutions for fixed-time signal plans are available** that have far-side kerb displays. There is a strong case for realising a trial aimed at integrating the PCS technology at some of (the many) Barcelona's junctions that operate under fixed-time signal plans. There are clear concerns as to how PCS will work with junctions operating under dynamic control – but it does appear the signals engineering options can deliver workable solutions in other cities.

Traffic engineering work will be required in order to select appropriate pilot sites and to prepare signal plans which would present pedestrians with improved crossing information. It is foreseen that a countdown pilot would feature as a complementary signal to the intermittent greenman that is currently used to communicate the clearance phase in Spain⁶. Research activity would aim to assess users' comprehension and rating of the displayed information.

Adopting a Forward Commitment Procurement (FCP) approach, Barcelona Municipality has realised activities that are enabling it to be pro-active with respect to adopting technologies that can make pedestrian crossings more accessible. Essentially, the need is unchanged, however the manner in which it is to be interpreted can now be more-precisely specified.

Considerable effort is required between internal departments of a local authority in order to publish a PIN. Procurement departments are not accustomed to the new approach of innovation procurement, and it takes time and effort for the department that has the unmet need (that is not responsible for general procurement) to achieve the collaboration required to undertake this step of the procedure.

A second consideration is that various city networks can help to diffuse the PIN initiative. In our case the most pro-active network was POLIS who not only mailed their database but also presented the information to their Intelligent Transport Systems (ITS) working group. Contacts with London, Aalborg and Ghent were made in this way; this helped when we developed options for the workshop programme, and in developing the Case Study Report.

The definition and identification stage and workshop preparation created a firm foundation for the market sounding process which generated valuable insights and a lot of new knowledge;

Both ITS integrators and signal manufacturers attended the workshop. Also, the involvement of the complementary stakeholders was highly beneficial. For example, neighbouring municipalities contributed with their experiences of using PCS solutions and in giving experiences about the difficulties of catering for pedestrians at signal junctions operating under dynamic control (notably for tram priority).

⁵The Case Study Report notes the work of the PASBlue and Cities Unlocked Projects.

⁶At the workshop it was learnt that Terrassa has implemented countdown at pedestrian-actuated signalled crossings.

With regard to the wider adoption of innovation procurement processes, the value of the process can be clearly seen in moving from a limited scope and perspective to one that embraces the bigger picture and delivers what is needed for the City in the longer term. It is also clear that with increased familiarity and training the FCP approach would provide a valuable tool for enabling innovation procurement in the Municipality.

5. Forward Plan

The Municipality used a PIN to seek PCS solutions working under dynamic signal control. It is noted that it is active in developing solutions for bus priority at signals within the frame of the actions of its SUMP (notably its work on Bus Lane Intermittent Priority), and that integration of PCS could form part of such solutions development.

PCS developments serving junctions operating under fixed-time signal control merit further action. It is proposed to focus a trial addressing local adaptation needs where a PCS solution works alongside existing signal regulations.

A Forward Plan will be developed for a solution that adds a PCS device in a way that provides complementary information to existing national traffic regulations. From the knowledge obtained during the market-sounding it is possible to contact suppliers involved in cases like London, Terrassa and Valencia so as to establish with reasonable precision a budget for such a next step (of pilot implementation). The Forward Plan will take into account the features of innovation procurement good practice such as wider market development, i.e. identifying other cities with the same or similar needs. This will be facilitated for example through the Polis and TRANSFORM networks. The means of enabling trials to be embedded within a procurement process will also be debated internally and it is anticipated that procurement approaches that support innovation such as use of outcome specifications, requiring progressive improvements within contracts, consideration of service rather than supply contracts and competitive dialogue would be considered.

The idea is for a pilot to be realized in 2016 at 4 to 6 sites (some of these being crossings of 10-20m width, and some being 20+m wide) for at least 3 months, with an assessment activity able to demonstrate: level of user acceptance, level of incidences of pedestrian / vehicle conflict. With respect to site selection, it is recommended that at least one of the sites where acoustic signals have been demonstrated be included in the PCS demonstration, and consideration be given to trialing PCS at a junction with bus-priority (where these phases can be separated). It is recommended that it be an objective of the Forward Plan to decide if this can be undertaken within the limits of standard contracting procedures.