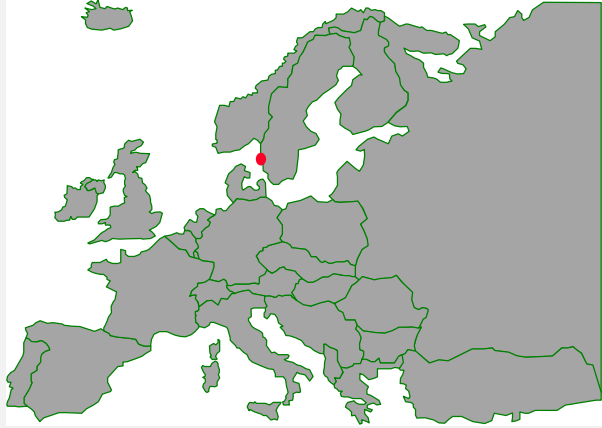


DEMONSTRATION SITE:	GOTHENBURG/SWEDEN 
NAME OF THE DEMONSTRATION PROJECT (CASE STUDY):	“FLEXROUTES”
DURATION OF THE PROJECT:	01.01.1996 – 31.12.1997
NAME OF THE TAP PROJECT:	SAMPO (SYSTEM FOR ADVANCED MANAGEMENT OF PUBLIC TRANSPORT OPERATIONS)

URBAN PROFILE

Gothenburg is the second largest town in Sweden, situated on the West Coast, between Oslo and Copenhagen, with approximately 500 000 inhabitants.

The project’s demonstration site is an urban district, called Högsbo, which has about 16.000 inhabitants, mostly living in high rise buildings. This district has the highest proportion of elderly in Gothenburg (almost a third are 65 or older).

ABSTRACT

The importance of DRT (Demand Responsive Transport) services is relevant especially for those citizens who are living in areas where the offer of proper conventional public transport services is decreasing or not available at all. DRT are also highly demanded by specific user categories, such as disabled or elderly people.

The key objective of the SAMPO Project was to increase the opportunities for mobility of citizens in rural and urban areas, through the provision of integrated DRT services. Another objective was to find new ways for disabled and elderly people, and other with barriers to travel, to participate in their communities’ activities, by meeting their needs through flexible methods of transport.

In the SAMPO demonstration project “FlexRoutes” in Gothenburg a new DRT travel concept with flexible services routes has been successfully tested in combination with new telematics applications for more efficient booking and better optimisation of resources.

Advanced Transport Telematics (ATT) tools, as used in the SAMPO Project, can support integrated, multi-modal passenger transport services and opens up opportunities to use transport resources more efficiently. The ATT products adopted in this project have been used to implement basic functional requirements of DRT like: booking management, travel planning and scheduling, service monitoring, communication management, passenger support, user dialogue management.

By introducing the Automated Trip Notification and Automated Booking functions, Sweden has made big steps towards improving the economic viability of DRT. A great majority of elderly

“FLEXROUTES”

and STS entitled users have a positive opinion about the FlexRoute service which gives them a true possibility to be active.

BACKGROUND AND OBJECTIVES

Over a third of the European people are living in rural or small town areas, one fifth are elderly or mobility impaired. Mainly in rural areas public transport services are weak, because the demand is not strong enough. This results in an unattractive service, which is only used by few people. People can either get lifts or are obliged to buy a car. However there are specific user groups, like elderly and disabled people, which are strongly dependent on public transport.

In Sweden, care for the disabled and elderly people has always been an important part of the national welfare system. The society takes great responsibility to organise and execute transport services for these user groups. In the city of Gothenburg Special Transport Services (STS) are provided for elderly and disabled people.

However, these STS turned out to be very expensive and therefore the city of Gothenburg wanted to find more efficient solutions to meet special needs with intermediate forms between public transport and STS.

With the introduction of Flexible Service Routes, the city of Gothenburg offers new transport potential for the elderly and others with special needs. The "FlexRoutes" services are the result of co-operative efforts of the Traffic and Transport Authority and the STS Authority.

By means of this new travel concept, FlexRoute, it was intended to:

- Significantly reduce public funding for STS for disabled and elderly persons by facilitating increased operating efficiency;
- Bridge the gap in existing service between eligible STS users and those with impairment, still confined to use regular public transport.

In the future it could also be expanded to provide an increased service level for those in the general public willing to pay for such service.

PRESENT STAGE OF IMPLEMENTATION

The "FlexRoutes" Project became operational in October 1996 and the system is now in daily operation with four low-floor minibuses which are very easy accessible for disabled and elderly users. One bus departs in each direction of the line every half hour and visits a planned selection of some of the 60 Meeting Points according to the demand. For each service is established an ideal route between "meeting points", not further than 150 meters from the user's home.

Each bus has a capacity of 10-13 seats and one wheelchair for curb side roll-on. The size requirements are set by the time restriction for pick-up and delivery (50-55 minutes/trip) and by the need to be able to turn at the many dead-end streets in the district.

Reservations can be made via telephone (to a special telephone number) to the Travel Dispatch Centre from up to 2 weeks in advance to up to 15 minutes before the desired bus leaves the end terminal. As an option for the FlexRoutes customers, an automated booking function exists. The advantage consists in the fact that it is a toll-free call that bypasses any eventual queue for manually booking calls. For the operator the advantage is the cost saving.

One end-terminal is Frolunda Torg, the largest shopping centre in Gothenburg and the other end of the route is Sahlgrenska Hospital, a major regional university hospital.



The test area

At the end of 1997, the SAMPO demonstrators had been evaluated in four main areas: technical performance, service provision, economic viability and market projection. Another evaluation has been made in the SAMPLUS project during the summer 1999.

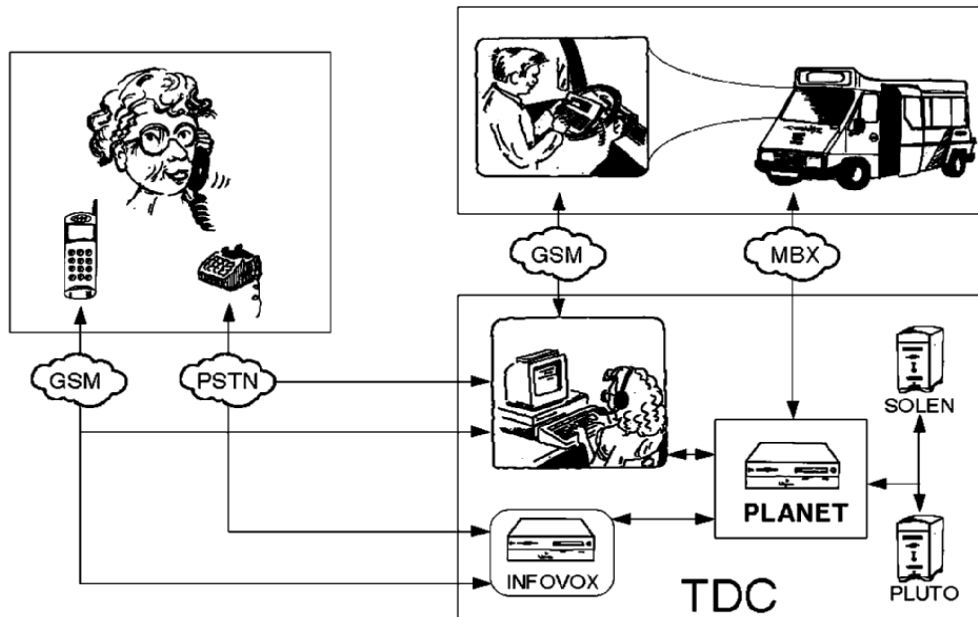
Due to the fact that the system has been very well received and proved its usefulness, the city of Gothenburg is planning to extend FlexRoute services to at least 10 other districts. Similar services have already been implemented in limited scale in a few other Swedish cities.

TECHNICAL PROFILE OF PROJECT

The Swedish test site followed the “stops in the region” concept of DRT, relying mainly on existing technologies due to the good experience with DRT in the form of STS shared ride taxi in Sweden. The FlexRoute service is based on the PLANET system, supplied by PLANit Sweden AB, which has been in operation at the STS Travel Dispatch Centre (TDC) since 1992. The system runs on Alpha computers from Digital Equipment and the communication with the vehicles is managed over Mobitex and GSM networks. The mobile equipment in the vehicles consists of Mobitex terminal with a printer for receiving essential data. The FlexRoute concept has an innovative element of flexibility in the optimisation of the routes by introducing a new telematic function:

- Automated trip notification: a call-back with a pre-warning 15 minutes before the preliminary or previously given pick-up time.

The automated trip notification function is essential because it provides a larger optimisation window at the time of booking and thus a higher productivity, i.e. more passengers per vehicle hour. The passenger is given a preliminary pick-up time. When all bookings for the respective trip are in, the system calculates the final route and assigns the actual pick-up times. Then, all passengers are receiving an automated call-back, 15 minutes before the previously given pick-up time, whether his preliminary pick-up time has been delayed or not.



Communication ways of the FlexRoute service

In order to increase the administrative efficiency of the system new telematics were also introduced for the booking of travel:

- Automated booking of travel, from both touch-tone phones and GSM phones, using an Interactive Voice Response (IVR) system.
- Booking directly with the driver at end-terminals (using a lap-top PC and Mobitex mobile data communication)

In the SAMPO trials, a new walk-up driver booking function was developed, where a customer could approach the driver at the two end terminals (with scheduled departures) and book the trip directly via the driver who initially was equipped with a mobile PC for on-line communication with the TDC computer. This was later abandoned and replaced in the SAMPLUS project with a magnetic card booking facility, where passengers can automatically book their return trips (back to home) 15 minutes before departure.

The cancellation procedure is to call TDC to cancel a trip no later than 15 minutes before the bus is leaving the end terminal.

There is no technical integration between the FlexRoute and the regular public transport system. Transfer to regular public transport is facilitated by the use of the same fare system and because the FlexRoute ticket is also valid for a transfer to bus or tram.

In the SAMPLUS project automated booking of travel and automated trip notification will be tested over a longer period. Moreover, user acceptance of the services and modal shift behaviour are evaluated almost three years after the introduction of the new service.

RESULTS AND IMPACTS

Three categories of assessments have been selected for the SAMPO project evaluation:

Technical performance

- The availability of the booking service was greatly improved by the introduction of the IVR system which is open around the clock;
- Users' opinion on the functioning of the IVR system was generally good. Many users complained about the fact that the dialogue was too long and too complex. Following this feedback, modifications have been implemented;
- The PLANET system can handle 6000-7000 trips/day without difficulty (combined STS and FlexRoute service);
- Average handling time is 1:38 seconds and average queuing time is 23 seconds;
- Most users found the automatic trip-notification system very useful and also quite reliable after some modifications during the SAMPLUS project.

During the initial demonstration phase, there appeared some problems concerning the Mobitex communication between the PLANET-system and the vehicles. Minor problems occurred also concerning the automatic trip notification. Many users claimed that the call is often made after they leave the house. Another unsatisfactory aspect is that some persons get more than one call-back (if more passengers are booking to the same trip after the first call-back has been made).

A major problem in the initial phase was passengers who wanted to board at the terminus without having made a reservation. The ultimate consequence of a large number of un-booked trips is displeased passengers who have booked their trips and have to wait for a delayed bus. The introduction of the magnetic card booking function in the SAMPLUS project has taken care of this problem.

The demonstrations were intentionally conducted using the existing system as much as possibly without major modifications of the software. After the concept has proven itself viable, the next step is to gradually make improvements to increase productivity both in terms of route efficiency (algorithms) and handling in the TDC. The goal is to have a fully automated dispatching process for FlexRoute which is a matter of fact for the STS operations since several years.

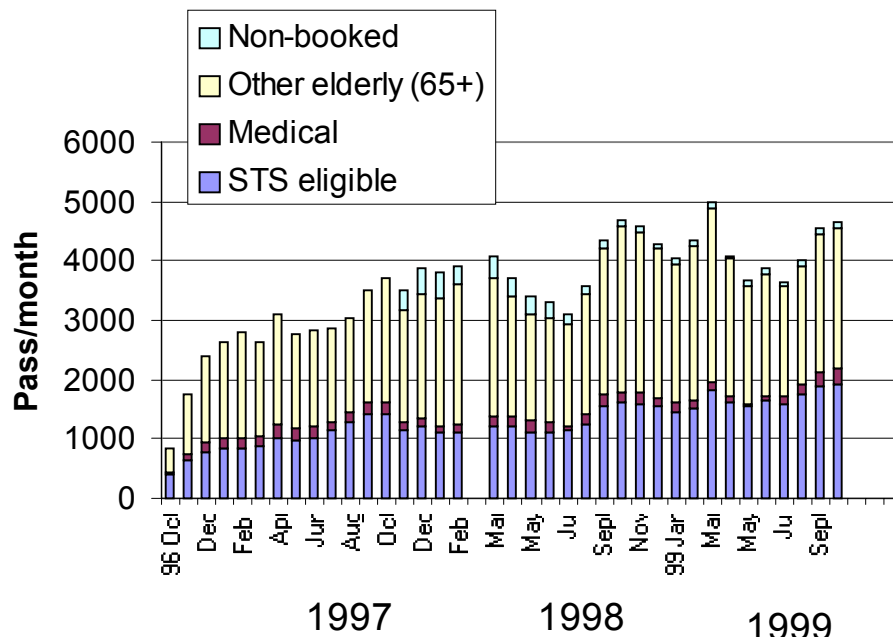
Service provision

The elderly and disabled users were questioned in a survey about how they received the FlexRoute service. The service was rated as "very good" by 82% and "good" by another 14 % of the sample. The usage of FlexRoute increased rapidly and has diverted travel from the STS taxi services, which require more financial support from the city. The major success factors are;

- Friendly and service minded drivers (rated 9.7 on a 10-grade scale);
- Fully accessible low-floor minibuses;
- Short walking distance (for disabled users door-to-door service);
- Excellent service in the booking centre (TDC);

Due to the fact that most elderly users are preferring human interface, IVR system requires a very high level of service or other incentives (e.g. fare discounts) to overcome this natural preference;

Ridership development for FlexRoute in Högsbo 1996-99



Economic viability

Detailed passenger and economic data has been generated throughout the project as well as data for the competing mode (STS), which is handled in the same system (PLANET).

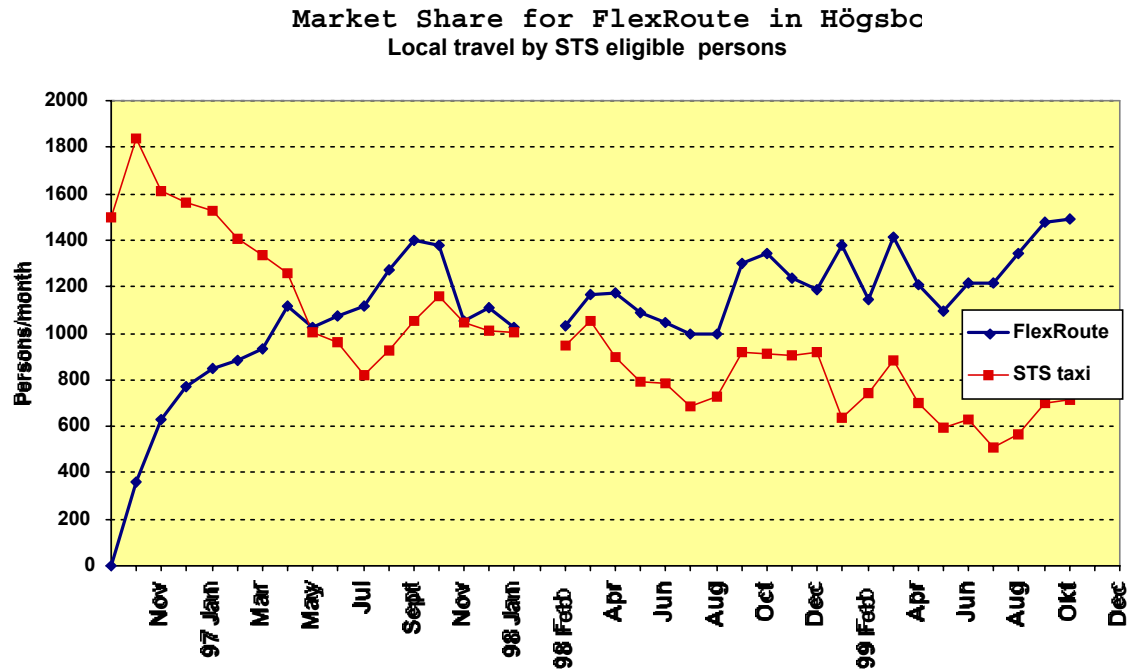
The fare revenue is about 20 % of the operating costs, which is normal for this kind of service (e.g. traditional service routes for persons with special needs).

The revenue from diverting the taxi travel to FlexRoute has gradually increased to a rather stable level of about 50 % of the total traffic costs (excluding booking costs in the TDC). This figure could rise another 10-15 % if the city decides not to subsidise STS taxi-travel where and when FlexRoute service is available. The city officials (including the local city district authorities) seem to be willing to absorb some extra cost in order to provide an excellent mobility for the elderly not eligible for STS but who still have some difficulties using regular public transport. There are clearly some cross-sector benefits (reduced medical and home care costs) which are difficult to assess.

The general opinion is that after an initial period of “novelty interest”, it will take up to two years to build up the market for these services.

Market projection

By introducing the Automated Trip Notification and Automated Booking functions, Sweden has made big steps towards improving the economic viability of DRT. A great majority of elderly and STS entitled users have a positive opinion about the FlexRoute service which has a positive social impact on their lives, giving them a true possibility for being active. Over 60 % of STS entitled users have after two years voluntarily given up STS shared-ride taxi in favour of FlexRoute. This result encouraged city officials to push the FlexRoute concept further and a decision has been taken to increase the service to at least 10 more city districts at a pace of two new FlexRoutes per year. In a few years the projection is that the FlexRoute fleet will consist of some 40 minibuses.



BARRIERS AND CONFLICTS

The Swedish demonstration involved a complex institutional framework at the city level. A regional reorganisation of responsibility for public transport and STS is planned within the next few years.

Another issue was the fact the introduction of DRT systems required more marketing and training than was initially estimated.

The analyse of users needs showed some potential conflicts:

- Resistance of having to book, by the passengers used to fixed-route service;
- Preference of the end-user to have a human interface when making the booking;
- Allocation of costs of the telephone call and the booking service;
- Perception of delay/disruption by the passengers entitled to STS (taxi users);
- Perception of a risk to loose the STS permit if they use FlexRoute instead of taxi,

TRANSFERABILITY

Investigations have been made for the possibility of extending the FlexRoute services to other areas in Gothenburg as well as to other DRT applications in the city (e.g. to replace larger fixed route buses in low traffic periods or in peripheral areas). For this purpose the STS authority and PLANit Sweden AB are discussing possible modifications to the PLANET system beyond the scope of the SAMPO/SAMPLUS project. Some of such improvements have already been introduced.

Some small and medium sized cities in different parts of Sweden have already introduced DRT systems similar to FlexRoute for elderly and disabled, generally without initially using the advanced telematic systems of the SAMPO project. A first FlexRoute operation is now being planned for Stockholm, where the STS operations using taxis are costing the taxpayers some 100 MEuros per year.

The FlexRoute concept probably has the best chance in urban and suburban applications while other forms of DRT services have to be tailored for more rural areas as has been proven in the other SAMPO demonstrations (in Finland and Belgium).

LESSONS LEARNED

Based on SAMPO experience, the reliability of TDC software and communication links between TDC and vehicles/drivers form a risk that must be seriously taken into account. Proper verification and testing is a key issue in confirming reliability.

Elderly persons, the main target group for this demonstration, are cautious and conservative in using new telematics and user interfaces must be extremely simple. Motivation (including information and incentives) and training are very important elements in the introduction of such new services.

At an institutional level, the main need is a normative law. Legislative issues have to be taken into account when arranging the organisational issues and eliminating barriers.

Organisational arrangements are important when developing working concepts for DRT services, because of the fact that there are many stake holders and organisations involved in the planning, development and operational aspects.

ADDITIONAL INFORMATION

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