Chapter 20
Using a GPS Active Logger to Implement Travel Behaviour Change Programs

Italo Meloni
University of Cagliari, Italy

Benedetta Sanjust
University of Cagliari, Italy

ABSTRACT
Implementing behavioural strategies aimed at reducing car use represents one of the most topical challenges for current transport research. Most of the current Voluntary Travel Behaviour Change (VTBC) programs are moving towards ICT devices for data collection. The advantages of using ICT have been recognized for implementing behavioural strategies and VTBC in order to improve observation of pre- and post-implementation behaviour. This chapter describes the implications of a personal Active Logger (AL) implemented by CRiMM (University of Cagliari, Italy) for the collection of individual activity-travel patterns before and after a VTBC implementation. In particular, VTBC data collected through an active tracking system (GPS tracking + real time activity diary completion) are compared with data collected using a hybrid tracking system (GPS-only system + deferred activity-travel patterns). The results show that, despite the greater effort involved in real time compilation, the information collected by the active logger is more in line with VTBC requirements and expectations.

INTRODUCTION
Implementing behavioural strategies, aimed at reducing individuals’ need to drive, represents one of the most topical challenges for current transport research (Handy & Krizek, 2009). For this purpose, a number of Voluntary Travel Behaviour Change (VTBC) programs have been implemented in different countries, including Australia, UK, Japan, Germany, and Austria (Richter et al., 2011). So far, VTCB policies have resulted in a 5 to 15% reduction in kilometres travelled (Brög et al., 2009), but in order to also facilitate the shift towards sustainable modes some aspects of the VTBC still need particular attention (Stopher et al., 2009). Since travel behaviour is linked to individual daily
activities, it is important to develop methods and tools for data collection that are able to detect the entire sequence of daily activities and trips. In particular, spatial and temporal attributes as well as quantitative behavioural aspects (activity times, waiting times, chosen routes, etc.) need to be incorporated into data collection.

Among others, Stopher (2005) identifies three main guidelines to improve VTBC programs, all related to the reliability of the available data. First, activity-travel patterns must be measured before each policy implementation, so that personalized travel plans can be designed for each participant according to his/her specific needs; second, activity-travel patterns should preferably be measured also after policy implementation, in order to establish whether a change has occurred and its effects on personal activity-travel patterns; third, the high variability involved in daily activity-travel patterns - and especially in the context of soft measures - needs to be captured, collecting data for repeated observations (Stopher, 2005).

From these guidelines, some behavioural aspects emerge that are important for collecting data to be used for VTBC implementation. The first concerns the personalization of measures: by collecting activity patterns it is possible to devise personalized solutions. The personalized quantitative feedback is in fact utilized to describe the benefits on a personal level associated with the proposed solution, acting as a lever for behaviour change. Additionally, personalized measures make participants more responsible as to the importance of their contribution (active support). Moreover, monitoring post-implementation behaviour, besides being valuable for evaluating the effectiveness of the VTBC measure, also strengthens the measure itself, encouraging participants to continue their commitment.

In this context, the availability of new technologies (GPS, Internet, Smartphones) has made it possible to collect repeated data, of higher quality and at lower costs (Meloni et al., 2011a), and GPS data have been conveniently employed in Mobility Management and behavioural strategies in general (Brög et al., 2009; Socialdata Australia, 2006a; 2007a). Generally speaking, the use of GPS technology came about through a passive tracking system that requires a post-processing phase implemented on well defined GIS to reconstruct activity-travel patterns. The most recent active loggers, smartphones or PADs with dedicated applications, enable users to record their activities and trips in real time together with the relative attributes. Another type of data collection, the so-called Hybrid, consists of a passive system combined with the compilation of a classical activity-travel diary a posteriori (Schönfelder et al., 2002).

Though there exists general consensus that the use of GPS technologies can have positive effects on the implementation quality and evaluation of VTBC programs compared to the traditional survey methods (reduced burden on participants, tracking active travel and public transport), in spite of the technological hitches that may rise (GPS signal not found, battery life, etc.) (Stopher, et al., 2009), the implications of using an active rather than a hybrid system are still not clear.

The present work contributes to the state of art by providing a comparison of active vs. hybrid methods and their implications on VTBC implementation. Specifically, the aim of this work is to compare the accuracy of the two methods in collecting daily activity-travel patterns for the creation of personalized travel plans (PTP). The active logger employed in this study is a smartphone with incorporated software application that combines GPS data with real time activity-travel attributes (Meloni et al., 2011a). The hybrid alternative has been created asking participants to use the same device in GPS-only mode, accompanied by a telephone interview (activity-travel data) at the end of the day. The active logger offers a number of advantages namely (1) comprehensive collection of daily activity-travel patterns and related attributes, (2) GPS tracking of daily routes and (3) evaluation of transport policy effects aimed