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FLEXIBLE AGENCY FOR COLLECTIVE,
DEMAND RESPONSIVE MOBILITY SERVICES



Deliverable D6 **FAMS Trials Report: Testing and Evaluation**

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EXECUTIVE SUMMARY

The FAMS (IST-2001-34347) Trial Project was initiated under the EU Research and Technological Development programme Information Society Technologies (IST). The project aims to scale up the technologies, services and business models currently adopted in Demand Responsive Transport (DRT) and support the evolution from single DRT applications towards the concept of a Flexible Agency for Collective Demand Responsive Mobility Services. The FAMS work includes the following elements:

- adaptation and scale-up of previously demonstrated DRT technologies and methods
- deployment of the Flexible Agency concept in two EU sites (Angus in the UK and Florence in Italy)
- implementation of trials at the sites
- comparative assessment of technologies and organisational models
- assistance to the users and suppliers in decision-making
- collection of knowledge and best practice into a 'Handbook and Best Practice Guide'
- market stimulation for IT and e-Business/e-Work products

Two Collective Transport Operators/Agencies [Angus Transport Forum (ATF) (UK) and SITA (IT)] have implemented and tested the Flexible Agency concept. Two IT suppliers, Mobisoft Oy (FI) and Softeco Sismat (IT) have provided the required technology transfer by adapting solutions obtained in previous RTD projects. One public transport service operator, ATAF (IT), has provided the transfer of expertise about DRT operations and supported the implementation of best practices in community transport and DRT at end-user organisations. Two IT and Transport Consultancies, MemEx (IT) and ETTS (IE), have ensured the co-ordination of the technical trials and the Common Evaluation framework.

The FAMS Take-up Action has three main strategic objectives:

- To innovate the way DRT business and service models are implemented.
- To build confidence for authorities and investors.
- To lead to deployment of DRT concepts based on innovative Flexible Agencies.

FAMS is based upon and adapts available results – technologies, processes and business models – from previous RTD activities/projects in two main areas:

- a) technologies, models and IT tools for DRT planning, operation and management, supporting key phases of the service provision scheme
- b) web based architectures, tools and models for eBusiness/eWork applications, facilitating co-operation among DRT transport operators within the Flexible Agency concept (B2B services) and improving access for the end-users of the transport service chain (B2C services)

This document D6, the FAMS Trials Report, is a stand-alone document that firstly provides a short introduction to the FAMS Project. After that it provides an overview of demand responsive transport (DRT), Travel Dispatch Centres (TDCs) and Flexible Agency. Then it describes the FAMS sites, their location, scale, demographics, population, nature of area and maps. The main contribution of D6 is to provide a clear, illustrative and easy to understand description of the FAMS trials sites and take-up activities that have been carried out. D6 provides also a description of the operation and trials; infrastructures, fleets, environments, personnel, users, special circumstances etc. In addition, D6 provides a summary of the comments and findings related to the trials including qualitative evaluation results. All this leads to the sections where challenges and lessons learned from the trials are reported and conclusions and recommendations deriving from the trials and evaluation results are made.

1 INTRODUCTION

1.1 Presentation of the FAMS Project

The FAMS project aims to scale up the technologies, services and business models currently adopted in Demand Responsive Transport (DRT) and to support the evolution from single DRT applications towards the concept of a Flexible Agency for Collective Demand Responsive Mobility Services.

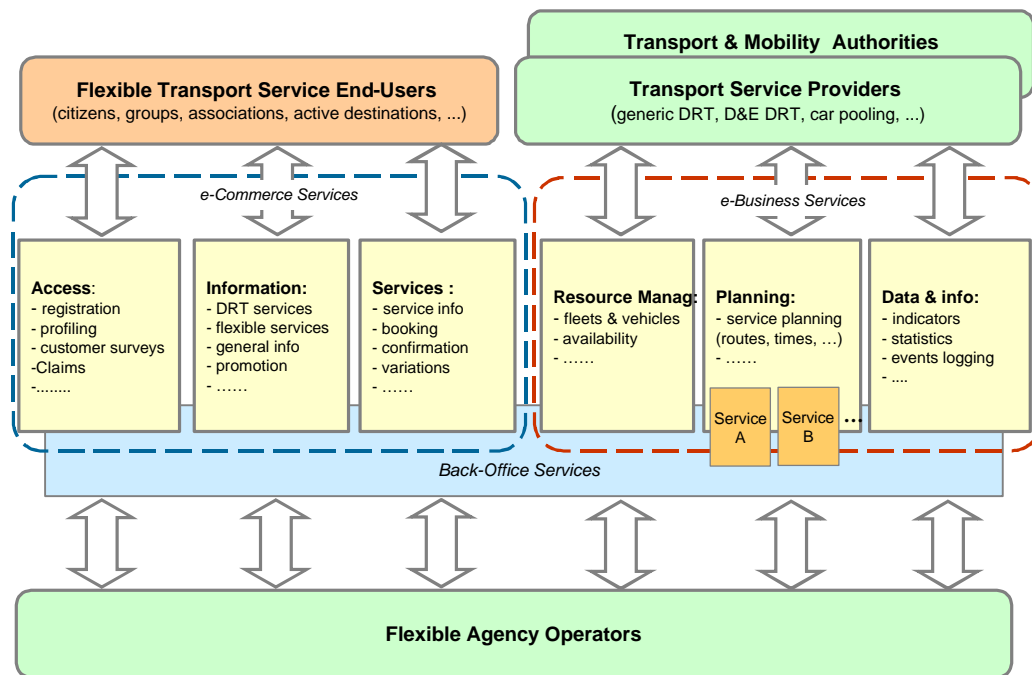


Figure 1.1: Overview of the Flexible Agency

The core objective of the FAMS Trial Project is to scale up technology, service and business models currently adopted in Demand Responsive Transport and support the evolution from single DRT applications towards the concept of a Flexible Agency for Collective Demand Responsive Mobility Services.

Based on this, the FAMS Take-up Actions have three main strategic objectives:

1. To innovate the way DRT business and service models are implemented, through the adaptation, extension and trials of new IT infrastructures and e-Commerce/e-Business services to support their operation within the Flexible Agency concept.
2. To build confidence for authorities and investors (operators, communities and suppliers) to plan, organise and deliver:
 - a quality product that meets the needs of the users who have, until now, been marginalised by the transport offer
 - alternative mobility products that are cheaper and more attractive than non-viable conventional services
3. To lead to deployment of DRT concepts based on innovative Flexible Agencies. The implementing agency needs tools to support the business and the organisational service models – that is hardware, software, communications, skills, training, etc. – leading to the take-up of the outputs of the advanced telematics and support products.

1.2 Structure of the FAMS Project

The FAMS project is structured in a set of six Work Packages (WPs) which allows for distributed management and execution of the project across the partners and sites. The structure of the project and the dependencies are shown in Figure 1.2.

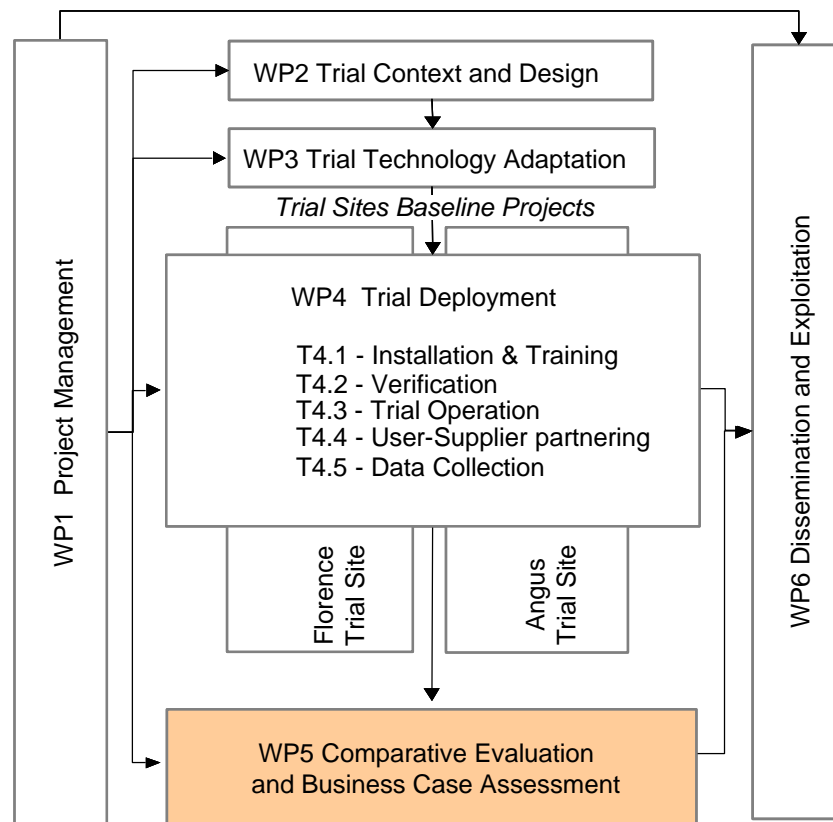


Figure 1.2: Work Packages of the FAMS project

1.3 Structure of Deliverable D6

Deliverable D6 has the following structure;

- Executive Summary: highlights and explains the objectives and results of D6
- Introduction: presentation of the FAMS project, roles of WP5 and Deliverable D6
- FAMS concepts: context, DRT, Flexible Agency, challenges at the sites
- FAMS sites and trials: description of the FAMS sites and the trials
- Description of the take-up activities
- Description of the operation and trials
- Findings from the sites
- Challenges and lessons learned
- Conclusions and recommendations
- Glossary
- References.
- Annexes.

2 DEMAND RESPONSIVE TRANSPORT AND THE FAMS CONCEPT

DRT can be defined as transport adapted to meet the known needs of users, typically on a trip-by-trip basis. Thus, there are at least the following core functions:

- Knowledge-acquiring function to understand the actual demand, or at least the relevant variations in expected demand.
- Analysis function to determine what action to take in response to this known demand.
- Dispatching function to communicate changes to assignment and operating personnel.

There may be a default route with variations applied as required (as in some of the Florence services) or the service may be determined entirely from the specific demand for that trip (as in Angus). DRT services can be defined as having at least one degree of freedom for the trip being offered. A key added-value area of FAMS is in the Flexible Agency concept that provides a higher order entity than the traditional operator of the individual DRT line or group of lines. Figure 2.1 shows an abstract operational reference model for the agency.

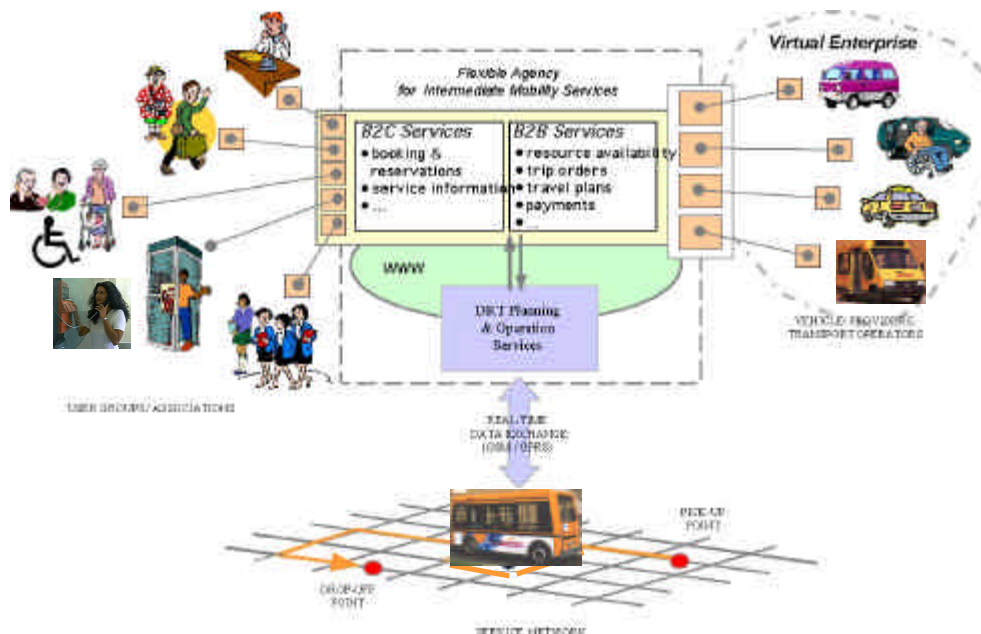


Figure 2.1: Overall structure of the Flexible Mobility Agency

2.1 Challenges

2.1.1 Challenges at the Angus Site

The Angus pilot seeks to maximise the use of existing public/collective transport resources in the area to produce flexible, user-friendly integrated services and to provide a sustainable means of delivering transport provision utilising new technologies. This challenge requires a visionary approach and dismantling of artificial barriers erected by the 'it's always been done like this' mindset. Legislation needs to be flexible to encourage co-operation between modes. Technology can assist in designing a solution to the transport problems caused through lack of co-ordination and integration of existing services. Service delivery will be designed to meet the needs of the customers not just the operators. The FAMS project embraces all current EU, UK and Scottish Executive policies across community planning, sustainable development, social inclusion and environmental policies. The challenge is to see if it is possible to demonstrate real progress in these areas with regard to planning a public transport solution in rural areas that is designed from the bottom up.



Figure 2.2: The Rural Area of Angus (Glen Isla)

2.1.2 Challenges at the Florence Site

To increase the use of the public transport resources the Florence site has identified several challenges and objectives under the FAMS project. Among them the most ambitious challenge is the will to put together different public transport operators sharing the same technological architecture in order to maximise the quality of the service offered to their clients and to minimise the resources used. In a context such as the Florence area this approach is completely new and represents the first attempt to break a standstill scenario, where the operators often act like competitors rather than co-operators. Based on these premises, FAMS will allow the development of co-managed new services, the transfer of the organisational and operational expertise, and adaptation of the existing DRT technologies for managing different flexible transport services in urban environments. This change requires an ‘open mind’ approach not only by the operators involved, but also by the local authorities that have to encourage it by promoting new services and assisting them with proper and flexible acts.



Figure 2.3: The Florence Urban Area

3 THE FAMS SITES AND TRIALS

3.1 Overview of the FAMS Sites

The trial site in Angus is new to DRT applications, with local plans being made to introduce DRT and the Flexible Agency at the site. The site covers the rural Angus area surrounding Alyth, Kirriemuir and Brechin and allows evaluation of transferability issues, both on the technical and organisational level.

The trial site in Florence has the base DRT technologies already in place and has already gained valuable knowledge about DRT through previous demonstration projects. The site is in the ideal situation to scale-up the local systems, and to develop and trial the technological infrastructure and the collaborative service models underlying the Flexible Agency concept.

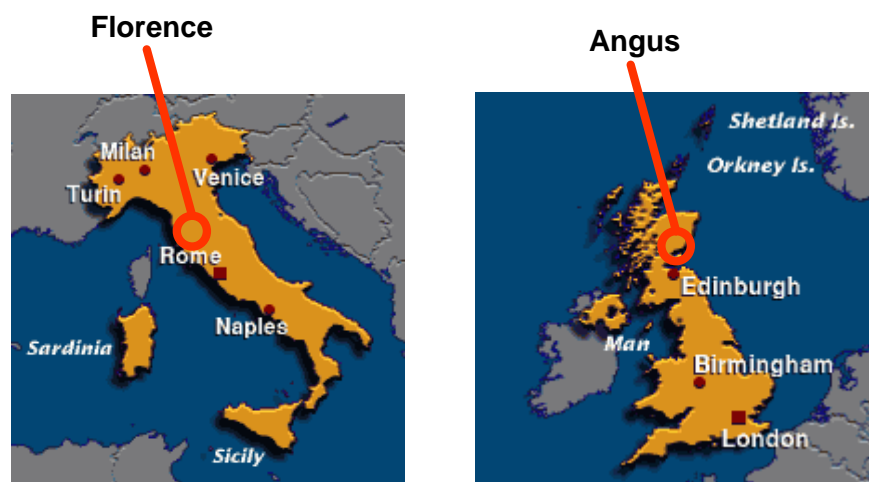


Figure 3.1: Location of the FAMS Trial Sites

3.2 Characteristics of the Angus site

3.2.1 Geographical Location and Context

Angus has a population 112,000 people. It is situated in the north-eastern part of Scotland, lying to the northeast of Dundee on the Firth of Tay. In an area of 2,200 km², mountains, glens, rivers, rugged cliffs, seaside towns, market burghs, turreted castles and ancient relics stand side by side. Figure 3.2 shows the location of the Angus site. The coastal belt is well served by public transport services to and from Dundee, Arbroath, Forfar, Montrose and onward north to Aberdeen and southwest to Edinburgh. The northern boundary of this coastal strip is marked by the settlements of Alyth, Kirriemuir and Brechin.



Figure 3.2: Location of the Angus Site

The area selected for the FAMS Project covers 1,270 square kilometres, (58% of the Angus area) and a population of 9,742 (8.9% of the Angus population). The site covers the rural Angus area surrounding Alyth, Kirriemuir and Brechin and will allow evaluation of transferability issues, both on the technical and organisational level. Due to the low population density, this area is not currently well served by public transport services. Problems and challenges related to rural depopulation, youth issues, access to employment, training, childcare, health, education and recreation were all recognised. A decline in tourism in Angus was also highlighted. Creating employment opportunities in the Glens of Angus was seen as vitally important if the reduction in families living in these areas was to be reversed.

The FAMS concept is new for operators and drivers in Angus. Being able to identify new markets through the participation in the FAMS project is a bonus for the operators. In return it has been expected that the operators provide full co-operation in the evaluation of the FAMS concept. Demographic data was used to forecast the total travel potential for the Angus area. It was anticipated that, as school transport vehicles were to be used, these figures would provide the cornerstone to services. Car ownership and existing travel use was also taken into consideration. As a result of working with local groups it was possible to project anticipated tourist growth. The chaos theory was seen as a suitable model to adopt for the Angus project. It is hoped that order will result from this approach. No restrictions other than finance (ability of the individual to pay and communicate with the TDC) are foreseen.

Post Buses operate limited services in Glen Isla (hinterland of Alyth), Glen Esk (hinterland of Brechin) and Glen Clova (hinterland of Kirriemuir). The take-up and trial site in Angus is new to DRT concepts, services and applications. The main actor at the Angus site is the Angus Transport Forum (ATF). It has a membership of over 60 organisations, comprised of voluntary organisations, Community Councils, transport providers and residents of the area. Glen Isla/Alyth has a population density of 1.2 persons per km². Glen Esk/Brechin has a population density of 10.8 persons per km² and a low demand for public transport. Glen Clova/Kirriemuir has a population density of 4.6 persons per km². and 16% of the population is over 60 years old.



Figure 3.3: Alyth



Figure 3.4: Kirriemuir



Figure 3.5: Brechin

Alyth, Kirriemuir and Brechin have good transport links on the coastal side but towards the Glens the public transport services range from adequate to poor or non-existent, particularly at the heads of the glens. Rural depopulation, sustainability, access to employment, health, education, training and child care are all perceived as major problems unless people have access to a car. The nature of the Glens can be seen in the following figures.



Figure 3.6: Glen Isla



Figure 3.7: Glen Esk



Figure 3.8: Glen Clova

People in the Angus area are more or less car dependant. Access to employment, training, education, health services, child care, shopping, recreational facilities and visiting are all dependant on access to a car and sufficient funds to undertake the wide range of activities taken for granted by those living in urban areas. Average income in Angus is 10% less than in Scotland as a whole. Health care policy in the Angus area is in a period of change with more services being centralised in the Ninewells Hospital, Dundee and Stracathro Hospital, Brechin. Visits to these hospitals can mean a whole day spent travelling by public transport and may involve several changes of vehicle.

Dundee and Angus Tourist Board, Angus Council, and Scottish Enterprise Tayside encourage tourism in the area. However, it is difficult for cottage industries to attract part-time staff, due to the lack of transport in the area. Visitors are restricted to car owners.

School children are restricted in their ability to undertake after school activities due to the lack and/or cost of finding alternative transport. Older children remain heavily dependant on parents therefore restricting personal development.

In Angus, the provision of public transport is deregulated. Bus operators can operate services by registering with the Traffic Commissioners in Edinburgh. Taxis are regulated in the UK by legislation that sets charges based on imperial measurements (miles and yards).

3.2.2 Service Characteristics

The Angus service concept has been designed to maximise the use of commercial, statutory and voluntary sector vehicles already operating in the area to provide link feeder services into existing bus networks in the market towns (hubs) of Brechin, Edzell, Kirriemuir and Alyth. It is felt that also the co-ordination of special events, car sharing, parcel deliveries etc. could be added to the list of services to be provided. The services are promoted using leaflet drop, posters, newspaper articles, special events, travel club etc. Utilisation of buses, taxis, private hire vehicles, voluntary and statutory sector resources is seen as necessary to avoid resistance to concept. If any one sector is left out, the concept of a truly integrated service being provided by an “honest broker” non-aligned agency will be questioned. Each sector already has suspicions about the agency and the motivation for collecting information about the use of the agency. There is great mistrust between sectors and it is important to break these barriers down and show that partnership working can work. The deregulated environment means that only voluntary participation from the various sectors can be expected.

Difficulties arise when trying to plan journeys utilising more than one mode. Concessionary travel fares are only valid on stage carriage services. A Travel Club was created to establish the level of interest in over 90 activities. This information is held in the TDC and used to plan events locally for groups in the evening and at weekends. Door-to-door services are offered where no commercial services operate. Where it is possible to undertake the route or part of it by a commercial service, a door-to-service link is provided.

It is also possible for local groups affiliated to ATF to have group members trained to Minibus Driver Awareness Scheme (MiDAS) standard. This allows groups to hire ATF accessible minibuses to undertake the journeys to planned club events in the evenings and at the weekends. Costs are reduced to cover fuel, insurance, servicing and depreciation.

DRT services are being booked the day before departure, with the goal of being allowed 2 hours before departure. This will allow both drivers and customers to get used to the concept and to establish local demands. The services are run between 09:00 and 19:00 hours for individuals and in the evenings and Sundays for group hire. The routes are variable within a defined public transport network.

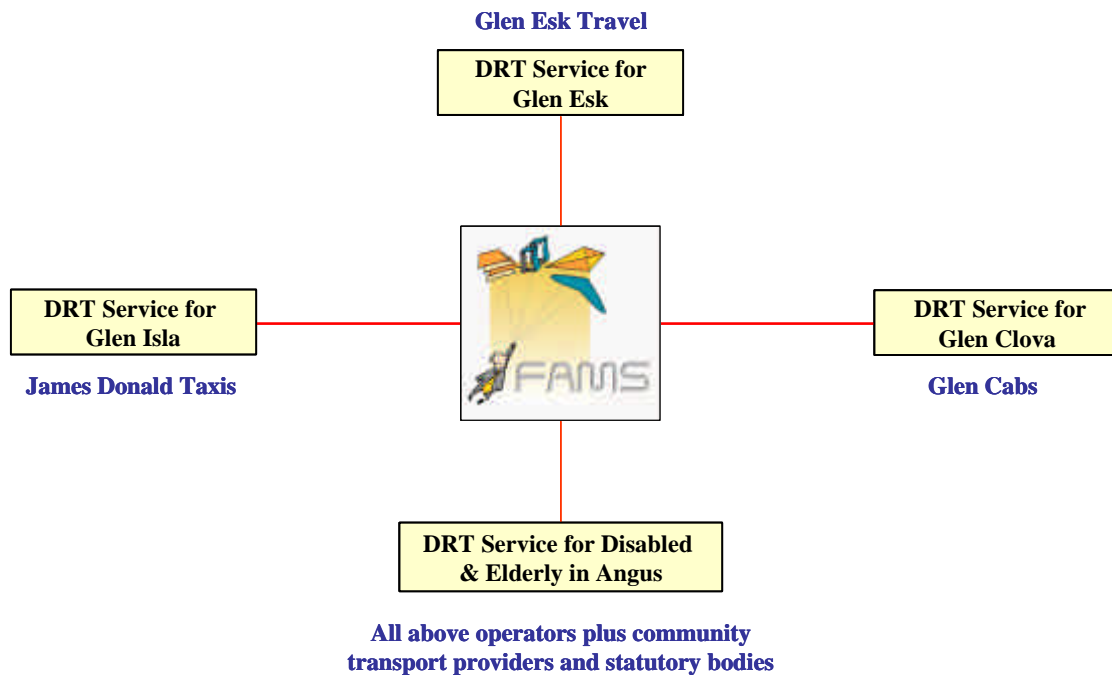


Figure 3.9: FAMS services in Angus

The Glen Esk services in Angus are provided by Glen Esk Travel. The variable services operate from Monday to Sunday. The request for a booking takes place by phone or by telefax. The confirmation of the booking depends on individual requirements and is made by phone, mobile phone, text message, telefax or e-mail. The services are open for all.

The Glen Isla services in Angus are provided by Jim Donald Taxis. As in Glen Esk the variable services operate from Monday to Sunday. The request for a booking takes place by phone or by telefax. The confirmation of the booking depends on individual requirements and is made by phone, mobile phone, text message, telefax or e-mail. The services are open for all.

The Glen Clova services in Angus are provided by Glen Cabs. As in Glen Esk and Glen Isla the variable services operate from Monday to Sunday. The request for a booking takes place by phone or by telefax. The confirmation of the booking depends on individual requirements and is made by phone, mobile phone, text message, telefax or e-mail. The services are open for all.

The Disabled and Elderly services in Angus are provided by all DRT operators, community transport providers and statutory bodies. The variable services operate from Monday to Sunday. The request for a booking takes place by phone or by telefax. The confirmation of the booking depends on individual requirements and is made by phone, mobile phone, text message, telefax or e-mail. The bookings can take place on referral by Statutory Body or Local Authority Concession Pass holder.

As mentioned above the TDC is situated in the Stracathro Hospital as shown in Figure 3.10. The TDC personnel take care of the planning of the Angus services described above.

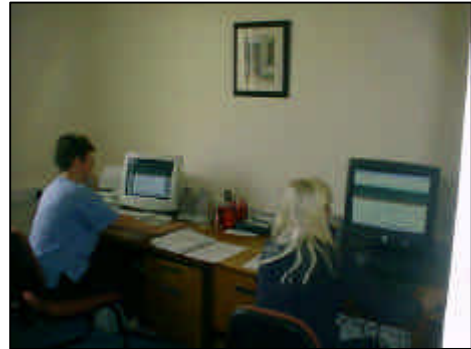


Figure 3.10: The TDC in the Stracathro Hospital

The vehicles being used are fitted with MobiRouter systems supplied by Mobisoft Oy. This allows the TDC to communicate throughout the operational day. GPRS communications are also being evaluated. Figure 3.11 illustrates the accessible vehicles used in Angus.



Figure 3.11: The Angus DRT Vehicles

3.3 Characteristics of the Florence site

3.3.1 Geographical Location and Context

The FAMS trial site in Italy includes Florence Metropolitan Area, with a total area of about 500 km². The whole metropolitan area and Florence in particular are characterised by a very old cultural and economical history, with about 590,000 inhabitants and huge commuter/tourist flows during the whole year. Figure 3.12 shows the Firenze site location.



Figure 3.12: Location of the Florence Site

Florence is the capital of the region of Tuscany, on Italy's north-west coast. The city has two airports: Amerigo Vespucci is a few kilometres north-west of the city centre, and Galileo Galilei (for international flights) is about 75 km west of the city. It is possible to walk from one end of the city centre to the other in about 30 minutes. Florence is an important and rich city, but sometimes also congested, noisy, crowded and dirty because of the traffic.

There is a comprehensive bus network run by Azienda Trasporti Area Fiorentina (ATAF), which operates between 05.30 and 00.00. The blue SITA coaches arrive and depart from the SITA bus station, west of the railway station. These coaches have services to Siena, Arezzo, Castellina, Radda and Gaiole. The conventional public transport is well organised, but there are additional needs for transport services. These have been the main target of FAMS. The following figures illustrate the beautiful city of Florence. The centre of the city has impressive buildings, statues and bridges. Tourists from all over the world visit the city of Florence every year and it is important to develop public transport services for them.



Figure 3.13: Florence

On the other hand the FAMS service areas of Scandicci, Campi Bisenzio, Sesto Fiorentino, Porta Romana and Calenzano, are more suburban than the centre of the city as shown below:



Figure 3.14: Scandicci

The public transport services are operated and co-ordinated by three main private and public transport companies: ATAF SpA, Li-NEA SpA and SITA SpA. ATAF is operating advanced technological infrastructures (AVL/AVM system) to ensure monitoring of the bus fleet on the network, communication with drivers, vehicle location and service regulation on the network. ATAF has already pioneered a flexible and intermediate DRT service in the urban and metropolitan area. This is managed by a TDC, based on advanced system concepts and technologies (the PersonalBus™ system, developed by Softeco Sismat) to support trip request and reservation handling, trip planning and vehicle dispatching. The DRT service provided by ATAF is complemented in the suburban area of Scandicci by Li-NEA. This gives an opportunity to the FAMS agency to co-ordinate the DRT services operated by Li-NEA. Figure 3.15 shows the location of the Florence Site services.

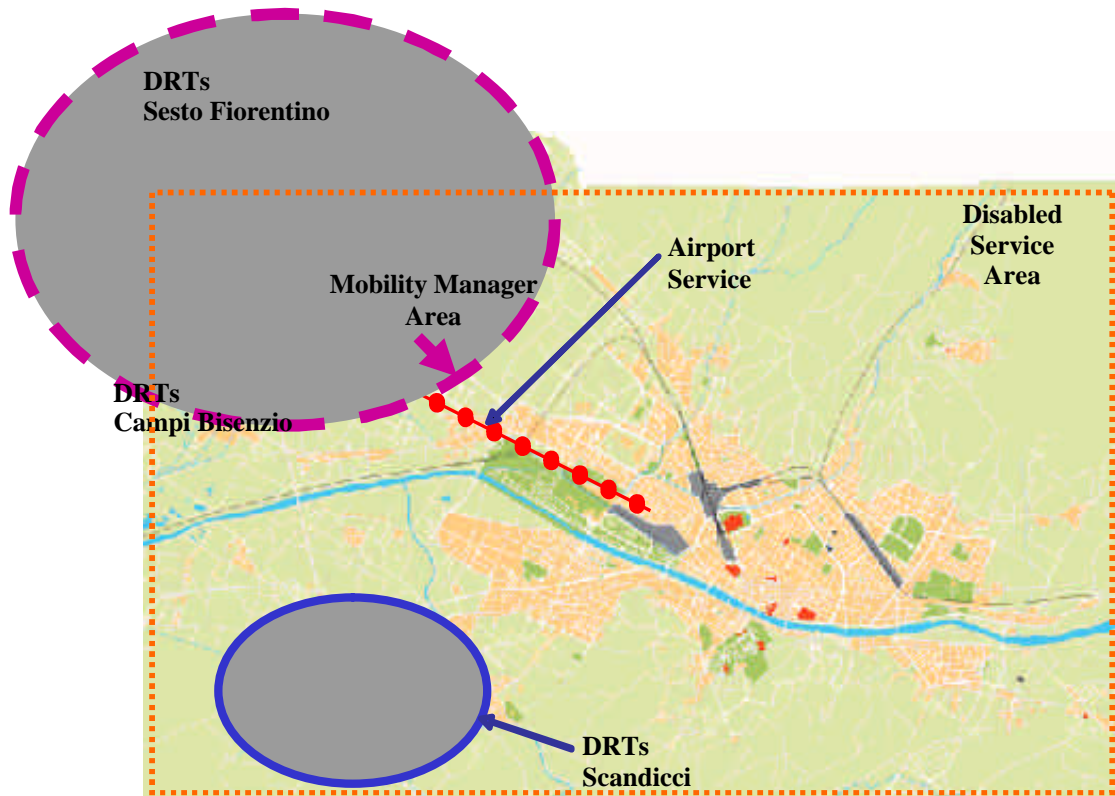


Figure 3.15: Location of the Florence Site Services

3.3.2 Service Characteristics

Figure 3.16 summarises the FAMS services in the Florence site.

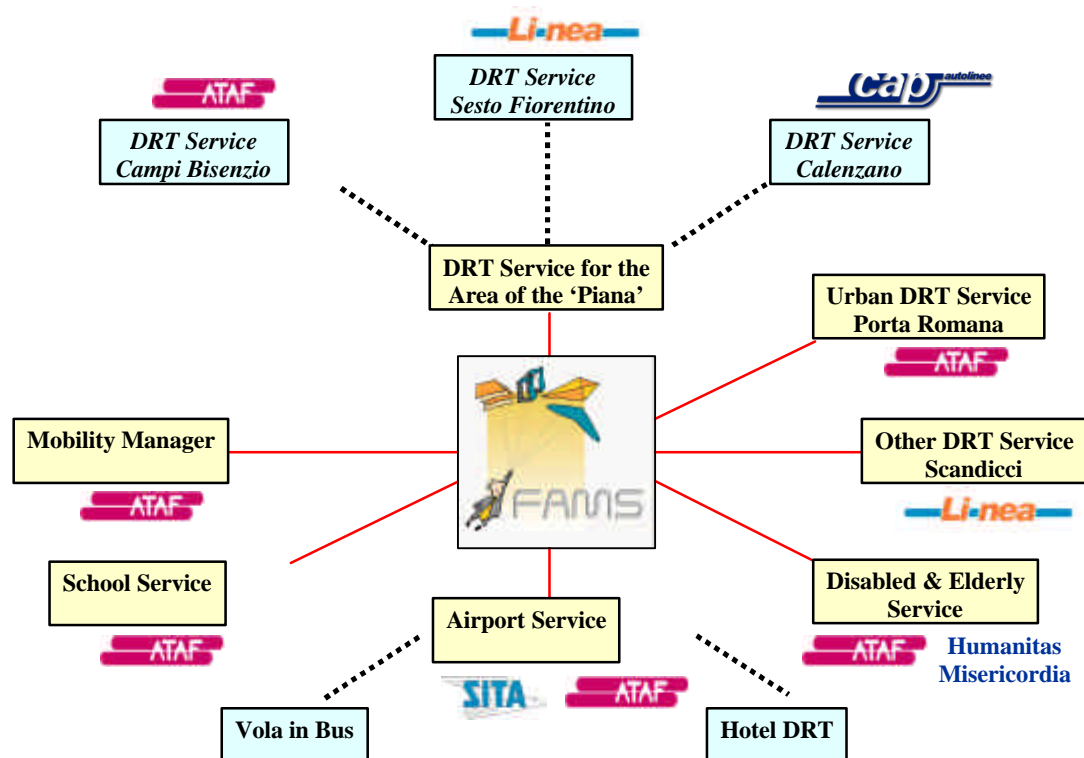


Figure 3.16: FAMS services in Florence

The Railway Station to Airport service (Vola in Bus) in Florence is operated by SITA and ATAF. It has fixed times and fixed routes. In FAMS the booking module has been developed so that the bookings are made via the FAMS portal in the Internet. The service is meant for the registered users such as hotels, hostels, SITA bus station, ATAF Info Point in Piazza Stazione. The two operators define the number of available seats per journey with respect to the vehicle capacity. Figure 3.17 on the following page illustrates the Vola in Bus service.



Figure 3.17: Railway Station to Airport Service

The Hotels to Airport service in Florence is operated (at the first stage) by SITA. It has variable time schedules within a pre-assigned availability interval and variable routes within a defined transport network. In FAMS the service and service management has been established. The bookings are made in the Internet portal and additional information can be obtained by a phone call to a SITA operator within a defined time window. The booking takes place off-line within the fixed time limit of the previous day. The service is meant for pre-defined hotels

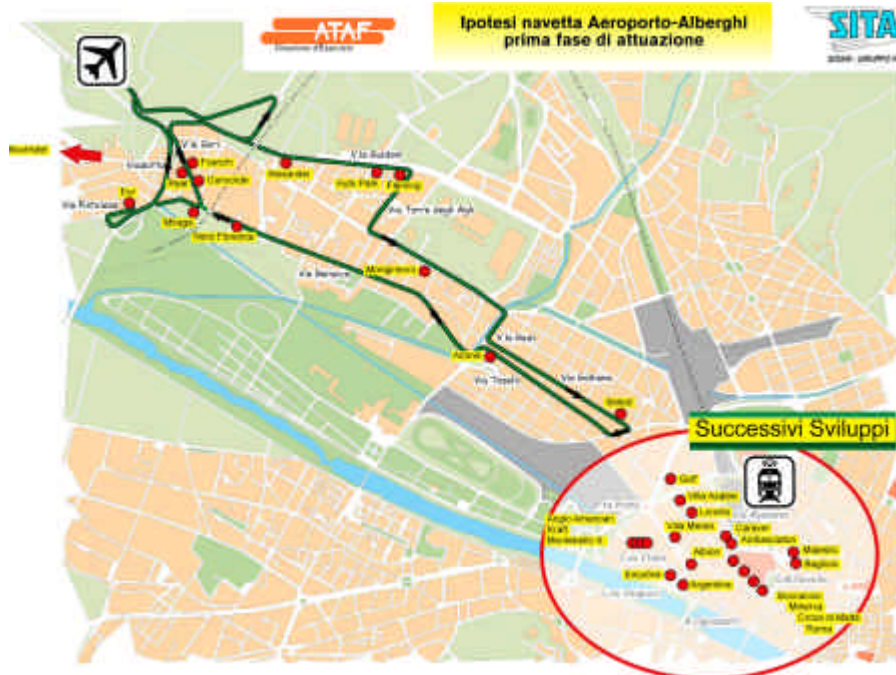


Figure 3.18: Hotels to Airport Service

The Campi Bisenzio DRT service in Florence is operated by ATAF. It has variable time schedules within a pre-assigned availability interval and variable routes within a defined transport network. In FAMS the off-line booking and confirmation module has been developed. The bookings are made via the FAMS portal in the Internet. The booking takes place off-line within the fixed time limit of the previous day. The confirmation of the booking is made subsequent to the request. The service is meant for the pre-registered users.

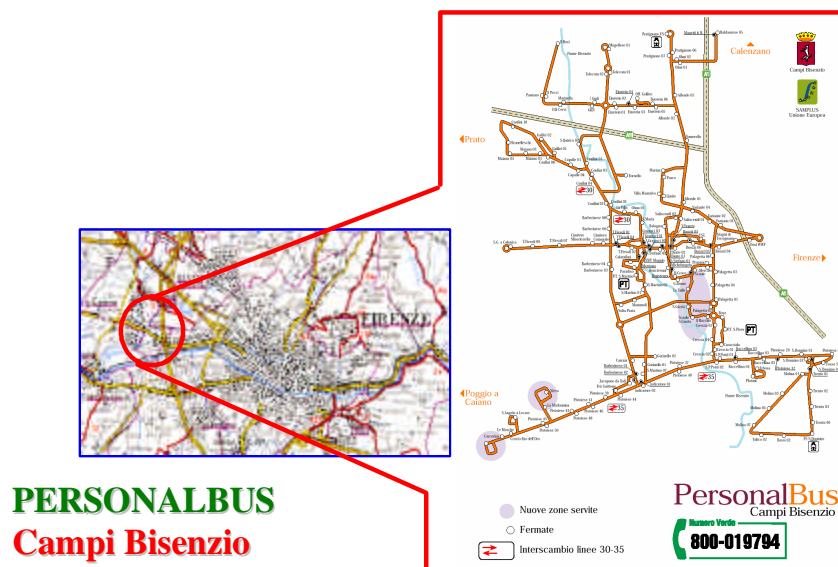


Figure 3.19: Campi Bisenzio DRT service

The Scandicci DRT service is operated by ATAF and LI-NEA. It has variable time schedules within a pre-assigned availability interval and variable routes within a defined transport network. In FAMS the off-line booking and confirmation module has been developed. In addition, the information exchange module between service manager and service operator has been developed. Bookings are made via the FAMS portal in the Internet. The booking takes place off-line within the fixed time limit of the previous day. The confirmation of the booking is made subsequent to the request. The service is meant for the pre-registered users.

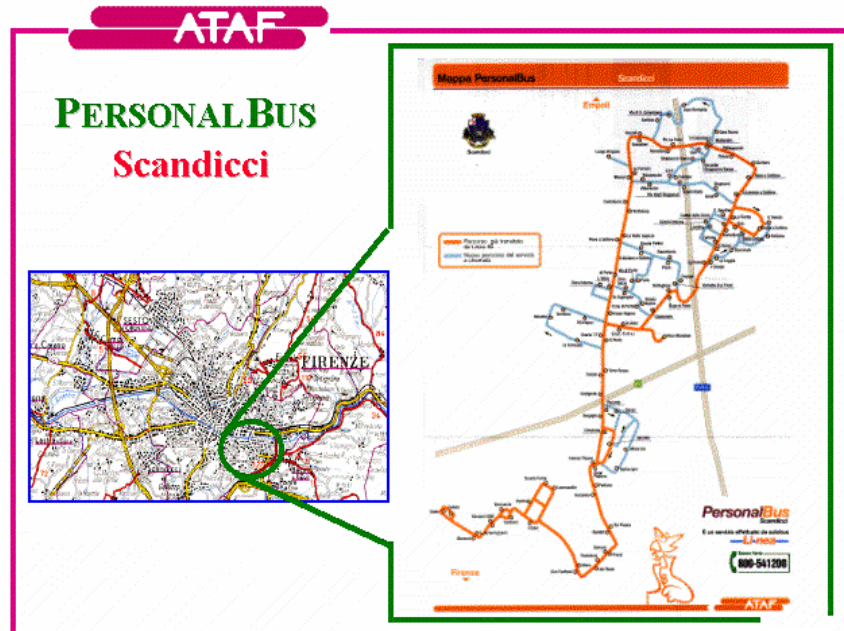


Figure 3.20: Scandicci DRT service

Sesto Fiorentino DRT service in Florence is operated by ATAF and LI-NEA. It has variable time schedules within pre-assigned availability interval and variable routes within a defined transport network. In FAMS the off-line booking and confirmation module has been developed. Also the development of information exchange module between service manager and service operator was done in FAMS. The bookings take place off-line within the fixed time limit of the previous day via the FAMS portal in the Internet. The confirmations of the bookings are made subsequent to request. The service is meant for the pre-registered users.



Figure 3.21: Sesto Fiorentino DRT service

The Porta Romana DRT service is operated by ATAF and LI-NEA. It has fixed time schedules and fixed routes. In FAMS the off-line booking and confirmation module has been developed. The information exchange module between service manager and service operator was developed in FAMS. Off-line bookings take place via the FAMS portal within the fixed time limit of the previous day. There is also a possibility for on-line booking before the start of the journey. The on-line bookings are subject to availability. For confirmation there are printed forms to be shown to the driver. The service is meant for the pre-registered users.



Figure 3.22: Porta Roman DRT service

The Calenzano DRT service in Florence is operated by ATAF and CAP. It has fixed time schedules and fixed routes with route deviations. In FAMS the off-line booking and confirmation module has been developed. Also the development of the information exchange module between the service manager and service operator was developed in FAMS. The bookings are made via the FAMS portal in the Internet. The booking takes place off-line within the fixed time limit of the previous day. The confirmations of the bookings are made subsequent to request. The service is meant for the pre-registered users.



Figure 3.23: Calenzano DRT service

The DRT services for Disabled in Florence are operated by ATAF and the different associations. It has variable time schedules and variable routes within a network defined by the origins and destinations of disabled registered users. In FAMS the off-line booking and confirmation module has been developed. The bookings are made via the FAMS portal in the Internet. The booking takes place off-line within the fixed time limit of the previous day. The confirmation of the booking is made subsequent to request. The service is meant for the pre-registered users.

The Mobility Manager in Florence is a different kind of service with respect to the others. All the transport operators in the Piana Area (the north-west area of Florence), the local authorities dealing with public transport planning (province, municipalities, region), companies located in Piana and industry and labour associations are involved. ATAF is the planning organisation in this service. Mobility Manager covers variable routes within a network defined by the origins and destinations of registered users.

The technological scenario built up to support the DRT operations in Florence and the operational experience gathered provided the starting point to upgrade the existing TDC into a Flexible Agency. The agency interconnects the different public (ATAF) and private transport operators (SITA and Li-NEA). It also co-ordinates, differentiates and optimises the overall intermediate service offer in the metropolitan area. The core DRT planning/operation facilities for the Flexible Agency is provided by the PersonalBus™ system. These facilities are extended by the required B2B/B2C components and made interoperable through the different transport service providers. An information, booking and reservation portal provides a set of facilities as a common interfacing module with users/citizens/associations, common resources availability and service management interfacing module with Li-NEA, ATAF and SITA fleet providers. Figure 3.24 illustrates the TDC arrangements.



Figure 3.24: The TDC in Florence

With FAMS the transport operators expect to achieve a number of business advantages:

- Personalised services for particular user categories, such as disabled, elderly people and schoolchildren, tailored to each category specific need.
- Provision of information about the service quality and planning.
- Special services connecting the main city generation/attraction centres, the airport, the main railway terminals and the main hotels.
- Integration of e-Business solutions to allow interaction between all the transport operators and easy access to services (information, booking and reservation, etc.) to different user categories.

- Confirmation of adequate interaction and co-operation between service providers (SITA, Li-NEA, citizens associations) and the service planning and dispatching TDC (ATAF).
- Transfer of operational and management expertise from the current DRT operated by ATAF in Florence to the new agency.

In addition to facilitating the development of wider service options to customers, an integrated agency offers a true opportunity to create co-ordination at the metropolitan level between all the actors involved in the provision of different kinds of service (public transport operators, municipalities, disabled associations, etc.). This will improve the service offer to users and optimise the overall financial resource utilisation for transport services.

Some of the institutional and organisational issues related to co-ordination between the different service providers were investigated in the Florence Metropolitan Area and agreements were stipulated, so that the scenario is ready to enter the new operational challenges that are proposed within FAMS. In addition, other local authorities are linked to FAMS at the local level: Florence municipality and all the other service providers (public, private for-profit and private non-profit) mainly specialising in dedicated services (elderly and disabled) operating at the metropolitan area level.

4 TAKE-UP ACTIVITIES

According to the Oxford English Dictionary, one definition of ‘take up’ is with a special objective implying a purpose of using in some way such as:

- to take-up one's pen to proceed or begin to write
- to take-up a book (i.e. with the purpose to read)

Clearly there are two elements included in take-up. First one takes something and then uses it. In FAMS the sites have first taken the DRT tools and then used them in trials. These trials have aimed at the adaptation and introduction of new concepts and industrial DRT applications based on existing technologies and middleware for the management of the Flexible Agency and related services. The IST programme specifically encourages the concept of take-up of leading edge technologies and methodologies by industry and other organisations in order to achieve greater efficiency, higher quality and greater economy. However, in FAMS take-up it is not only about the FAMS regions, it is important that the take-up of the new concept is monitored to assist other organisations in Italy and in the UK to understand what is involved and to establish realistic timescales for implementation.

FAMS has implemented and tested the Flexible Agency concept, evaluated the viability and the impacts in real business cases and gathered knowledge and best practice to ensure dissemination and subsequent adoption at the European level. The take-up measures have included the following elements at the both sites:

1. Adaptation and scale-up of DRT technologies and methods and e-Business/e-Work collaboration and team-working tools and methods, to support the operation and co-ordination of a set of DRT services by a Flexible Mobility Agency.
2. Deployment of the Flexible Agency concept and transfer the technological, operational and organisational experience in DRT to these sites.
3. Implementation of trials at the sites.
4. Comparative assessment of technologies, organisational models and implementation contexts, based on a common Measurements and Evaluation Plan.
5. Collection of knowledge and best practice on Flexible Agency implementation and operation and dissemination.

Due to the nature of the take-up project, it was possible to introduce the verification system based on the existing technologies earlier than originally promised. The deployment work during the take-up served training, education and promoting purposes. The FAMS verification systems, based on the existing technologies and applications (MobiRouter in Angus and PersonalBus in Florence) supported the technology adaptation work.

4.1 *Take-up at the Angus Site*

In Angus, where the whole DRT concept was new, it was possible to become acquainted with the new concept and related IT application before going live. The existing MobiRouter system was implemented for training and verification purposes at a relatively early stage in the FAMS project. Throughout the design process extensive consultation took place with the different stakeholders. The major forces behind the FAMS activities in Angus have been:

- very few rural bus lines in the Glens area
- access to employment and training is difficult for rural residents
- unsatisfactory access to health facilities
- poor access to after-school activities
- unsatisfactory access to childcare
- increasing costs of motoring
- lack of accessible public transport services, including taxis
- funding of voluntary organisations

- budgetary pressure on statutory bodies
- limited joint ticketing initiatives
- exclusion from certain services through not being a client
- declining population in trial area threatens future of schools, shops etc

The driving force behind the take-up activities has been the ATF. It has participated and contributed to a range of activities related to the development of transport services at the Angus test site. Several activities have taken place during the FAMS take-up process, both technical and organisational. The legislation in the UK is fragmented and is designed to protect the client depending on the service he or she is entitled to use. This may not assist in the development of an integrated multi-modal solution. However, the results of previous DRT research and development projects (SAMPO, SAMPLUS, INVETE) had indicated that DRT may provide a partial solution to the problem experienced in Angus, where the intention has been to take into account the lessons already learnt from the previous projects and tailor the concept to meet the needs of the area utilising existing resources in the first place.

Increased awareness of DRT and associated technologies is a necessity for successful take-up actions in the FAMS project. From the beginning of FAMS over 40 planning, promotion, marketing and training meetings and presentations have taken place, not only in Angus but also elsewhere in Scotland. In addition to end-users/customers the target audiences of these meetings have included local authorities, major transport groups such as Stagecoach and First Group, and political decision takers (including lobbying of local politicians and members of the Scottish, UK and European parliaments). All major Scottish and UK political parties have now visited the Angus TDC. Cross party support for the FAMS concept has now been achieved and may result in further test sites for DRT projects in Scotland. The Scottish Minister for Public Finance and Public Services has instructed civil servants to assist the Angus project and will receive personal updates on the project's progress. The Scottish Executive is considering introducing further DRT pilot schemes in Scotland.

The local and national transport operators have also visited the site. A major public transport operator in Scotland is considering the purchase of taxis to feed main transport bus and train services.

The introduction of FAMS in Angus has attracted support from over 30 different groups including statutory bodies, service providers and users.



Figure 4.2: The FAMS Launch in Angus

ATF is at the moment represented in the following groups:

- NHS Tayside Transport Review
- Angus Community Planning Group
- Leader Plus Local Action Group
- Angus Association of voluntary organisations
- Small Business Gateway
- Local Area Groups. 6 have been established; Arbroath/Montrose hinterland, Brechin/Glen Esk, Carnoustie/Monifield hinterland, Forfar/Letham hinterland, Kirriemuir and the Glens, Newtyle/Liff/Muirhead

Three user groups consisting of members of the community, transport operators and policy makers, were established in August 2002. They meet regularly and co-ordinate the development work utilising local resources. The main goal of the groups is to embrace social inclusion, community planning, rural regeneration and development of integrated transport policies in service design.

The TDC was established by ATF at Stracathro Hospital, Brechin Angus in May 2002. The dispatchers started work in mid-May 2002. Over 100 application forms were sent out to people interested in the co-ordinators' positions. One full-time and one part-time transport co-ordinator were appointed. When establishing the TDC there were some problems with the Internet access at Stracathro hospital due to the age of take out the internal telephone exchange. After that the ISDN connection was installed and Internet problems were solved. The MobiRouter system was installed in the TDC in May 2002 for verification purposes. Thus the dispatchers had the basic application in use at an early stage in the project and the training and education of the users has been possible ever since. Indeed, when it comes to the take-up and its success it is important to state that training plays an important role in the success of the concept. Training must cover all aspects involved in the project including drivers, end-users, authorities, TDC staff and telematics suppliers.

One of the main objectives has been to guarantee the multi-modal public transport service and to improve the efficiency of the services. Initial trials involving the Scottish Patient Transport Service (PTS) have resulted in significant annual savings in service delivery costs. Customer complaints have also reduced. In a deregulated environment with each mode governed by different legislation this is no easy task.

In Angus the decision was made that a structured approach should be adopted in reporting the project to the media. It was decided that the background and aims of FAMS should be promoted in the following areas:

1. Trade press.
2. Institute of Transport Publications.
3. Local/regional/national newspapers.
4. Political - local, regional, national and European levels.
5. Universities and educational establishments.
6. Transport consultants.
7. Possibility of TV documentary covering the two sites.
8. Video/CD produced by University as a project to cover both sites.

The end-users are perhaps the most important actors in FAMS. The goal of the take-up and trial activities has been to provide the end-users with cost-effective, user friendly services that make it possible to reach the desired destination on time. The service performance is continuously monitored by the TDC, user groups, questionnaires and surveys, passenger complaints register. Over 3,000 leaflets were mailed to households and organisations in the area prior to the trials. Posters and information were distributed to all public buildings in the trial area. ATF also provided essential information about the FAMS project in summer 2002 and 2003 Newsletters.

Local events have been hosted to meet the demands of the hobbies/interests during and beyond the current end of the project. Over 10,000 questionnaires related to access to leisure activities were issued in September 2002 to each household and business. Information is shared with Angus Council's Community Education Department to aid development of community projects to meet residents' interests. In order to support the take-up process and to collect ideas for the new concept 1,500 survey sheets were circulated in the Brechin-Glen Esk area. 23% (350 surveys) were returned, highlighting individual interests in over 90 subjects. Statistically this sample is reliable and provides valuable information for the Angus site.

The Travel Club was launched in August 2002 and now has over 350 members. All the Travel Club events are supported by DRT using community transport based solutions. The Travel Club will be developed throughout the project's life and beyond, e.g. local clubs are to be created.

The TDC has co-ordinated various events in the pilot area during 2003 including the Angus Glens Hill Walking Festival. A supporting working group was established in September 2002 consisting of the Tourist Board, Angus Council Economic Development Department and Scottish Enterprise Tayside together with local businesses and individuals.

Contacts with schools and colleges were established in June 2002 to establish access to education.

A local business help group was created in October 2002 in conjunction with Scottish Enterprise Tayside, Angus Council Economic Development Department, the Small Business Federation and employment services to establish access to employment and training. A health service transport working group was established in April 2002 to establish access to health services.

Transport service providers want to increase the quality of service design by introducing multi-modal solutions and thus offer better services. To achieve this TDC technologies have been and will be used to map existing provision and demands before working with operators and statutory bodies on new services. Fare integration and structure, multi-modal integration and mobility management have been planned and developed and the processes will continue during and beyond the lifetime of the FAMS project. Joint ticketing between modes and operators is one of the goals in Angus, even though it is basically outside the remit of FAMS.

ATF has 3 MiDAS assessors and 3 Passenger Transport Assistant assessors (PATs). Driver training courses have been held resulting in 22 people achieving the nationally accredited MiDAS qualification. The training started in June 2002 and continues throughout the project and beyond.

From the beginning of the project it has been important that the users can book the journey in advance and to be sure of a reserved seat. This feature was introduced when live services were launched in autumn 2002. Its performance has been measured by questionnaires and a customer complaints register. User groups in Angus have identified that the vehicle comfort is a concern. This is because existing services have been mainly provided for schoolchildren. Creation of multi-modal, multi-agency services result in improved vehicle specification. For the FAMS project the ATF sourced 6 pre-owned vehicles are used to assist disability access within the project area.

Training of the users and testing the ideas of the basic concept with the help of the verification system has helped to fine-tune the ideas for the Flexible Agency. The MobiRouter verification system was installed in May 2002. A mobile vehicle test kit was provided to allow testing of various networks in order to assess which would be most suitable for the pilot area. Discussions with local operators highlighted the needs of some operators to

have a mobile unit to transfer between vehicles and in order to retain contact with the driver when not in the vehicle; however, mobile units have not yet been installed. Issues such as vehicle design and the location of airbags have highlighted difficulties in installing the fixed units in some vehicles. Black holes in vehicle/TDC communications networks were also established in Glen Prosen, Glen Clova and Glen Isla. Each glen (valley) has its own best network. This was one of the biggest technological challenges to meet in the Angus site. A compromise was reached and a network was elected to cover the majority of the pilot areas. However, Glen Clova, Glen Prosen and Glen Esk have limited coverage. This cannot be resolved until an improved network is supplied. Due to the road layout it is unlikely that any vehicle will be out of contact for more than 30 minutes. People wishing to travel within the network holes have to book the day before in order to be sure that operators can be made aware of their request.



Figure 4.3: The Aplicom unit

MobiRouter was used between Months 2 to 9 to establish the potential to meet stakeholder expectations in Angus. This allowed the system to be demonstrated to various stakeholders and establish the need for refinements to meet the needs of the project partners. The activities related to take-up have been carried out in close relationship between the users and the supplier. All the findings have been reported and prioritised so that the most relevant and crucial ones were taken care of first. There were other findings that were not so important for the trial phase and FAMS, but they provided ideas for future development after FAMS. All these ideas and comments were also filed and will be used in the future, when needed.

4.2 Take-up at the Florence site

In Florence, where the basic system was already running before the FAMS project, the take-up activities could be carried out effectively, since most of the users already had some level of knowledge about DRT services and the dispatching system. FAMS was able to build up upon and around the existing DRT services in Porta Romana, Campi Bisenzio, Scandicci, Sesto Fiorentino, etc. There are plans for gradually expanding these services to co-ordinate all intermediate transport services in the Florence Region. Thus, FAMS take-up activities have long-term goals. The trial technology adaptation started in Florence in May 2002. The take-up involved detailed definition of the DRT services managed by the Agency, collection of required information and building the required local datasets. The solutions developed and taken up for Florence include Internet-based services to improve access to and management of various DRT schemes at the site. The services are targeted for both several DRT user

categories and DRT services providers, available through the FAMS Agency Portal providing access to different flexible transport schemes in the area.

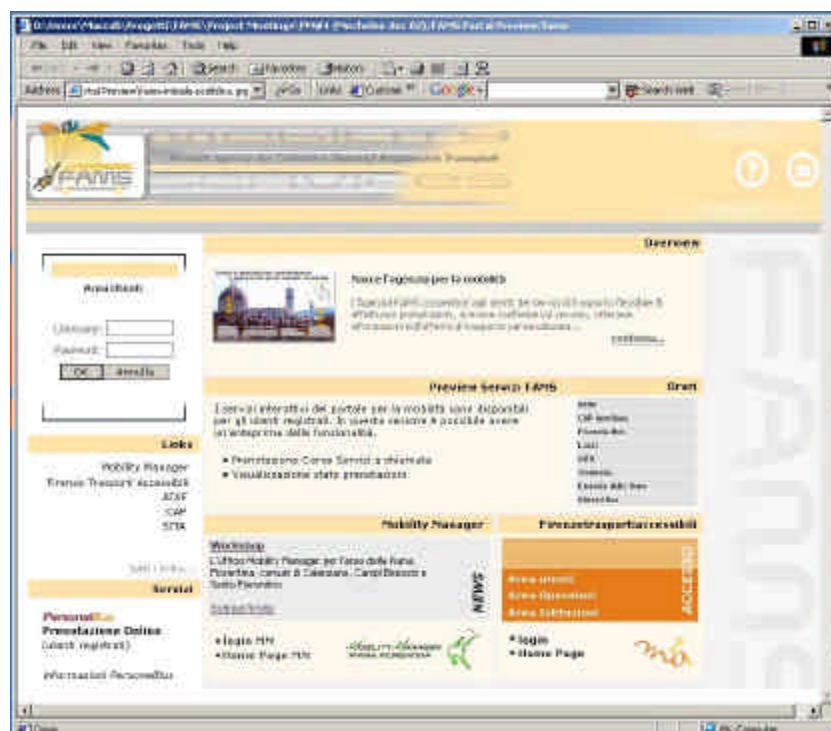


Figure 4.4: The FAMS Agency Portal

Site preparation started in June 2002 covering collection of data related to the DRT services managed by the Agency, implementation of local datasets, preparation of local technical systems, design and preparation of new or renewed DRT schemes, personnel training, negotiations with different stakeholders, information provision and marketing of future services. Specific attention was given to the involvement of local authorities and integration of DRT services, as well as on the overall concept of the Agency. A specific training system and manual were developed to practise trip booking, reservation, customer management, request notification etc

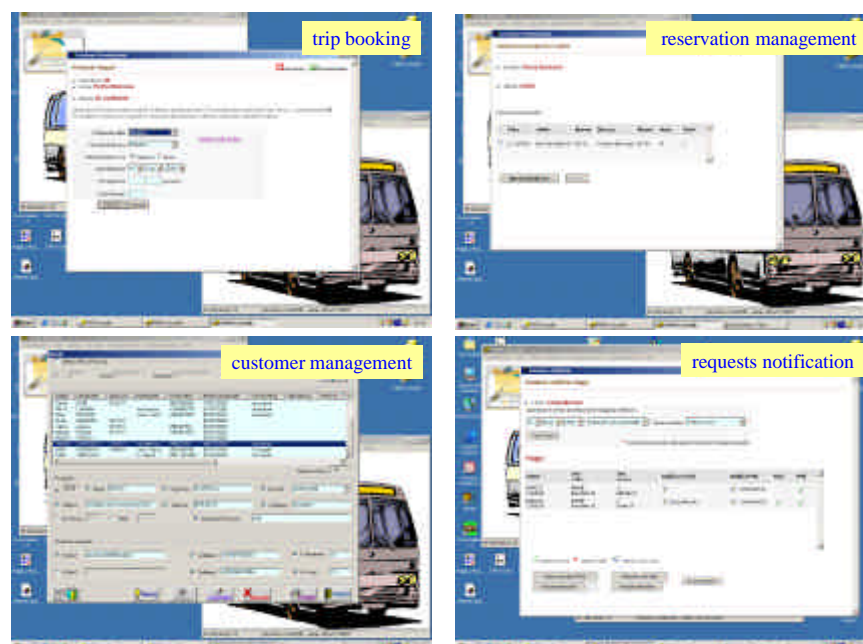


Figure 4.5: The Florence FAMS Training System

The trial deployment activities started with installation and training of the local users and operators. This work was completed in November 2002 with the deployment of DRT software at SITA, the enhancement of TDC software, the development and deployment of main B2C and B2B web services and the FAMS Portal in Florence. The related verification activities were also carried out by the start of the trial period. The trial period started in Florence in May 2003.

The core DRT planning/operation facilities is provided by the PersonalBus™. To match the needs of FAMS these have been extended with the required B2B/B2C components and made interoperable through different transport service providers by the development of an information, booking and reservation portal providing a set of facilities as a common interfacing module with users/citizens/associations, common resources availability and a service management interfacing module with Li-NEA, ATAF and SITA fleet providers.

It was important to identify the main goals and objectives of the stakeholders for the Florence site. Rather than identifying goals and objectives for the individual stakeholders it was preferable to group them for typology to avoid an excessive level of detail. This stakeholder grouping has also helped to show the commonality of the goals for each typology. The process of identification of the goals revealed that all the stakeholders have a common main goal - improving the quality of the service. The main goal for the FAMS agency is to manage the service.

For the dispatchers it was fundamental to be able to depend on an effective means of communication in order to assure the dispatch of the information. For the drivers in Florence it was important to offer a better service and to improve the working condition. At the local level the main authorities involved in the take-up and related activities have been Florence Town Council (which fixes the rules of the services within the city), the Province of Florence (which signs the service contract with the operators) and the Tuscany Region (which has the available economical resources and defines the guidelines for harmonised and comprehensive transport policy upon homogenous areas both from a geographic and mobility point of view.)

The DRT services have been designed to provide an alternative service to the users of an area with limited public transport. Their main characteristics are a booking service for long- and medium-term requests (off-line service); a call service for short-term requests (on-line service); routes are made around the stops in the service area; the users' requests are managed by ATAF by means of a TDC; and the planning/management of the service is managed by with dedicated software or, in the simplest cases, is made manually by the TDC operators.

5 TRIAL OPERATION

Both in Angus and Florence the preparatory work had been made in good time before trials. The TDCs at the sites, the transport operators and the authorities had all organised their work

| | ATAF | SITA | ANGUS |
|---|------|------|-------|
| 1. DRT services | ✓ | ✓ | ✓ |
| 2. Airport service | ✓ | ✓ | |
| 3. Mobility Manager service | ✓ | | |
| 4. Door-to-door delivery to disadvantaged users (D&E) | ✓ | | ✓ |

Figure 5.1: The FAMS Services Operated in Trials

In Angus, even though the DRT concept was new, the dispatchers had been trained and they had time to become acquainted with the DRT system. In Florence, the dispatchers had been using the basic DRT system for some years and had no teething problems regarding the DRT system. However, at both sites the training and management of all personnel involved in the trials has been and continues to be of great importance. The suppliers will provide assistance and training throughout the project, since the objective is to continue the operation and keep the agencies and applications in operation permanently after the FAMS trials. The FAMS trials concept operates under the existing regulatory frameworks both in Scotland and Italy. The success of the project may be in part due to existing regulations in one or both countries; therefore civil servants and elected members have been advised of the concept and any possible problem areas throughout the trial period. Based on the trial experiences the FAMS consortium should be able to propose solutions to problems quoting best practice from other countries. A successful, flexible and cost effective transport system requires a flexible regulatory framework. Depending on the market conditions in any country (deregulated or regulated) different solutions may be required.

5.1 Trial Operation at the Angus Site

In Angus a dialogue with all political parties at local, Scottish, UK and European levels was started at early stages of the project. Broad acceptance from all parties has been forthcoming and a realisation that although an integrated public transport system is the aim of the Government, the current legislation may not allow this to take place. Although the majority of public transport services in Angus are delivered by the main operators, Strathclyde Scottish and Meffans of Kirriemuir (both part of the Yorkshire Traction Group) and Wishart of Friockheim (Part of National Express Group), the concept and trial results are being reported to all major UK Transport Groups including Stagecoach and First Group. When the FAMS project started the characteristics of the existing service provision were:

- School transport 190 days per year.
- Shoppers' buses once or twice per week.
- Client based services: patient transport, education transport, social work transport, voluntary organisations.

The Angus trial area has been poorly served by traditional public transport for over 30 years. Local people have become accustomed to the lack of public transport services. Population in the glens in Angus has declined over this period of time threatening the very fabric of the area. Schools are faced with closure due to lack of pupils. Shops are closing due to lack of customers. The Angus site is typical of rural areas throughout Scotland and Europe. The DRT services for the disabled and elderly cover the whole Angus area.

Brechin, Kirriemuir and Alyth act as hubs in Angus. They are served by commercial services linking the major towns in Angus and also Dundee. To maximise the use of commercial resources the schools transport in the area is utilised. The research with existing operators showed that over 50 vehicles of various sizes are available schooldays, weekends and school holidays between 06:00 – 08:00, 09:15 – 15:00 and 16:30 - 24:00. They undertake school contracts for Angus Council. There is no resource tendering to meet the needs of all the agencies in the area. All operators are keen to expand their business and welcome FAMS being trialled in Angus. The main characteristics of the trial services being established by the site are as follows:

- Services operate under private hire legislation.
- Services operate between the hours of 07:00 and 19:00 hours Monday to Friday and are open to all residents and visitors to the pilot area.
- The TDC is open for calls between 08:00 and 17:00 Monday to Friday.
- Journeys only operate on demand, with no fixed routes.
- DRT services utilise vehicles currently used to provide school transport.
- The aim of the service is to allow access from/to the glens to link with the existing commercial bus network and to increase the equality of citizens.
- Clients can access the service by calling the TDC based at Stracathro Hospital, Brechin (Tel. 01356 665000) or by accessing services through driver en route.
- The advance booking time is 24 hours (the objective is 2 to 4 hours) until customers and operators are used to concept and holes in the communication network are resolved.
- Participating operators will receive passengers and goods requirements, route pick-up and drop-off details and times at 17:00 hours the previous day.
- The operator will be e-mailed or faxed confirmation of the details for the next day.
- Daily management information details include live and dead mileage. Fuel and labour costs, details about vehicles used, income from passengers and passenger numbers by type to be supplied weekly.
- The customer calls giving their name, pick-up point, drop-off point, pick-up/drop-off time, number of passengers travelling, luggage requirements, accompanying dogs, disability requirements, connecting service requirements.
- Door-to-door services are offered where no commercial services operate.
- Where it is possible to undertake the whole route or part of the journey by a commercial service a door-to-service link is provided.
- Complaints/suggestions will be registered.
- Confirmation of reservation will be by phone, if needed, or text message.
- Customer profiling.
- Service performance will be followed up.
- TDC and operator performance will be followed up.
- Anyone can use the service to gain access to/from the area by contacting the TDC or accessing a service directly through the driver en route.

Angus operators are

- J Donald with 1 Renault Master 8 seat minibus (Glen Isla – Alyth).
- Glen Cabs with 8 seat Euro Taxi wheelchair accessible and Meffans Coaches with a 25 seat coach (Glen Clova – Kirriemuir).
- Glen Esk Travel with an 8 seat Renault Master (Glen Esk).

Customers are advised about the options available at the time of booking. If a taxi is to be used, the cost of the journey is made known before the journey. Matrix pricing based on each operator's rates will be used to advise on all options and allow the customer to decide whether to accept the offer. Taxi fares in the UK are calculated based on imperial measurements (miles and yards). It is important recognise this in the design of systems to ensure continuity in pricing information given to the customer.



Figure 5.2: The FAMS Interchange Stracathro

During the Angus Hill Walking Festival 29th May – 1st June 2003 over 600 people used services co-ordinated by the TDC for the event. The experiences were highly encouraging.



Figure 5.3: The Hill Walking Festival 2003

Several visits have been made to the Angus site, including the Swedish Leader Plus delegation, Aberdeen University, Strathclyde University, Abertay University, the Scottish Executive, Forward Scotland and the Mobility Access Committee Scotland. Four vehicles were fitted with the hardware needed to communicate with MobiRouter during the trial period. This allows the TDC to communicate throughout the operational day.

In addition to the Aplicom device other options are also now available: WinCE based devices and embedded Windows2000 devices. They can easily be transferred from vehicle to vehicle and carried by drivers who can access information at any time are preferred by some operators, e.g. in rural areas owner drivers do not sit in vehicles all day. Vehicles, especially MPVs, are fitted with multiple airbags. Fitting fixed on-board units is becoming increasingly difficult due to dash board design. The rural operators do not sit in vehicles all day. Information sent to vehicles is often not received by operators sitting in depots. It is seen that the PDA system would be essential to overcome this problem. Indeed, a small PDA unit will

provide a solution and it may be the future terminal used in Angus. Figure 5.4 describes the MobiRouter architecture and Figure 5.5 illustrates a PDA terminal (not installed in Angus, since the technology was not available when the equipment was procured). An additional problem is that fitting fixed on-board units is becoming increasingly difficult due to dash board design, e.g. vehicles, especially MPVs, are fitted with multiple airbags.

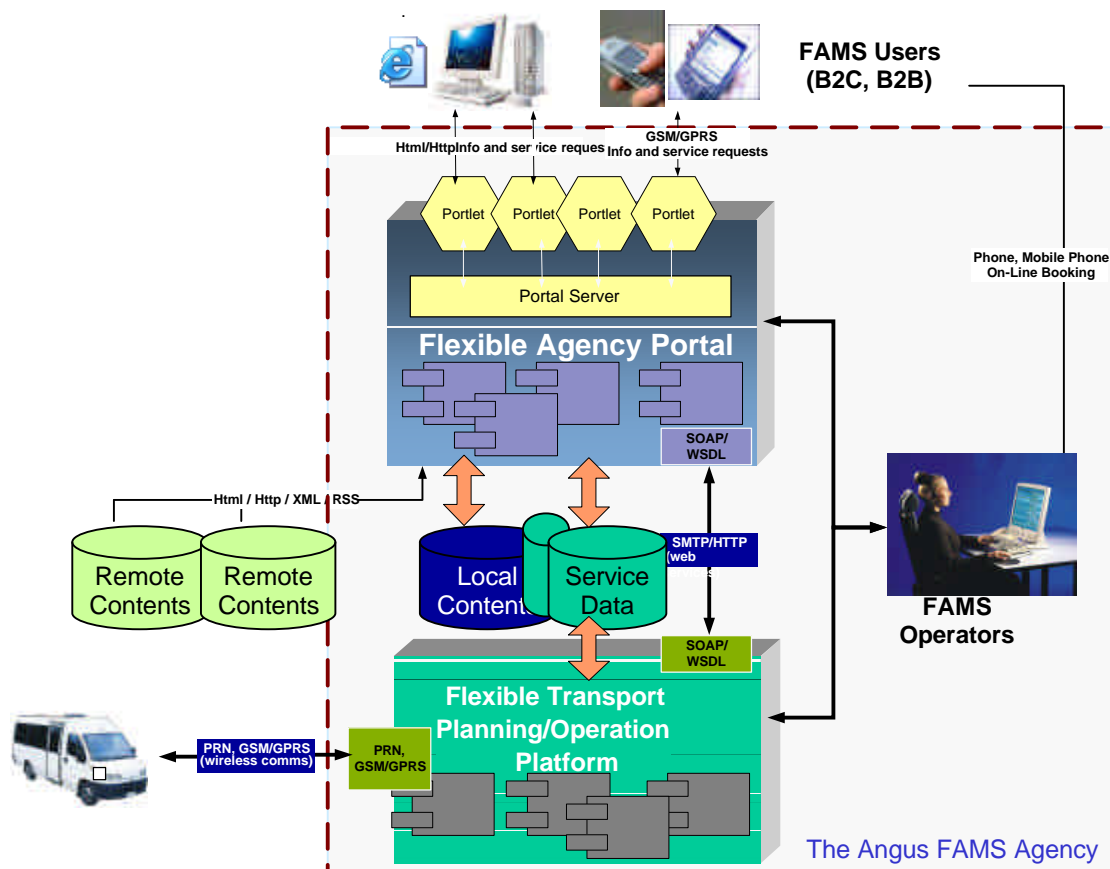


Figure 5.4: The Angus Trial Architecture



Figure 5.5: The MobiRouter physical architecture

5.2 Trial Operation at the Florence Site

The trial technology in Florence includes Internet-based services to improve access to and management of various DRT schemes. The services are targeted to DRT users (Figure 5.7) and to DRT services providers (Figure 5.8). The services are available through the FAMS

Agency Portal providing access to different flexible transport schemes in the area. The portal is Computer Associates' Clever Path™ Portal including portal platform and based services such as access, profiling, etc. The web services (both B2B and B2B) are based on Microsoft Share Point Team Services™, with some components for content management (news, events, etc.) and collaboration (calendaring, discussion forum, etc.) For the portal users there are possibilities for service booking, confirmation, vehicle availability checking, etc). The TDC software used in the trials is based on PersonalBus™ by Softeco Sismat with some extensions to interface web services. The FAMS Portal allows access also to other sites/portals.

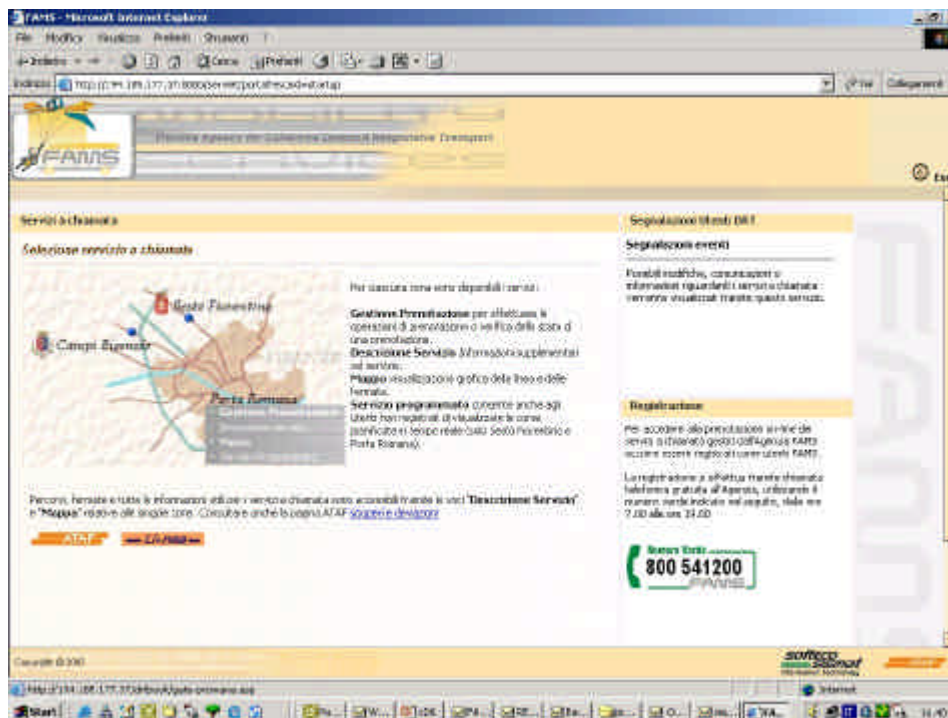


Figure 5.7: User Area of the FAMS Portal

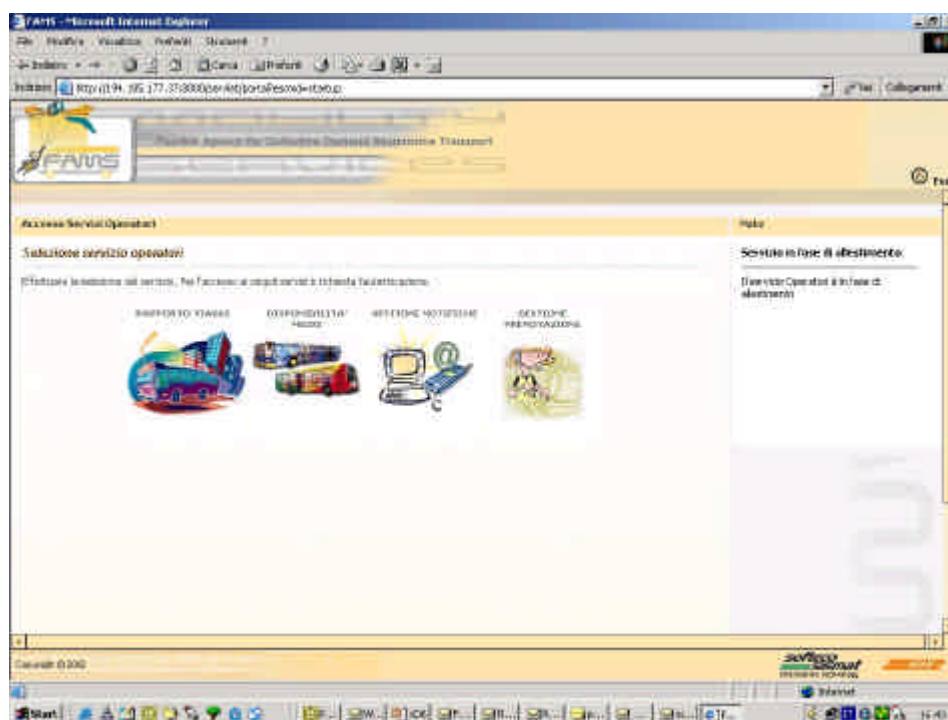


Figure 5.8: Operator Area of the FAMS Portal

Softeco Sismat has provided technical and other support throughout the trial period. This is substantially more than in a typical hardware/software maintenance contract, and is a core element of the partnering between the User and the Supplier.



Figure 5.9: PersonalBus™ Logo



Figure 5.10: TDC Operator using PersonalBus™

In Florence the agency is the reference (both as regards service booking/reservation and management and optimisation of the resources – vehicle availability) interface for the users of intermediate transport, with the responsibility/task of co-ordinating the different operators and managing in real-time the set of flexible services described in Chapter 3. They include:

- Many-to-many DRT services in Campi Bisenzio town, operated by ATAF.
- Many-to-many DRT services in Scandicci town, operated by LI-NEA.
- Demand responsive, special bus service connecting Florence's A. Vespucci Airport with the inner centre, operated by SITA.
- Door-to-door DRT social services for special user categories operated by different Associations/Public Health Care transport service providers.
- Dedicated school transport services, operated by ATAF.



Figure 5.11: ATAF Bus in Campi Bisenzio

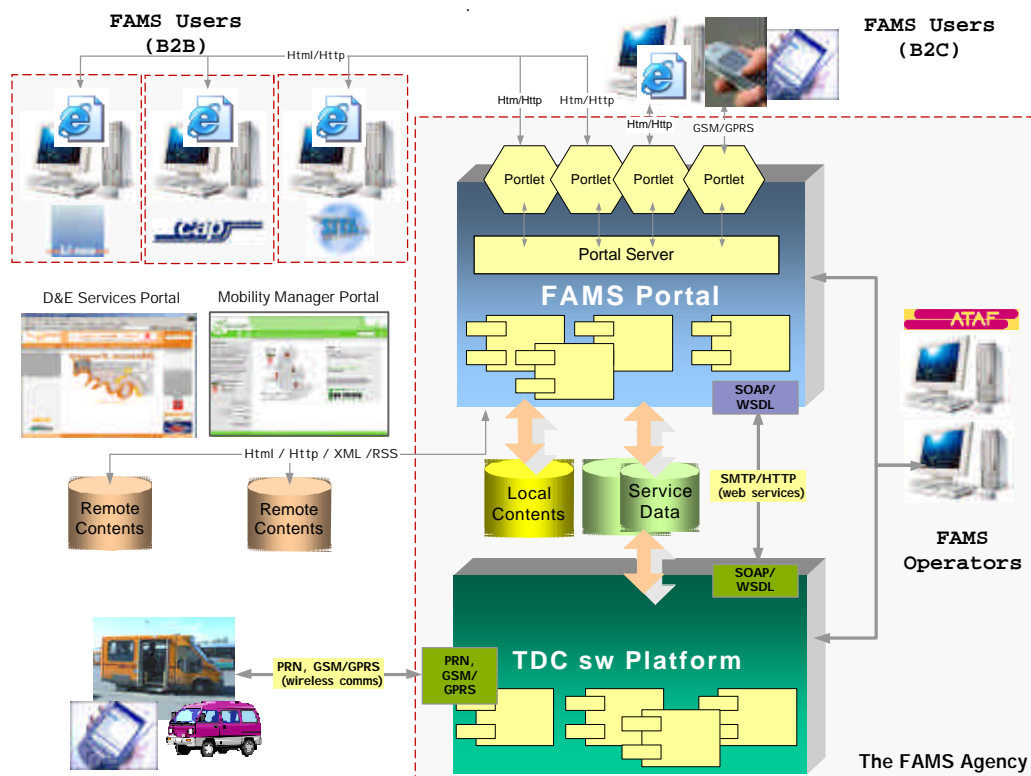


Figure 5.12: The Florence Agency Architecture



Fig. 5.13: The DRT drivers PDA



Fig. 5.14: The In Vehicle Terminal of DRT service

6 FINDINGS

The following list summarises the first findings and experiences of FAMS:

- Proper user-supplier partnering is needed to carry out the pre-trial phases and take-up.
- Development and take-up of DRT concepts and applications cannot be separated from the political, legal, organisational and institutional frameworks.
- Technological problems are often easier to solve than institutional and organisational ones.
- DRT concepts and flexible agencies should be based on the users' needs, in particular the needs of special users should be further studied and relevant services developed.
- The end-users have accepted DRT and the Flexible Agency concept.
- Some level of financial authority support is normally needed in order to provide DRT services.
- DRT services may be cost effective when statutorily required services are financed by the authorities, e.g. disabled and elderly.
- The introduction of DRT often means some level of telematics
- DRT development work cannot be carried out without committed responsible actors that understand the goals of the development activities.

6.1 *Findings at the Angus Site*

As with any new concept there has been a mixed range of views to DRT at the Angus site. It is therefore essential that all sectors are involved in the design, evaluation and monitoring of services. Building trust in the concept and associated technologies cannot be achieved by imposing the idea in a commercial environment. The type, number, and size of the operators in an area may have a bearing on the receptiveness to innovation. The deregulated transport environment, as in Scotland, means that trials of new concepts can only succeed when the operators are willing to participate.

6.1.1 **New Services**

Rural transport provision in Angus is centred on school transport and the vehicles used to provide it. Angus Council has encouraged operators to register school services thereby making them available to the general public.

FAMS in Angus seeks to utilise the dead mileage to and from schools to benefit local people and visitors by making links with the existing public transport network between the Angus Glens and Alyth, Kirriemuir and Brechin. These towns are used as hubs linking with the existing public transport network. Therefore it should be possible to provide a school day only service morning and afternoon from and to rural areas at minimal cost. The outcome is that these services allow equal opportunities for rural residents compared to those available to residents of the three towns.

In addition, when other day time services such as PTS, meals on wheels, school meals, internal mail and parcel delivery are taken into account, it should be possible to meet most requests without the need for new resources.

The key to the introduction of new services is community involvement in the design. However, it cannot be understated that the lack of long-term funding for DRT restricts people from changing how they travel. At every meeting ATF is asked how long the services will operate. No assurances can be given beyond May 2005.

6.1.2 Frequency

Traditionally, frequency is seen as the most important aspect in service provision. In the pilot area where the service provision equated to one return journey per week prior to FAMS the local expectation is extremely low. The ability to access individual interests has been seen as important. This was fundamental in the creation of the Angus Travel Club. Lack of transport in itself is not a problem, but lack of access to personal interests is the underlying issue.

Rural communities are more reliant on self-help. To create employment potential within the Glens, ATF has worked closely with local hotels, craft shops and activity centres to create markets to meet people's interests. This also creates travel demands from outside the area, which can result in visitors cross subsidising rural resident's travel. For example the creation of events in the Glens, such as the Hill Walking Festival, can result in a vehicle having dead mileage from the Glen back to Alyth, Kirriemuir and Brechin, creating journey opportunities for local residents. Vehicle choice will depend on the initial level of demand for the event.

6.1.3 Increase in Opportunities to Operate Service

True DRT services in Angus are welcomed more by groups than individuals. Experience shows that the lack of a fixed route or timetable is perceived by some individual to infer a lack of guarantee or certainty that the service will operate. Some elderly residents do not want to be picked up from their home as someone on the bus would know the house was empty. The weekly bus with the same driver is seen as a safe solution. Even being able to advise the name of the operator and vehicle being used will not satisfy some people. Survey material is expected to support these initial findings.

DRT is highly successful for local events such as the Hill Walking Festival, raft race and Highland Games. The FAMS concept enables communities to design events in the knowledge that the TDC can co-ordinate all transport requests. Services can be designed to suit the event and the customers. Pick-up points and vehicle size and other requirements can be determined by demand.

Youth groups are a market that has a vast potential: ATF is in the position of being able to run services for youth groups to places such as the cinema and ice rink. However, some parents see DRT as a means of passing parental responsibility on to the transport provider. ATF is working with Angus Community Education Department to resolve this issue.

Poverty and lack of information in rural areas is still a problem. Not everyone has a telephone or access to local newspapers. Literacy problems exist in some cases. Promoting the concept fully requires local champions to act as information providers.

Promotion of recreational opportunities in the Glens has also increased awareness of the area resulting in more visitors to the area. The Hill Walking Festival demonstrated that there is a vast demand for resources in the area when a co-ordinated events package is produced. TDC technologies can report the reason for travel where this is freely given by users, although locals are less open in disclosing this information, thereby assisting in planning future services.

Initial findings appear to support the FAMS concept as assisting local people to access local events and also promoting local businesses and opportunities. Co-ordination of marketing materials promoting local issues, events and facilities into one booklet for each year would simplify marketing. A diary of events with sections relating to employment, training, education, youth, tourism and health is a priority for 2004.

6.1.4 Increase in Door-to-Door Services

DRT has assisted certain sectors of the market. For example the Angus Disabled Ramblers can now organise events anywhere within the Glens in the knowledge that their members can be picked up door-to-door. This group has over 20 disabled members who now have the confidence to increase their activities as transport is no longer a problem.

6.1.5 Increase in Service Operating Hours

As ATF is only providing services on demand, the increase in operating hours is marginal as ATF is utilising dead time and mileage that operators were already carrying out for after and before school contracts.

6.1.6 Increase in Days of Operation

The initial target market was access to training, employment, childcare, health, visitors, shopping and leisure pursuits. Due to the existing high car ownership in the area DRT services are operating initially Monday to Friday 07.00 – 19.00. The main reason for this was to assist employment training. Through discussions with local groups, employment and childcare are clearly linked, e.g. some mothers seek part time jobs Monday to Friday during schooldays, therefore ATF is working with Angus Childcare Partnership to create after school clubs to enable children to be looked after until 1800 during term time. With the advent of the Travel Club and community based events, weekend services may be worthy of consideration. Due to the current staffing level of 1.5 persons at the TDC it is not possible to provide 7 day cover at present.

Locals still use the old one bus per week fixed services due to the fear of the DRT services ending when funding runs out.

6.1.7 Increase the Number of Destinations Reached by Integrated Services

Direct DRT services were designed to act as feeder services to the existing fixed route services operating to and from Alyth, Kirriemuir and Brechin. Places of interest and local event centres were also targeted to attract demands to serve the interests of locals and visitors.

Natural interchanges are evolving through the development process. Health centres, village halls, shopping centres and travel centres are all evolving as integration points as the trial continues. It is vital that these interchanges evolve as a result of user choice rather than taking the strategic planning approach of building a purpose built interchange before demand has been fully established. People seem to be changing their travel patterns, but at the moment they are mostly single purpose trips such as employment, health and visiting door-to-door. As services and confidence grow so too will passenger expectations. Thus, in the longer term existing interchanges may not be the prime choice once people consider multi-purpose travel.

6.1.8 Extent of Ability to Integrate with other Bus Services

The ability to integrate with other bus services was one of the planned key design aspects of the Angus pilot. Travel interchange in Alyth, Kirriemuir and Brechin would take place at the bus terminal points. However, although this was regarded as essential and responding to the public demand, the uptake has been disappointing. A number of reasons have been established for this:

1. Lack of joint ticketing.
2. Time factor: fixed routes plus DRT can take 3 times as long as a car.
3. No availability of concessionary fares on DRT services.
4. No booking of seats available on fixed routes.

5. Perceived poor reliability of public transport.
6. Difficulty promoting DRT services outside the pilot area restricts knowledge of services available to the tourist market.
7. Lack of trust in a new concept which has no fixed route or time. People wonder whether it is too good to be true.

The current system ensures that the DRT service will arrive 5 minutes before the fixed route service and wait. However, the fixed route vehicles do not have any communications systems to enable contact with the TDC. This leads to a situation of having a good concept but insufficient technology to fully exploit its full potential.

Extremely low initial use highlighted by the survey work demonstrated that some people require a purpose and destination before they can choose to travel. The Angus Glens offer natural beauty that matches anywhere in Europe and hill walking is Scotland's most popular pastime followed by fishing and golf. All these activities are available within the Angus Glens.

6.1.9 Extent of Ability to Integrate with Train Services

The main railway stations in Angus are situated in Montrose and Arbroath. These are outside the pilot area but services do operate to Brechin and Kirriemuir so it is possible (although somewhat time consuming) to get from the rail services to the DRT services. Again ticket issues and booking seats would be an issue. The size of vehicle being used by an operator on any given day or if the vehicle is low floor and wheelchair accessible is not known.

6.1.10 Access to Healthcare

Health services in Angus are currently undergoing a review. This process has been ongoing for several years. Changes in the direction are commonplace. Before ATF planned its services the health policy was to centralise services in Dundee and a new hospital in Angus was to be built. Now the policy is that Stracathro Hospital, Brechin will be changed to an outpatient day hospital and will not be closed as previously announced. Brechin Infirmary, Montrose Infirmary and Arbroath Infirmary will be retained; Whitehills Hospital Forfar will be rebuilt and Ninewells Hospital in Dundee will be used to supply Health Services to Angus residents.

Rural residents without access to a car can, on referral by a doctor, use the PTS. However, the journey times can be extremely long, being up to 3 hours each way. Volunteer car drivers are also used. They are paid 38p per mile which is an extremely expensive method of delivering transport. In the near future a pilot project is to be established utilising the Angus TDC. The reorganisation of health care facilities for Angus residents has resulted in delays in introducing a more cost effective user friendly service. It was hoped that services would be integrated from 13th October 2003, but due to Scottish Ambulance Service reorganisation this has been put on hold. A smaller trial may take place starting in December 2003.

6.1.11 Combined Information and Payment Services to Users

The Angus TDC provides information regarding all fixed route services, voluntary organisations and operators. Bookings cannot be made other than for DRT. For information purposes it is difficult to establish fares to advise potential passengers as the fares are not printed on timetables. All timetables have been entered into the system and the Angus Council advises of the changes. The driver will advise passengers to contact the UK's public transport helpline (which gives times only and no fares).

Some questions related to fares and ticketing have emerged such as why concessionary fares cannot be applied to services where taxis are used and why is there no joint ticketing between services. These questions are justified and they should be answered with a new public

transport structure in the future. A simple definition for the meaning of public transport is required, to assist decision makers and customers alike, before the true potential of the TDC and DRT technologies can be achieved. At the moment this is the greatest single problem in the UK due to the wide range of services that are provided under differing legislation.

6.1.12 Development of New Service Concepts for DRT

The aim is to maximise the use of commercial resources in the area. It is therefore essential that the resources used to provide school transport in the area are utilised. A number of client based statutory body services are also provided in the area by the Scottish Ambulance PTS, Social Work Department and Day Care Centres.

Regarding future activities after the FAMS project, there seems to be many possibilities for new types of public transport services in the UK. One change might be made by a major bus company which is facing operational problems and is open to new ideas to make operations more efficient. Some potential has also been identified in car rental and car repair services: running these businesses generates lots of pick-ups and drop-offs, which could be controlled and optimised by a virtual agency. In the long-term there is one major potential: the ownership of a car is coming increasingly expensive, and it is likely that car-pooling will become popular, which could be a huge potential revenue generator for flexible agencies. Co-ordination of transport demands for major events, such as the Olympic Games, World Cup, rock concerts, Highland Games, football matches, is an area where FAMS related concepts and technologies have vast potential. It is foreseen that once the project has demonstrated solid results, such possibilities could be promoted in trade press and academic publications.

6.1.13 New Technologies

Some of issues mentioned here have also mentioned earlier. Due to the high reliance on school transport the drivers are not in their vehicles all day. At an early stage in the project it became apparent that information was not being responded to for reasons other than those of a technical nature. Information sent to vehicles was often not received by drivers sitting in depots or at home.

In addition, the vehicle design restricts the use of fixed on-board units; in particular the presence of airbags can make it difficult to fix on-board units legally to dashboard. A PDA system could be essential to overcome these problems. Furthermore, large commercial operators would rather have mobile communications that can be transferred easily between driver and vehicle.

Black holes in vehicle/TDC communications networks are a reality in Glen Prosen, Glen Clova and Glen Isla. Each glen (valley) appears to have its own preferred network. This was one of the biggest technological challenges faced in the Angus site and cannot be resolved until an improved network is supplied or if multiple networks can be accessed by the on-board unit.

The cost of calling the TDC has been seen as unnecessary by some customers who do not understand why it is not possible to deal with the driver directly. This may be orchestrated by operators as a way of keeping regular customers for themselves. Whilst directly contacting drivers or operators can guarantee business, it does not meet the FAMS objectives of maximising the use of all existing resources, which should ultimately benefit the customers. These problems are understandable since the customers may not always see the whole picture, ideas and objectives of DRT services and the TDC.

6.1.14 Training

Training has played an important role in the success of the concept. Training has covered all aspects involved in the project including drivers, consumers, authorities, the TDC personnel

and the telematics suppliers. A log of all aspects of technological and operational issues raised during the project is essential to demonstrate the success or otherwise of the concept.

6.2 Findings at the Florence Site

The findings in Florence differ somewhat from those of Angus. Whereas Angus is a green field site, Florence has been running DRT services for several years. This means that the findings are at the moment more related to technical issues than organising and running the services. The technological scenario built up to support DRT operations in Florence and the operational experience gathered has provided the starting point to upgrade the existing TDC into a Flexible Agency, interconnecting the different public (ATAF) and private transport operators (SITA and Li-NEA) and co-ordinating, differentiating, optimising the overall intermediate services offer in the metropolitan area. The core DRT planning/operation facilities for the Agency is provided by the PersonalBus system. The extension has been possible mainly due to the introduction of the required B2B/B2C components to the interoperability through the different transport service providers.

Through the FAMS organisational and business model, the agency is becoming the unique reference (for service booking/reservation and management and optimisation of the resources based upon vehicle availability) interface at the Florence site for the users of intermediate transport, with the responsibility of co-ordinating the different operators and managing in real-time a set of flexible services. The different types of transport should achieve a number of business advantages:

- Personalised services for particular user categories such as disabled, elderly people and schoolchildren, tailored to each category's specific needs.
- Provision of information on service quality and planning.
- Special services connecting the main city attractions, the airport, the main railway terminals and the main hotels.
- Integration of e-Business solutions to allow the interaction of all the transport operators and easy access to services (information, booking and reservation.) to different user categories.
- To ensure adequate interaction and co-operation between service providers (SITA, LI-NEA, Citizens Associations) and the service planning and dispatching TDC (ATAF).
- Transfer of operational and management expertise from the current DRT operated by ATAF in Florence to the new Agency

In addition to facilitating the development of wider service options for customers, the new integrated agency offers a true opportunity to co-ordinate for Florence at the Metropolitan level all the actors involved in the provision of services (public transport operators, municipalities, disabled associations), thereby improving the service offer to the users and optimising the overall financial resources utilisation for transport services. Some of the institutional and organisational issues related to co-ordination between the different service providers had been investigated in the Florence Metropolitan Area and agreements had been stipulated before the start of the Agency, in order to prepare the scenario for the new operational challenges currently undertaken within FAMS. The activities included trial operation which started in May 2003. [The delay at the Angus site is mainly due to the different level of complexity and state-of-the-art required for starting operations.]. A lot of effort has been made in order to meet the first feedback received from the operators after the training phase.

The real activities on the FAMS console (see Annex 2) were allowed to gain experience on its operational requirements and on the main needs of the target categories (mainly the TDC operators for B2B aspects and passengers for B2C aspects). In this context, the suggestions that have arisen from the TDC operators are already significant because they have gained experience on portal usage, even though during the summer the amount of requests is quite low so that the system and the operators themselves have not been stressed compared to the

foreseen full operation. With regard to passengers, since schools are closed during summer and trips requests by workers are considerably lower, no significant quantitative data have been gathered so far. Comments are mainly qualitative with some observations from users/passengers being collected.

6.2.1 Adaptation of technology (period July – September 2003)

The main observations have already been taken into account, enabling a constant fine-tuning of the Agency and its functions. In this sense the user/supplier partnering that is a core aspect of the FAMS Agency (co-ordination of the operator and networking) has played a fundamental role due to the technical and operational support by all the actors of the DRT service provision chain. Clearly this user/supplier networking and collaboration will span not only until the end of the trial operation but also after that, as took place during the establishment of the previous DRT and TDC. A synthesis of the first modifications to the Agency structure and functionalities deriving from the suggestions arising from the operators and sample of users and stakeholders follows. Adaptation and tuning of FAMS services have been based on feedback from the early days of operation, particularly the modifications which affected the following FAMS components:

1. FAMS Portal

General structure and layout

- more space for the user and operator areas; different DRT services are now highlighted

General navigation facilities

- improved presentation of navigation buttons, return to previous sections, etc. across different portlets

DRT reservation services

- graphical map accessible in the booking portlet, showing service networks and transport lines of interest for the requested service

Trip refusal services

- service added for refusal of offered DRT trip after notification from the Agency

2. Back-office services for FAMS Agency operators

Booking management

- improved registered user's searching, sorting and retrieval through ID

User's Requests management

- improved time performance in searching, loading, selection and management (e.g. cancellation) of users' requests

Reservation management services

- both existing and ad hoc trips proposed to the operator (Porta Romana DRT)

Logging services

- improved access, search and filtering of logged information

Trip presentation

- improved presentation of circular routes; main destination displayed

Error handling

- completely new error code/message architecture implemented, clearer information for the operator

TDC Operators management services

- ID assigned to each operator during user creation/configuration

Security

- portal service parameters can now be modified only by operators with the required privileges

3. Web server and portal server

4. Adapted TDC software

The modifications implemented have been successful, providing substantial bug fixing and user's adaptation for further testing and evaluation during operation.

6.2.2 Main results

The operational activities are still on-going and are planned to be retained at least until the end of the project. In order to promote use of the Agency and to verify its usability and impact on users, about 100 users/citizens have been contacted within the local promotion activities and they were provided with web access to all services and booking facilities. The summer period did not provide many bookings and therefore significant quantitative data on the Agency, but about 40 bookings have already been made via the website with no obvious problems. This is the first noteworthy result of the Agency implementation and can be considered its real start-up. The transport operators, in particular Li-NEA, are using the FAMS functions for service management and co-ordination (for example the daily list of vehicle availability for the Scandicci services is currently managed by the web).

The services of the Mobility Manager have been fully deployed and utilised by the different users (workers) and industrial companies (mainly for managing the survey/questionnaire and to have the specific information on the public transport services inside this area). In parallel, the site-level data collection has started, based on the defined evaluation plan while a complete definition of the reference parameters and indicators for the existing DRT services has been defined and consolidated. The data collection, as well as the trials, will continue for longer than originally expected, at least until the end of the project, in order to gain the most significant data.

The services provided in Florence under FAMS are and will be evaluated on the basis of the set of indicators established in Deliverable 2. The main indicators for the services are listed below, in order to describe the current Agency and TDC both from the technological point of view and from the user perspective (the detailed list with results will be provided in (Deliverable 7 – “Comparative Evaluation and Business Case Assessment”):

1. Total operating cost per vehicle/revenue time
2. Operating cost/km offered
3. Operating cost per ride
4. Fare revenue/operating cost
5. Load factor = passenger trip kilometres/seat kilometres
6. Total actual trip kilometres/total vehicle hours
7. Number of passengers boarding the vehicles/revenue time (pass/h)
8. Vehicle utilisation
9. Number of bookings per trip
10. Booking and dispatch cost per passenger
11. Number of connected phone calls per active TDC hours (calls/h)
12. Service hours
13. Service extension
14. User rejection rate (so far 8.8% in Campi PersonalBus, 11.1% in Porta Romana, 8.2% in Scandicci PersonalBus and 0% in Sesto PersonalBus, Calenzano PersonalBus and Disabled service)
15. Passenger convenience (see the tables below)

Campi PersonalBus

| ITEM | Very good | Good | Sufficient | Insufficient | Bad | Don't know |
|-----------------------------|-----------|------|------------|--------------|-----|------------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Services D&E | 10% | 45% | 25% | 10% | 5% | 5% |
| Control and independence | 35% | 40% | 10% | 15% | | |
| Willingness to pay | 10% | 75% | | 10% | 5% | |
| Ease of making reservations | 15% | 30% | 40% | 10% | 5% | |

Porta Romana

| ITEM | Very good | Good | Sufficient | Insufficient | Bad | Don't know |
|-----------------------------|-----------|------|------------|--------------|-----|------------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Services D&E | 40% | 50% | 5% | 5% | - | - |
| Control and independence | 35% | 40% | 10% | 15% | | |
| Willingness to pay | 5% | 75% | 10% | 5% | 5% | |
| Ease of making reservations | 15% | 30% | 45% | 5% | 5% | |

Scandicci Personalbus

| ITEM | Very good | Good | Sufficient | Insufficient | Bad | Don't know |
|-----------------------------|-----------|------|------------|--------------|-----|------------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Comfort | 5% | 40% | 35% | 10% | 5% | 5% |
| Control and independence | 30% | 35% | 15% | 15% | 5% | - |
| Willingness to pay | 10% | 60% | 15% | 10% | 5% | - |
| Ease of making reservations | 15% | 40% | 30% | 5% | 10% | - |

Sesto Personalbus

| ITEM | Very good | Good | Sufficient | Insufficient | Bad | Don't know |
|-----------------------------|-----------|------|------------|--------------|-----|------------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Comfort | 10% | 40% | 30% | 10% | 5% | 5% |
| Control and independence | 25% | 35% | 25% | 15% | | |
| Willingness to pay | 10% | 70% | 10% | 5% | 5% | |
| Ease of making reservations | 20% | 25% | 35% | 10% | 10% | |

Calenzano Personalbus

| ITEM | Very good | Good | Sufficient | Insufficient | Bad | Don't know |
|-----------------------------|-----------|------|------------|--------------|-----|------------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Comfort | 15% | 45% | 20% | 10% | 5% | 5% |
| Control and independence | 20% | 25% | 20% | 25% | 10% | |
| Willingness to pay | 15% | 70% | 5% | 10% | - | |
| Ease of making reservations | 5% | 30% | 45% | 10% | 10% | |

Disabled service

| ITEM | Very good | Good | Sufficient | Insufficient | Bad | Don't know |
|-----------------------------|-----------|------|------------|--------------|-----|------------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Comfort | 35% | 50% | 5% | 5% | - | - |
| Control and independence | 37% | 41% | 12% | 10% | - | - |
| Willingness to pay | 15% | 75% | 9% | 1% | - | - |
| Ease of making reservations | 16% | 30% | 44% | 7% | 3% | - |

16. Car availability (generally taken between 40-45%, expect disabled to be 0%)

17. System performance (overall reliability seems to be mostly good, speed of the system between good and efficient, dispatching efficiency also mostly good)
18. Operators' attitudes and acceptance towards the TDC procedures (speed of the system is seen as very good/good, speed of the programme and hardware good or sufficient, ease of use and quality of guidance for operators is mostly seen as good)
19. Operators' attitude and acceptance towards test area (number of stops, the distance of stops and size of the operating area are mostly regarded as good, the cost of the tickets is seen as very good)
20. Loss of potential customers due to the capacity of the reservation system (varied from 5.5% for disabled to 35.2% for Campi PersonalBus)
21. Trip booking time (length of an average phone call = 1 minute, number of phone calls handled by the dispatcher in 1 hour = 20/40 [40 in the peak hours], the trip is generated directly in the time of the phone call [takes about 45 sec])
22. Trip cancellation time
23. Trip handling time (the system can handle 20/40 phone calls per hour [40 in the peak hour])
24. DRT system processing time (see item 21)

7 CHALLENGES AND LESSONS LEARNED

The FAMS project has been taken up and trialled DRT and Flexible Agency opportunities in Florence, Italy and Angus, Scotland. It is obvious that DRT services and proper management of public transport services are particularly relevant to the areas, whether rural or urban, where conventional public transport does not offer a proper service for the citizens. FAMS has aimed at further developing both public transport services and telematics and at trialling and evaluating them. The FAMS results so far show that DRT and the Flexible Agency can offer solutions to increase public transport and related services that are environmentally friendly, flexible, open for all and take into account the needs of the special users such as the disabled and the elderly. The areas where DRT and Flexible Agency can offer a solution may be rural, urban or suburban. The common factor between them is the lack of access to different services and to proper transportation facilities. This very often reduces the ability of communities to develop and function effectively and in a proper manner.

In addition, citizens who are disabled, elderly, or whose mobility is restricted one way or another have great potential to benefit from the FAMS project work. The main impacts and benefits that have been experienced in FAMS are:

- Integration of services into a network with the help of the Flexible Agency provides greater transport cohesion in target areas.
- Improved access to local services and, with the help of feeder services, to larger centres.
- Better mobility stimulates economic activities.
- Improved mobility services for disabled, elderly and other special users decreases social exclusion and helps the users to participate equally.
- Better mobility and access to services especially help young people and families and decrease the decline of the population.
- Cost-effective services encourage creation of new services and attract new users.
- For areas wishing to develop and retain tourism, the DRT and Flexible Agency make it possible to develop tourism and events without cars (e.g. Hill Walking Festival in Angus).

7.1 Lessons learned in Angus

7.1.1 External assistance for development of the customer proposition

Throughout the design process extensive consultation took place and proved to be essential with the different stakeholders in Angus. The main players were the user groups: Scottish Enterprise, Angus Childcare Partnership, Tourist Board, NHS Tayside, Angus Council Economic Development Department, Angus Mental Health, Angus Rural Partnership and Forward Scotland. Feedback from the activities of these groups was used to highlight the issues to be taken into account when designing a project. The stakeholders were used for information sourcing and financial support in putting together a funding package. Continued meetings with the stakeholders highlight the success or otherwise of the concept in operation. These meetings take place on a one-to-one basis. This has proved to be the most successful (if not the most time consuming) solution. It is considered that the co-ordination of special events, car sharing, parcel deliveries etc. could be added to the list of services to be provided.

7.1.2 Barriers to integration of public transport services

The following list summarises the barriers to integration of public transport services in Angus:

1. De-regulation as a result of the 1985 Transport Act: the objectives were to create more choice and a market driven solution. The government has offered bus subsidy increases for rural areas but no grants for other modes. Co-ordination of large operators' services requires service agreements.
2. Service registration procedures: de-regulation allows operators to change services at any time giving 56 days notice. Information is often out of date.
3. Office of Fair Trading (OFT) regulation: trying to obtain co-ordination of large operators' services requires service agreements to be submitted to the OFT before services can operate.
4. Legislation governing different modes imposes barriers: statutory body services are often governed by a separate legislation.
5. Local Authority Conditions of Carriage vary from district to district and department to department.
6. Too many statutory transport providers: co-ordination of the existing services for the population of 110,000 would provide a more efficient and user friendly service.
7. Subsidy system: the subsidy cost should be based on supporting a new service design that meets local needs.
8. Lack of joint ticketing agreements.

7.1.3 Potential restrictive practices caused through existing policies

The local authority, Angus Council, states that it supports ATF and its work. Several local authorities have visited the Angus site and leave with great enthusiasm for the concept. In Angus, politically elected members want the concept to work but paid officers of the council feel threatened by change. Working groups are set up within the authority to produce policy documents with a clear vision for the future which embraces innovation. However, reality is quite different to theory.

The UK public transport industry is governed by a number of complex pieces of legislation. The first aspect to understand is the definition of 'public transport'. As far as the general public is concerned any method of transporting a person from A to B, where a payment is made directly or indirectly should be regarded as public transport. However, the reality of the current situation is far from clear, despite legislation that is supposed to encourage an integrated, co-ordinated transport system.

In 1986 the UK Bus Market was deregulated. Prior to this it was possible for local authorities to work with operators to design joint services and joint ticketing for multi-modal systems. However due to European legislation this cannot be achieved in a deregulated environment. Price fixing and collaboration on route design is illegal under anti competition EU legislation. Joint ticketing schemes can only be achieved where local authorities act as brokers.

The consumer sees this as the most frustrating and illogical aspect of public transport. The ability to pay one price for the complete journey is seen as an essential part of planning any journey. The current UK journey planner web site www.pti.org.uk only displays times not fares. The ability to establish costs before undertaking a trip is essential, particularly, when exact fare only systems operate in most cities in the UK.

Concessionary Travel Schemes

Angus Council, along with all other Councils in Scotland, introduced a free concessionary travel scheme for people over the age of 60 from 1st April 2003. These concessions are only valid within the area of the local authority in which a qualifying person resides. Angus Council has an agreement with bus operators to allow Angus residents to access Ninewells Hospital in Dundee. In rural areas elderly residents are frustrated because that they only have access to a very limited public transport service – if one actually exists. Taxi is the only other alternative; however, charges of around £1 per mile can make travel costs prohibitive.

Statutory Bodies

Each local authority department looks after the travel needs of its own client base. This can result in several vehicles being used in a local area to take people to various clinics, day centres or schools in the same town. This situation arises due to a lack of co-ordination and integration between departments. Local authorities operate their own fleets of vehicles and staff without charging end users for the service. This results in the full cost being met by local taxpayers.

Taxis/Private Hire

The majority of taxis and private hire operators are self-employed, owner drivers. In the whole of Angus there are 160 taxis and 65 private hire vehicles. Only 3 wheelchair accessible vehicles exist. Angus Council will have to resolve this matter in order to meet the government's disability discrimination guidelines. A taxi-card scheme was introduced to assist disabled people who cannot use ordinary buses. Due to the lack of accessible vehicles the potential for the scheme is restricted.

Patient Transport Service

The PTS operates as an independent section of the NHS. Only patients referred by local GPs qualify for free travel by the PTS. Spouses and other members of the family cannot be carried. Where the PTS cannot carry a referred patient it will use one of over 100 volunteer drivers to undertake the request. Volunteers are paid 40p per mile from their home to the final destination and return. It is accepted by the NHS that this system has been open to abuse over the years. The new free concessionary travel scheme has reduced complaints as all services are now free whereas previously only SAS services were free so the PTS was the preferred choice. Now GPs can advise elderly patients that bus travel to all NHS Tayside facilities in Angus is now free.

Voluntary/Community Transport

Where services do exist these are only available to the members of the organisations. Costs of around 30-40p per mile are charged by community car schemes. These organisations assist both the PTS and Social Work Departments.

7.1.4 Changes required to the Business Processes

Based on the findings in Angus several changes to the business processes are required. In a deregulated environment using an Agency (the TDC) to act as a broker for best value for customers the following processes are required:

1. Impartiality: the TDC cannot be seen to be aligned to any one operator.
2. Transparency: the actions of the agency must be accounted for and easily reported.
3. Flexibility: the agency must design its service provision to meet the needs of operators and customers.
4. Training: the agency must take responsibility for all aspects of training related to the delivery of DRT services, i.e. the TDC staff, drivers, supervisors, clients, customers.
5. Complaints: the agency must act as the processor and arbitrator between the supplier of equipment and any customer/operator complaints.
6. Quality controller: the agency must be able to demonstrate performance of service regarding complaints, late/early arrival, vehicle reliability, missed trips, no shows etc.
7. Data protection: the agency must adhere to the data protection guidelines.
8. Brokerage: the agency must be able to build working relationships with operators, statutory bodies, community groups and other providers of transport.
9. Service Design: the agency should work with all interested parties to highlight the trends to assist in the design and planning of future services.
10. Efficient: the provision of the agency role must be undertaken as economically and efficiently as possible. The cost of the service provided by the agency to the operators and the passengers alike must be accounted for and built into the cost of the business case.

11. Choice of ITS supplier: the agency must ensure that the appropriate system is chosen to meet the exact needs of the operational area.
12. Telecommunications network: the agency must establish the best network for the chosen area identifying call charges, SIM card charges, black holes in the network etc.
13. Telecommunications at the exchange: items to consider include whether the exchange is manned at all times; the need to link the number to access the outside line and whether this would affect telematics communications.
14. Vehicle terminals: identifying the requirements for the vehicles and drivers of each operator is vitally important to the success of the overall services. Issues to consider are the ability to man vehicles at all times; the ability to fix OBUs to the vehicle; and the provision of fixed or mobile units (the latter may offer greater flexibility).
15. Internet booking: this may be an advantage or disadvantage. The maximum number of bookings per day that can be handled, the security of the information/system and the ability of users to access and understand how to book all need to be considered.
16. System backup procedures: these are critical in order to ensure that information and bookings are not lost.
17. Power supply: the agency must identify any issues i.e. the testing of backup generators tested on a regular basis and whether this causes system problems.
18. Collator of information: gathering and reporting of the management information is essential in order to meet stakeholders' expectations.

The following issues are to be taken into account with regard to operators:

1. Driver training is essential: in order to cater for the area and customer profile, disability awareness training should be undertaken and the ability to use telematics systems must be addressed.
2. Flexibility: services are delivered to meet the customer requirements not (only) the operators needs.
3. Vehicles: the operators require vehicles designed to meet the local needs.
4. Reporting: the operators must agree to provide all the information requested by the TDC agency to ensure the development of the concept.
5. Ticketing: the pricing structures must be simplified

Current restrictions have to be acknowledged:

1. Deregulated environment: the operators can only participate on a voluntary basis.
2. Legislation: designing multi-modal solutions is almost impossible due to the vast array of legislation in the UK.
3. Joint ticketing: agreements between statutory bodies and operators are required before such agreements can become operational. Even then items such as concessionary fares are an issue. These are only applicable on stage carriage services. In rural areas such services may not exist. A concession pass holder may only have the choice of a taxi for transport, for which it is not possible to use the pass.
4. Bus Service Operators Grant (BSOG): this is given to a range of registered stage carriage services and Section 19 and 22 community transport services. It gives operators rebates from fuel tax based on mileage operated. DRT has not been eligible to receive this grant as there is no commitment to the number of miles or journeys to be operated. Without this grant assistance DRT services are more costly to operate than fixed route registered services. However, following a consultation exercise the DfT is now (autumn 2003) considering how to arrange BSOG for DRT services.

7.1.5 Organisational change and barriers to change

For the DRT TDC concept to evolve, the benefits need to be recognised of a one stop shop for customers to contact regarding their travel requirements. If these are to be met in the most cost effective manner, the current supply mechanism and resources must be fully identified. The cost and money already spent on existing transport services must also be identified. However, statutory bodies are reluctant to provide existing costs as accounting systems and

reporting often vary between departments and between operators. Costs are being sought from Angus Council and the Scottish Patient Transport Service.

The advent of new technologies such as GPS, GPRS, databases, spreadsheets, electronic ticket machines (Wayfarer) and on line booking systems has made it possible to monitor the resource use against the demand patterns. This has been highly successful in the logistics and holiday travel sectors.

It is important to identify an integrated public transport system that will operate in the future and demonstrate the commitment to meet the consumers' needs. Unless everyone signs up to a common vision with agreed goals, the desired results will never be achieved.

There are also questions such as how much it will cost and save. These are the most commonly asked questions in the design process of DRT. Due to the number of agencies involved using differing accounting procedures, it is virtually impossible to find out existing costs.

The motivation of the Angus scheme was to highlight the potential for delivering a more user friendly, efficient public transport service, designed by the customer for the customer using best practice from throughout Europe. Money alone will not resolve the UK's transport problems. There has to be a greater acceptance that the current legislation and existing working practices actually restrict the potential for greater integration and co-ordination.

It is hoped that FAMS within Angus demonstrates solutions to these problems and offers assistance to decision and policy makers. Angus Transport Forum (ATF) is a Scottish based charity, representing the interests of its stakeholders and communities of Angus. As it is not politically aligned or accountable to any individual operator its' position is unique and it is able to act as an honest broker between all interested parties.

The uptake of the FAMS concept and expansion into other areas would require an Agency to manage and control day to day operational requirements. The question remains at present as to who should do this. It is ATF's vision that a non profit making organisation be established to act as the citizens' champion in delivering individual travel solutions through the use of new technologies. (databases, mobile phone, GPS GPRS). The long-term vision is an Expedia type website for individuals to book and prepay their public transport requirements.

At the moment the Scottish Executive provides a website www.pti.org for finding information. A call centre also takes calls regarding timetable information only. To obtain fares requires further call(s) to the operator(s) in question. It would appear logical that this concept could be developed, with full information from one source.

The larger the volume of calls taken by any one centre the more cost effective the service provided will come. However, due to the varying levels of service provided in each area of the UK with no fixed fare structure operated by any two operators, it is not clear whether existing computerised systems are able to cope with the complexity of schemes on offer.

Training call centre staff to understand differing services with no fixed routes and answering calls requiring reassurance regarding services being delivered, will not be an easy proposition. It is to be seen whether a large call centre based TDC will be able to claim impartiality between operators. In addition, it has to be established whether the operators wish their service utilisation to be known by third parties. It also needs to be proven whether it would be more effective to combine all public transport systems into one agency covering, air, sea, rail and motor transport.

It is impossible to answer any of the questions above until a common long-term vision for public transport is established. Small schemes such as FAMS in Angus can highlight the

issues and potential for change but this cannot be achieved without wide-scale commitment to change.

Barriers and resistance to change within operators and agencies have been identified.

Operators:

The following need to be decided:

1. Driver training. Most rural operators provide school transport under contract and do not have ticket machines on vehicles. Any new technology is treated with suspicion, being regarded as a “spy in the cab”. Training is required to overcome such attitudes.
2. Drivers like to know their start and finish times. DRT often means that only approximate start/finishing/meal break times can be given.
3. Route training for DRT services is perceived to be more difficult than on fixed route services.
4. Cost – the identity of the organisation that will pay for the telematics and their maintenance in the long-term.
5. Start up – the identity of the organisation that will pump prime the service with a subsidy.
6. The identity of the organisation responsible for publicity.
7. The fee paid by the operator to the TDC in order to participate.
8. The appropriate legislation covering DRT.
9. The availability of BSOG on DRT services.
10. The co-ordination and distribution of joint ticketing revenue and the cost to operators for the administration of the scheme.
11. The availability of concessionary fares across all modes.

Agencies:

The following need to be decided:

1. The identity of the lead agency.
2. Relevant legislation governing the TDC.
3. The effect of the TDC concept on existing statutory staff resources and services.
4. The legislation that will be used to operate the services.
5. The party responsible for conducting risk assessments.
6. The party responsible for screening staff criminal records.
7. The procedure for handling budgets.
8. The procedure for handling complaints.
9. The chain of accountability.
10. Fear of change.
11. The identity of trainers.
12. The source of funding.
13. The location of the TDC.
14. The procedure for coping with fluxes in the workload.

Drivers:

The majority of drivers employed by bus companies participating in the scheme are employed part time to drive school buses 190 days per year. As these are the vehicles now being used for DRT services, it is increasing the number of operational hours. Some drivers are happy with payment for the extra hours whilst some are not. Some drivers like new technology, some are more afraid in case they make a mistake and some see it as a spy in the cab.

7.2 Lessons learned in Florence

The summer period did not permit to have many bookings. However, some 40 bookings have been performed via the website with no obvious problems. In addition, transport operators, in particular Li-NEA, use FAMS functions for service management and co-ordination (for example a daily list of available vehicles for the Scandicci services). In parallel, the site-level data collection has started and will continue at least until the end of the project. The experience already gained has made it possible to gather some qualitative indications on the

portal and to carry out some fine-tuning. The importance of the user/supplier partnering is the core aspect of the FAMS Agency, and will continue until the end of the trial operation and beyond.

Contributions from users have been received making it possible to focus on some important aspects of the Agency. Regarding the portal, users emphasize its general structure, layout and navigation facilities, together with some improvements to DRT reservation and trip refusal services. The operators feel that efficient booking management and user requests management are important. Error handling and security are also important aspects. The modifications implemented have been successful, enabling substantial bug-fixing and users' adaptations for further testing and evaluation during operation. Deeper knowledge of DRT and TDC services has been gained from the initial data analysis, showing the required direction of work in order to improve the services' cost-effectiveness and efficiency, together with users' satisfaction.

DRT services are generally more expensive than regular line services, but the difference is compensated for by the advantages brought by the introduction of flexibility. Moreover, with DRT services it is possible to provide better coverage in terms of area and users, with more cost-effective services and a better fit with the users' needs. However, any cost/benefits analysis is partial, if it does not take into account the funds that the authorities pay to guarantee the mobility advantages to the community and the consequent overall increase in the number of potential users ("overall improvement of the perceived service quality"). In practice the main expected results are the increase in the service accessibility for everybody, providing a higher quantity and quality of service (with the same amount of economic resources) due to the overall optimisation given by the Agency and the consequent increase in the service cost-effectiveness. In this context, it is important to notice that the surveys revealed that disabled people are available to pay higher fares in order to obtain better services, more suitable to their specific needs, which allow them to live an almost normal life

The social role of DRT services is underlined by the survey on users' car availability. In Campi Bisenzio 42.2% of PersonalBus™ users do not own a car, so that the DRT application significantly contributes to the achievement of equity goals, providing a suitable mean of transport for those people who can not afford to have their own a car for different reasons. DRT services in Florence at present do not represent a market opportunity for the company but are a winning strategy to increase the quality and quantity of service even with a limited amount of additional costs, that can be compensated by the increase of passengers (e.g.. for Campi PersonalBus from some 400 to 12,000 pass/month) and by the reference municipalities that will be available to pay more with the evident increase of the potential area covered.

The factors contributing to the development and success of the DRT service have taken advantage of the correct planning and analysis phase. Characteristics of the site have been utilised. For example in Campi Bisenzio, where in the last decade there has been a big expansion in the number of residents and industries, the correct town planning and new infrastructures, are particularly fitting for a service on demand:

- Most of the trips are quite short.
- There is a considerable percentage of erratic movements.
- Some areas of Campi cannot be reached with a traditional service due to the road characteristics (narrow, poor surface).
- In the area of Campi there was already a typology of DRT services for disabled users, so the town was already prepared for it.

The correct design and planning phase of PersonalBus™ has been possible mainly due to the strong technical and political co-operation between local authorities, users and the public transport company. Before the introduction of the service, a complete origin/destination survey was made for the whole Campi area, in order to identify both the current and the potential users, together with other information on the mobility needs of different target categories.

In Florence a complete recognition of the characteristics of the road network of Campi has been made. Thus, the most proper typology of the network has been identified. Other important aspects taken into account have been the most relevant attraction centres, such as the main industrial and commercial areas and the main parking areas. Particular attention has been paid to the accessibility of the service, improving the conditions of streets and sidewalks in bus stops zones, and operating low-floor vehicles that can take disabled users.

7.2.1 Organisational changes and barriers to change/expand DRT

Some obstacles have been encountered in the organisation of the Agency especially concerning the disabled and elderly service, where each operator had its field of power independent from the rest of the world, while now they will have to share their processes, providing information about their vehicles and personnel availability. Thus, with the same amount of subsidy for the sector, a higher level of service quality and quantity will be provided, co-ordinating and optimising the overall fleet utilisation. Another obstacle to DRT development is the current structure of the contract for the service definition between the public transport company and the P.A., currently defined on the basis of the number of kilometres run by the service, i.e. in the same way as the traditional line service. The reference parameter for the preventive calculation of the amount of kilometres is the service for the previous year: this is not correct and it represents a big limitation on the development of a DRT service in a year, since the most relevant parameters to define a DRT service should be the network extension (number of kilometres and number of stops/meeting points) and the service hours. Thus, there can be a limited change in the actual kilometres run by the service, but in any case every kilometre more than the maximum amount planned is not paid. This is a big problem because the more successful it is, the more the service is active in terms of kilometres run for the service. On the basis of the experience acquired on DRT services during the last year, new standards are being studied in order to solve the existing gaps. They take into account the number of hours when the TDC or the service is active and will hopefully be applied to the FAMS Agency. In addition, some internal issues had to be overcome in order to successfully implement DRT and the Agency, at two different levels:

- Service planning, involvement of the company sector dedicated to the definition of the routes of the lines, timetables, driver management, etc.
- Management and control of the technologies involved, by using a specific office.

The daily resources involved in the provision of DRT service are:

- 2 operators at the TDC (1 for the morning and 1 for the afternoon) from Monday to Saturday and 5 minibuses.
- 9 drivers from Monday to Friday (4 vehicles from 6.30 to 19.30 and 1 from 12.30 to 15.00).
- 6 drivers on Saturday (2 vehicles from 6.30 to 19.30 and 1 from 06.30 to 09.00 and from 12.30 to 15.00).

The operational costs for this typology of service are:

- TDC personnel.
- Drivers.
- Network maintenance (e.g. bus stops/meeting points, informative panels).
- Toll-free number for the service booking.

The additional costs compared to the regular service, in particular, are caused by the toll-free number and mostly by the TDC operators, even if this is compensated for by the fact that a single operator can operate on more than one zone. The planning phase must follow an optimisation process classified on different levels. The key criteria for the resources optimisation process can be classified on different levels:

1.a Resources :

- number of vehicles
- vehicle type and capacity (e.g. 8 mt, 12 mt, ...)

- vehicle shifts (availability in time)
- 1.b Network characteristics (i.e. model):
- DRT bus stops (location)
 - DRT bus parking areas (location, capacity)
 - road network characteristics (road type – e.g. small buses, normal buses, allowed turnings at intersections – per bus type)
- 1.c Planning and assignment parameters:
- DRT: Direct Ride Time
 - The passenger ride time from origin to destination with no stop in between and via the shortest route
 - MRT: Maximum Ride Time
 - The maximum allowed passenger ride time
 - $MRT = a + b \cdot DRT(a)$
 - WSP: Widest Shift at Pickup Time
 - The maximum delay at pickup time allowed during planning
 - WSD: Widest Shift at Delivery Time
 - The maximum early arrival at destination stop allowed during planning

All these planning parameters, which can be handled by the operator at each planning session, have a relevant impact on the DRT service optimisation. The DRT service schedule processing can be done on-line or off-line, after the collection of all the reservations. In order to perform an adequate optimisation of service resources, the provider must bear in mind the wishes and the demands of the customers, and try to find the best compromise between the resources and the quality of the service, on the basis of the main following criteria:

- 2.a minimum number of vehicles used (for planning)
- 2.b minimum on-board time for passengers
- 2.c minimum cumulative difference between passenger requested times (at pick-up or drop-off) and planned times $\sum_i \Delta_i$
- 2.d minimum travel time between stops (shortest route)

In the optimisation process a balance should be based on these criteria, meeting the different objectives of operators and customers. The main boundaries in PersonalBus™ are:

- for 2.a: Two main objectives:
 - 1) To identify the minimum number of required vehicles (*minimisation of expenses*).
 - 2) To keep spare vehicles to cope with additional demand in peak periods.
- for 2.b: The passenger comfort.

The introduction of the FAMS Agency, by means of the B2B solutions, mainly changed the way of exchanging information about vehicles availability between operators in one way, and the related feedback on the service planning to the operators, providing an efficient, fast and easy way to communicate that substitutes the old-fashioned ways (telephone, fax, ...).

8 CONCLUSIONS AND RECOMMENDATIONS

The experiences of the FAMS project have shown that the take-up and further development of telematics tools and applications can be done effectively, but only if it is taking into account the political, juridical, institutional and organisational frameworks. Often the main challenges, problems and barriers related to development of new kinds of flexible public transport concepts have not been technological. There are however institutional, juridical and operational issues and questions that have to be clarified by the potential new take-up sites before the full scale DRT system can be implemented. The take-up activities, new service concepts, DRT and related telematics applications and technologies have been accepted both in Italy and Scotland by dispatchers, operators and end-users.

8.1 *Conclusions and Recommendations for Angus*

The FAMS Agency and the DRT services in Angus did not exist before the project. As with any new concept there have been different views of DRT. Therefore it is essential that all sectors are involved in the design, evaluation and monitoring of services. Building trust in the concept and associated technologies cannot be achieved by imposing the idea in a commercial environment. Depending on the type, number, and size of the operators in any area, there may be a bearing on the receptiveness to innovation. The deregulated transport environment, as in Scotland, means that trials of new concepts can only succeed where/when the operators are willing to participate. There are some important issues that should be taken into account, when creating DRT services and flexible agencies in similar environments:

1. It is important to check the existing juridical and regulatory frameworks.
2. The operational environment must be defined (including all the existing modes).
3. The operators (and other stakeholders) should agree upon the services to be provided.
4. Information about the existing services should be available or provided by the transport operators.
5. Co-ordination of the existing services is important.
6. Subsidy systems should be clarified.
7. Joint ticketing agreements are of great importance.
8. The technological environment must be ready for the new service and the tools required need to be defined and developed
9. Information provision and training are essential

8.2 *Conclusions and Recommendations for Florence*

The findings in Florence differ somewhat from those of Angus. Since Florence has been running DRT services for several years conclusions and recommendations are at the moment more related to technical issues. The importance of the user/supplier partnering is the core aspect of the FAMS Agency, and will continue until the end of the trial operation and beyond.

It was also seen to be very important to use the suggestions and indications arising from TDC operators because they have gained experience on using the portal emphasising its general structure, layout and navigation facilities, together with some improvements to DRT reservation and trip refusal services. Error handling and security are also important aspects. The modifications implemented have been successful, enabling substantial bug fixing and users-adaptation for further testing and evaluation during operation. The operators feel that efficient booking management and user requests management are important. With regard to passengers no significant quantitative data have been gathered so far since schools are closed during the summer and also the trip requests by workers are considerably lower. Mainly qualitative comments have been made, by users/passengers.

9 GLOSSARY

Active revenue time

Time during which a vehicle is active during revenue service, i.e. it does not include the time during which the vehicle is standing by and waiting for bookings.

Actual trip time/distance

The time/distance actually taken per passenger trip.

Automated booking

The use of telematics tools by the customer in order to allow contact with the centre managing the journeys (TDC) by interacting directly with the booking functionalities, without any need to go through an operator. Channels for automatic booking are, e.g., Internet, voice response systems (see also IVRS), and smart card readers.

Automated trip notification

The ITS function which will automatically notify the customer about his pick-up time (usually about 15 minutes in advance).

AVL (Automatic Vehicle Locationing)

A system for the automatic identification of the position of a vehicle usually through GPS or beacon-based technology and other on-board equipment (such as odometer and gyrometer). The position information is transmitted by the vehicle to a control centre, which is able to monitor the various aspects of the operation. Typically, locations are presented to the operator on a digital map or through a similar graphical representation.

AVM (Automatic Vehicle Monitoring)

A system that allows for the determination of the movements and activities of vehicles belonging to a certain fleet on the road network. It often includes functionalities for fleet management and requires AVL to be present.

Booking

A confirmed reservation where the order has been entered in the TDS and a pick-up time has been agreed between the customer and the DRT service provider.

Call-back

See Automated trip notification.

Cancellation

An order submitted by the customer requesting deletion of a previous reservation or booking.

Capital costs

Cost of supply and commissioning of system, including special tools, and initial set of spare parts.

Captive passengers in DRT

Passengers who are only able to use DRT as a means of transport. This may be due to financial reasons (cannot afford a taxi or permanent access to a car) or mobility reasons (cannot get into a taxi or ordinary bus easily) or there is no nearby conventional bus service.

Connection link

The physical movement of a passenger changing from one public transport vehicle to another in order to continue the trip.

Customer

A person or organisation involved in a sales transaction concerning the DRT service, in which a DRT booking is requested. The customer try to make a booking for him/herself and/or other potential passengers.

Dead time

Time taken to travel from the depot to the service area, or vice versa. This includes the time taken for the preparation of the vehicle for DRT (before revenue time) and the unloading of equipment, data and cash as end of day duties (after revenue time).

Deviation time/distance

The extra time/distance taken due to deviation to pick up other passengers. Deviation time/distance = actual trip time/distance - direct trip time/distance. This only applies if a semi-fixed route is operated.

Direct trip time/distance

Time it would take to travel directly from the origin to the destination, i.e. assuming that no deviation takes place in order to pick up other passengers. This only applies if a semi-fixed route is operated.

DRT (Demand Responsive Transport)

Demand Responsive Transport is an intermediate form of public transport, somewhere between a conventional service route that uses low floor buses and special transport services that typically use a single or shared taxi mode. DRT services are offered to customers according to their individual needs, generally only stopping where passengers request pick-up or drop-off. Routes are scheduled with software or manually from a central dispatching system (see also TDS). DRT route models are defined according to the level of flexibility, the type of stopping points and the degree of linearity or area coverage offered by the service.

Economic viability

The financial costs and benefits of a system taking into account the level of private or public financing which are required in order to create and manage the system in a particular market environment.

Fare revenue

Revenue received from fares, including approximate pro-rata revenue received from passes.

Feeder service

A public transport service which collects and/or distributes passengers within a pre-defined catchment area for passengers, from and to primary routes and other modes of transport (e.g. express bus, inter-urban bus, tram, rail).

Flexible route

A scheduled service between two end top points which has fixed departure times, but with a more or less flexible route, which responds to the actual needs for pick-up and drop-off on the route. See also semi-fixed route.

GIS (Geographic Information System)

A Geographic Information System is a class of systems and software applications for the graphical representation and management of geographical information

GPS (Global Positioning System)

A localisation system based on a network of geostationary satellites. It can be utilised to estimate the position of vehicles within AVLAVL systems.

Idle revenue time

Revenue service time spent either standing by waiting for each dispatch/pick-up, or time spent travelling from last passenger alighting point to next passenger pick-up point, i.e. with no passengers on board.

Intermodality

Intermodality occurs when the route of an individual passenger consists of a combined chain from origin to destination involving at least two different modes. A transport network or route serving passengers is intermodal if it is established by means of more than one mode.

Invataxi

Vehicles which are specially equipped for mobility impaired persons. They can have varying seating capacities.

ITS (Intelligent Transport Systems)

A group of techniques, using information technology and telecommunications in vehicles and infrastructure, supporting or performing serviced intended to improve transportation from the point of view of safety, efficiency, comfort and the environment.

IVRS (Interactive Voice Response System)

System for the automatic and interactive management of the telephone dialogue with the user. It usually allows the selection of options within a pre-defined menu. The user's choices can be communicated by pressing the keys on the keypad or by voice recognition. In the case of DRT services this means that there is no dispatcher interface when booking a trip.

Journey pattern

An ordered list of stop points and timing points on a single route, describing the pattern of working for public transport vehicles. A journey pattern may pass through the same point more than once. The first point of a journey pattern is the origin. The last point is the destination.

Mapping point

A point for which the mapping information (e.g. geographical location) may be recorded.

Market projection

An estimate of the possibilities of applying and developing a system to a new (sector of a) market, measured in terms of the economic feasibility, service provision and technological performance of the systems involved.

Non-captive passengers

Passengers who have access and resources to use transport other than DRT, e.g. car, rail, bus, taxi.

OBU (On-Board Unit)

Any electronic device installed on board of a vehicle which is able to interact locally with people (e.g. the driver or passenger) or other devices and possibly to communicate with equipment outside the vehicle.

Operating costs (vehicle)

Includes costs for: driver, fuel, maintenance, depreciation, insurance, taxes, overheads.

Order

A request issued by a customer to the DRT service provider, concerning the reservation of a ride or cancellation of a previous reservation or booking.

Passenger

A user of the DRT service travelling with a service vehicle. The status of a user changes from being a customer to a passenger once the booking has been accepted at the TDC.

Refused customer

Person who made contact with the TDC dispatcher but could not, for some reason, be provided with a booking because, e.g. the service was fully booked or the requested origin and/or destination was outside the service area.

Reservation

The order issued by a customer made in advance of the trip to get a DRT vehicle to go to a requested stop point for boarding and alighting.

Revenue time

Time during which vehicle is in service. For vehicles hired on a trip basis (e.g. taxis, invataxi) this includes the time after the order has been accepted and actually leaving for the journey, but does not include dead time. For vehicles hired on a time basis (e.g. buses, DRT buses) it includes the 'standing by' time in the project area waiting for bookings (idle revenue time) but does not include dead time.

Revenue time = Active revenue time + Idle revenue time

Ride

A ride refers to a trip made by a passenger on one particular mode of transport. A number of rides may make up a trip. Within FAMS, the ride will generally refer to the leg of the journey undertaken on the demand responsive transport service. It will not include walking time to the pick-up point (this is a separate trip).

Ridership

The total number of passengers who board the DRT vehicles in the service area during a given period. Passengers include both the revenue passengers and assistants to disabled and elderly persons who travel for free.

Route

An ordered list of locations defining a path through the road network. A route may pass through the same location more than once.

SAMPLUS (SAMPO Plus)

European project in the framework of the TAP programme for the further demonstration of and development of systems and architectures for the management of DRT services. SAMPLUS followed the SAMPO project.

SAMPO (System for the Advanced Management of Public Transport Operations)

European project in the framework of the TAP programme for the development and demonstration of systems and architectures for the management of DRT services.

Semi-fixed route

A scheduled service between two end stop points which has fixed departure times but with a more or less flexible route, which responds to the actual needs for pick-up and drop off on the route. In addition, there are also one or more scheduled stop points along the route, leading to a semi-structured service. See also flexible route.

Service area

The area over which a defined DRT service is provided. This may cover an area in which the service journey begins and ends at the same stop point, or it may be a corridor in which the service journey begins and ends at two different stop points.

Service journey

A passenger carrying journey by a vehicle between an origin and destination, which may be on a direct schedule route or on a flexible route. The route followed by the vehicle is created by the TDS.

Service journey pattern

The journey pattern for a (passenger carrying) service journey.

Service provision

The effective organisation and offer to the public of a service (such as DRT) and the perception by the users (including passengers) and operators of its compatibility with its objectives, reliability and level of convenience.

SMS (Short Message Service)

Short text messages, up to 160 characters, that can be sent or received from mobile units linked to a GSM network.

Stop point

A location where passengers can board or alight from vehicles. A stop point may be fixed (regular bus stop), predefined (recognised meeting point) or non-predefined (generally the doorstep of the passenger). The vehicle only calls at predefined and non-predefined stop points as a result of a booking request by a passenger.

STS (Special Transport Service)

Special transport services are adopted in order to respond to the needs of a group of users such as the elderly and people with disabilities. Typically, they are carried out with special vehicles which can

accommodate specific equipment such as wheelchairs. STS are usually managed by the municipal authorities (e.g. in Nordic countries) or by voluntary organisations (e.g. Italy, United Kingdom).

System architecture

This defines, following specified methodologies, the main components of a system and their inter-relationships (in terms of the functions performed, data flows, information, physical components and the organisation of a system).

System integration

The design, construction and operation of transport services within a prescribed boundary (usually geographical) through the co-operation of all relevant service providers (e.g. operators, authorities, technology). The end product is the provision of transport services that: satisfy user needs (e.g. cost effective and efficient completion of a unimodal or intermodal journey); perform consistently, efficiently and cost effectively; and is subject to operational testing and evaluation.

TAP (Telematics Applications Programme)

A European Union programme of research and technological development and demonstration in the area of telematics applications of common interest, 1994-1998.

Target population

The people for whom a certain service is provided. Typically, they live within the area in which the service takes place; e.g. in the case of DRT services the target population can be all inhabitants within a certain distance (e.g. within 100 metres) of predefined stop points, or all inhabitants within a defined service area.

TDC (Travel Dispatch Centre)

The location organising the Travel Dispatch System (TDS). The TDC is the interface between the customers and the providers of the service, including the fund holder (e.g. the local authority), the operator and the driver. Typically, the TDC is located in the operational environment of the fund holder, which is usually the local authority, but may be the operator. A TDC may be located in a multi-sectoral call centre (where unrelated non-transport services are also provided), or within an independent research and development environment.

TDS (Travel Dispatch System)

A booking and reservation system which has the capacity to dynamically assign passengers to vehicles and to optimise the routes taken by vehicles. The operational TDS is located in the TDC.

Technical performance

The ability of the ITS to operate within specified standards, e.g. reliability, safety, convenience to the public transport operator and the TDC.

Time vehicle was booked

The time at which the customer came into contact with the operator.

Timing point

A point for which the timing information necessary to build schedules may be recorded.

Transferability

The ability to transfer a technology application or methodology or result from one applicable area to another, or from one geographical organisation and operative context to another.

Trip

Trip refers to one part of the passenger's journey origin to the passenger's final destination. A journey may be made up of a number of trips, e.g. 1st trip: walk to stop point; 2nd trip: by bus to railway station; 3rd trip: by train to end destination.

Trip booking time

The minimum advance time required from the passenger in order to make a reservation for a trip. Also known as reservation constraint time.

Trip cancellation time

The advance warning time required from the passenger in order to cancel a trip.

Trip handling time

Time taken to inform passenger of their actual pick-up time once their call has been received and their demand for the service registered.

Vehicle journey

Refers to the depot-to-depot journey.

Vehicle time

Time during which vehicle is not at the depot or used in other duties or service. Vehicle time = Revenue time + Dead time = Active revenue time + Idle revenue time + Dead time

Abbreviations

| Abbreviation | Explanation |
|---------------------|--|
| | |
| ATT | Advanced Transport Telematics |
| AVL | Automatic Vehicle Locationing |
| AVM | Automatic Vehicle Monitoring |
| CEN | Comité Européen de Normalisation (European Standards Committee) |
| DRT | Demand Responsive Transport |
| DSRC | Dedicated Short Range Communications |
| GIS | Geographic information systems |
| GPRS | Generalised Packet Radio Service |
| GPS | Global Positioning System |
| GSM | General System Mobile (French) / Global System for Mobile communications (English) |
| GUI | Graphics User Interface |
| HMI | Human Machine Interface |
| IDRTS | Integrated Demand Responsive Transport Services |
| INVETE | Intelligent IN-VEhicle TErminal for multimodal flexible collective transport services (EU supported ITS project) |
| IP | Internet Protocol |
| ISO | International Standards Organisation |
| ITS | Intelligent Transport System |
| IVRS | Interactive Voice Response System |
| IVT | In-Vehicle Terminal |
| LAN | Local Area Network |
| MIDAS | Minibus Driver Awareness Scheme |
| NMT | Nordic Mobile Telephone |
| OBV | On-Board Unit |
| PRN | Private Radio Network |
| SAMPLUS | SAMPO Plus – successor project to SAMPO |
| SAMPO | System for the Advanced Management of Public Transport Operations |
| SMS | Short Message Service |
| STS | Special Transport Services |
| TAP | Telematics Applications Programme |
| TCP-IP | Transmission Control Protocol / Internet Protocol |
| TDC | Travel Dispatch Centre |
| TDS | Travel Dispatch System |
| UNA | User Needs Analysis |

10 REFERENCES

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2. <http://www.virtualtourist.com>
3. FAMS Project, Deliverable D5 – “FAMS System Deployment” (2003)
4. FAMS Project, Deliverable D4 – “Flexible Agency Architecture & Trials Set-up” (2003)
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ANNEXES

Annex 1 - Angus Transport Forum Summer 2003 Newsletter and of Poster

Demand Responsive

Angus Rural Transport Pilot Scheme (D.A.R.T.S.)



GLENS ISLA

SUMMER 2003

WHAT'S ON

Summertime again. Looking for something to keep you occupied during the holiday period? Demand Responsive Transport services are being coordinated by Angus Transport Forum to allow you to participate in the wide range of activities organised this summer in the Glens.

You can plan your day around one of the following activities, Hill walking, Water Sports, Horse Riding, Mountain Biking, Fishing, Kayaking, Wall Climbing/Abseiling, Assault course, Archery, Crafts, Painting, Photography, Genealogy. For the less energetic you can also visit the Health Spa why not getaway from it all and refresh your Body and Mind? There are also a wide range of hotels and Restaurants offering the best of local produce.

Passengers must pre book their journey by calling **01356 665000 between 0900 and 1700, Monday to Friday**. Passengers will then become members of the Forums travel club.

Daily membership rates are £3.00 for adults and £1.50 for children and pensioners. Membership offers individuals travel on any journey coordinated by Angus Transport Forum on that given day.

SUMMER 2003

Kirriemuir, Kingoldrum, Lintrathen, Peel Farm, Glen Isla

Depart

| | |
|-----------------------|------------|
| The Square Kirriemuir | 0930, 1400 |
| Lintrathen | 0945, 1415 |
| Peel Farm | 0950, 1420 |
| Arrive Glen Isla | 1005, 1435 |

Glen Isla, Peel Farm, Lintrathen, Kingoldrum, Kirriemuir

Depart

| | |
|-------------------|------------|
| Glen Isla | 1005, 1435 |
| Peel Farm | 1020, 1450 |
| Lintrathen | 1025, 1455 |
| Arrive Kirriemuir | 1040, 1510 |

Passengers must pre book their journey by calling **01356 665000 between 0900 and 1700, Monday to Friday**. Passengers will then become members of the Forums travel club.

Daily membership rates are £3.00 for adults and £1.50 for children. Membership offers individuals travel on any journey coordinated by Angus Transport Forum on that given day.



PROJECT PART-FINANCED
BY THE EUROPEAN UNION

Europe and Scotland
Making it **work together**



information society
technologies

Angus Transport Forum Demand Responsive Angus Rural Transport Pilot Scheme

(D.A.R.T.S.) 

Does limited access to public transport in the Angus Glens restrict your lifestyle?

If you are experiencing problems trying to access employment, training, education, health care, child care, visiting, shopping or leisure activities in the rural areas of Angus, surrounding Alyth, Kirriemuir and Brechin then Angus Transport Forum may be able to help.

The D.A.R.T.S project can assist you to access to/from and within the areas of Glen Isla, Glen Prosen, Glen Clova, Glen Moy, Glen Ogil, Glen Lethnot and Glen Esk, using local taxis and bus operators.

All trips must be pre booked at least the day before as services only operate based on demand between the hours of 0900 and 1900 hours Monday to Saturday.

For further details and to pre book your trip, telephone 01356 665000 between 0800-1700 (Monday to Friday).

This project is part funded by the following funds and organisations European East of Scotland Objective 2 Programme, European Rural Development Fund; European Commission, Directorate General Information Society 5th Framework Programme; The Community Fund; The Scottish Executives Integrated Transport Fund; Angus Council; NHS Tayside; Scottish Enterprise Tayside; Angus Childcare Partnership; Forward Scotland; Angus College; Cairngorm Partnership; Scottish Ambulance Patient Transport Service; Ordnance Survey and Rees Jeffreys Research Road Fund.

Annex 2 - 'FAMS Consolle' Training Material in Florence

FAMS Loader

Questo applicativo ha lo scopo principale di definire una o più connessioni ad un server oracle con cui poter lanciare una o più FAMS Consolle che sfruttino tali connessioni. Inoltre, gestisce gli aspetti di archiviazione, ovvero:

- se e quando effettuare lo spostamento dei dati di servizio nell'archivio storico;
- quanti giorni di servizio storico mantenere in database prima di effettuare uno svuotamento su file;
- dove creare il file stesso.
-

Il FAMS Loader si presenta così:

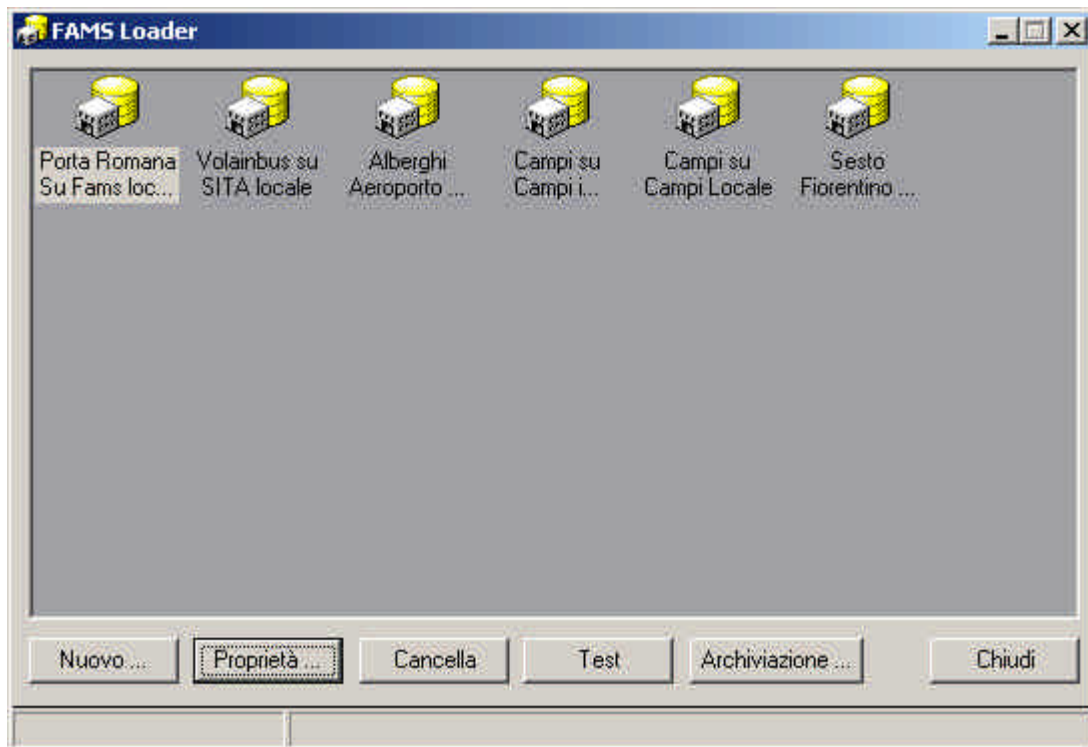


Figura 1

Ciascuna delle icone in giallo rappresenta una connessione ad un servizio di un particolare utente di uno specifico database.

Il tasto **Nuovo** serve per creare una nuova connessione e richiama la maschera di figura 2 con i campi vuoti e pronti per essere riempiti.

Il tasto **Proprietà** visualizza la maschera di figura 2 con i dati specifici della connessione selezionata e permette la modifica.

Il tasto **Cancella** elimina definitivamente la connessione selezionata facendo sparire l'icona corrispondente.

Il tasto **Test** effettua una prova di funzionamento della connessione selezionata.

Il tasto **Archiviazione** permette di determinare la frequenza con cui l'applicazione effettua un controllo sul database della presenza di dati risalenti al passato (da ieri in poi) visualizzando la maschera seguente:



Intervallo indica in ore minuti e secondi il tempo che intercorre tra una verifica e l'altra. **Ritardo** esprime in ore minuti e secondi il tempo minimo che trascorre dall'avvio dell'applicazione prima del primo controllo. Nell'esempio Dopo 5 secondi dall'avvio viene effettuato il primo controllo che si ripeterà ogni 6 ore.

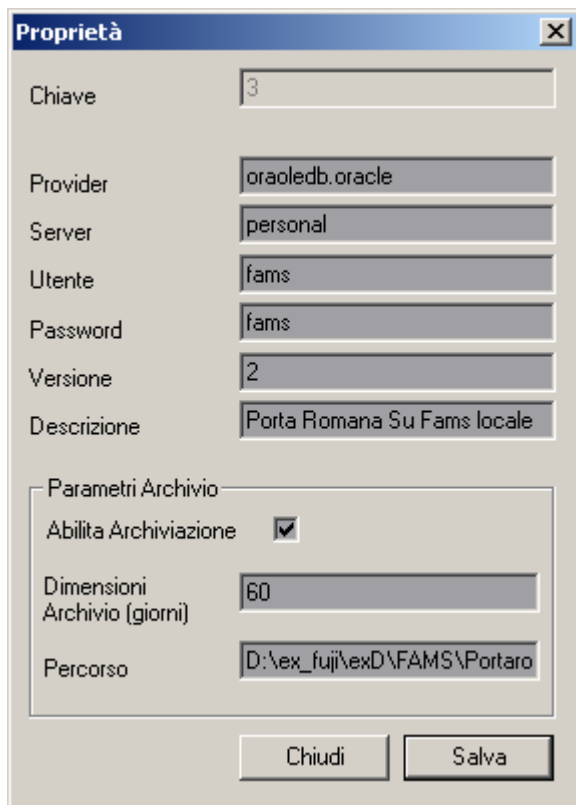


Figura 2

Chiave è un valore univoco numerico intero usato come chiave della connessione.

Provider è il nome dell'OLEDB Provider per il meccanismo di dialogo con il database. Specificare oraoledb.oracle per il database Oracle.

Server è il nome del service oracle che identifica il database al quale collegarsi.

Utente è il nome dell'utente del database.

Password è la password dell'utente del database.

Versione è il numero identificativo della rete di servizio all'interno dell'utente db specificato.

Descrizione è un testo libero ed è ciò che appare sotto alle icone gialle di figura 1.

La sezione **Parametri Archivio** è quella che si occupa della gestione dell'archiviazione.

Abilita Archiviazione se spuntato indica che FAMS Loader si occuperà di archiviare i dati di questo particolare servizio.

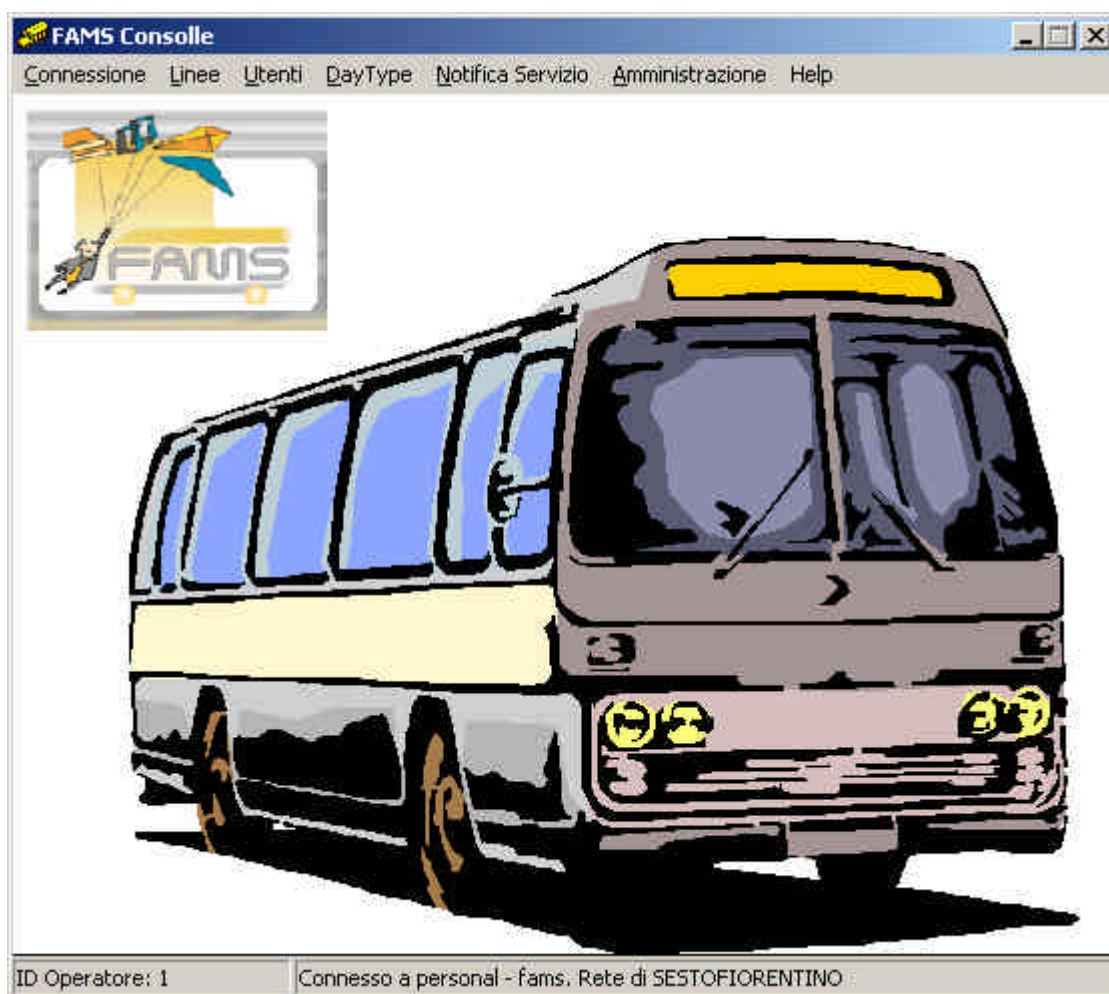
Dimensioni Archivio esprime il numero di giorni massimo che si vuole mantenere in archivio. Per i giorni precedenti (più vecchi) verrà effettuata una cancellazione dall'archivio storico e verranno trasferiti su file.

Percorso indica appunto la localizzazione su disco del file di archiviazione contenente i dati storici più vecchi del numero di giorni specificato in *Dimensioni Archivio*.

Infine, nella stessa directory di FAMS Loader viene creato per ogni giorno un file di log dell'attività di archiviazione effettuata.

NOTA Per i servizi (Campi, Alberghi Aeroporto) che dipendono da PersonalBus occorre mantenere disabilitata l'archiviazione in FAMS Loader poiché se ne incarica già PersonalBus.

FAMS Consolle



La FAMS Consolle è lo strumento a disposizione degli operatori di centrale per:

1. configurare numerosi aspetti delle logiche di funzionamento dei servizi esposti dal portale web;
2. definire le linee di trasporto e le loro varianti nonché i calendari di cadenza delle stesse;
3. definire le corse specifiche che originano dalle linee e dalle loro varianti;
4. definire utenti finali, superutenti, tipologie di servizio, operatori di trasporto e operatori di centrale;
5. accedere direttamente al servizio web per la notifica delle richieste;
6. accedere direttamente al servizio web per la prenotazione su Sesto Fiorentino e Porta Romana;
7. abilitare il tracciamento su database delle attività che coinvolgono l'agenzia;
8. visualizzare e stampare l'attività dell'agenzia tracciata sul database.

La FAMS Consolle può essere avviata anche senza utilizzare il FAMS Loader.

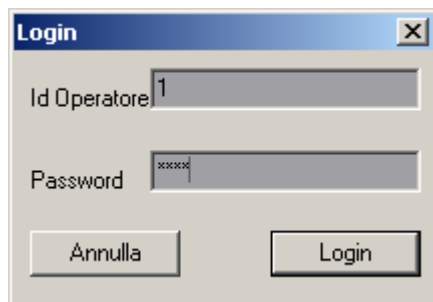
Per farlo basta fare doppio click sull'icona della FAMS Consolle e in questo caso verrà proposta la mascherella di figura 2 e sarà necessario specificare tutti i parametri per la connessione.

Lanciando invece la FAMS Consolle dal Loader, basterà fare doppio click sull'icona del servizio desiderato (connessione desiderata).

Il primo passo prima dell'utilizzo della FAMS Consolle è la login.

L'operatore di centrale deve autenticarsi per poter utilizzare la consolle.

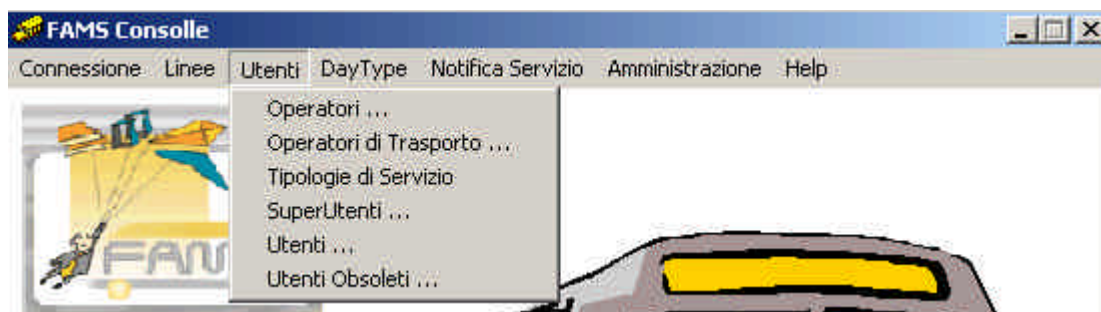
La maschera di login è la seguente:

A small dialog box titled "Login" with a close button (X) in the top right corner. It contains two input fields: "Id Operatore" with the value "1" and "Password" with masked characters "xxxxx". At the bottom, there are two buttons: "Annulla" (Cancel) and "Login".

Quindi ciascun operatore di centrale che utilizza la FAMS Consolle dovrà essere stato preventivamente registrato dall'operatore di centrale Amministratore che è l'unico che ha i privilegi per gestire altri operatori.

Il menu **Utenti** permette la gestione completa (creare modificare e cancellare) di operatori di centrale, operatori di trasporto, tipologie di servizio, superutenti, utenti finali.

Da notare che tutte queste entità vengono definite per il particolare Utente DB (vedi schema Architettura Database Oracle slide20) e non per la particolare rete di servizio o tipologia di servizio.



Per abilitare uno specifico servizio web all'interno del portale attraverso la voce **Tipologie di Servizio** occorre che sia definito un servizio con il nome previsto dalle pagine gate-xxx.html del portale.

Per disabilitarlo è sufficiente modificare il nome o cancellare la definizione del servizio da disabilitare.

All'interno di questa maschera si definiscono i parametri più interessanti circa le modalità di prenotazione possibili attraverso il portale.

Su oggi permette di abilitare o disabilitare la prenotazione sulla giornata corrente.

Per oggi dopo specifica in ore e minuti quanto tempo deve intercorrere tra il momento della prenotazione e l'orario di inizio della corsa.

Se ora sono le 12:00 e PerOggiDopo vale 0.40 vuol dire che non posso richiedere una corsa con orario minore delle 12:40.

Per domani entro esprime l'orario entro cui occorre prenotare oggi per un giorno a venire.

Se PerDomaniEntro vale 18:30 significa che oggi posso prenotare per un qualsiasi giorno a venire via web solo fino alle 18:30.

Fascia di ricerca esprime in ore e minuti la fascia di ricerca delle corse da proporre all'utente in ritardo e in anticipo rispetto all'orario richiesto.

Se l'utente richiede una corsa con orario di salita alle 12:00 e FasciaDiRicerca vale 0.45 il sistema proporrà (se esistono) corse che si sovrappongono temporalmente all'arco temporale 11:15 – 12:45 comprese.

Fascia di Prenotazione esprime la data massima per cui è possibile richiedere una corsa da parte di un utente sommando ad oggi il numero di giorni indicati.

Se oggi è il 1 di Maggio e FasciaDiPrenotazione vale 20 significa che l'utente via web può fare una richiesta per un qualsiasi giorno compreso tra oggi (se SuOggi è abilitata, domani altrimenti) e il 20 di Maggio ovvero entro i prossimi 20 giorni.

Le Linee

Per quanto riguarda la definizione delle linee possiamo introdurre alcuni concetti utili per una migliore comprensione del funzionamento della FAMS Consolle.

Una generica **linea** è semplicemente una denominazione alfanumerica che identifica una particolare tipologia di linea di trasporto. In relazione al periodo dell'anno, all'orario e alla vettura con cui viene effettuata la linea, si possono avere diverse varianti della linea stessa.

Le varianti quindi sono esse stesse linee e sono caratterizzate da un percorso espresso come sequenza di fermate e tempi tra le fermate o meglio tra ciascuna fermata e l'origine del percorso che quindi rappresenterà il tempo 0.

Ogni variante può essere associata ad uno **schema temporale** detto tipologia di giornata (DAY TYPE). Tale schema indica in quali giorni dell'anno e a quali orari (TIME TABLE) viene effettuata la variante.

Quindi occorre comporre il così detto **calendario delle varianti** che indica per ogni giorno dell'anno quali varianti verranno effettuate e a quale orario partiranno, da quale vettura verranno eseguite e a quale operatore di trasporto appartiene la vettura.

Una volta definito il calendario delle varianti, per un servizio di trasporto tradizionale, avremmo completato la schematizzazione delle linee. Per un servizio a chiamata, invece,

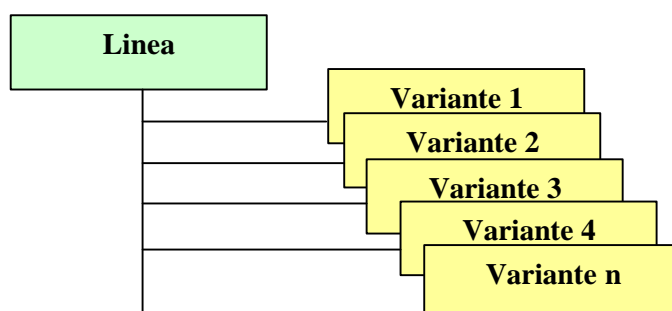
occorre ancora un passo. La linea tradizionale ed il servizio tradizionale, infatti, sono di natura immutabile e quindi gli utenti non possono in alcun modo influire sulla linea che è stata definita a priori. Al contrario, in un servizio a chiamata, sono proprio gli utenti che ogni giorno usufruiscono del servizio a modificare in varia misura (a seconda del grado di libertà lasciato dal servizio) le linee predefinite.

Per questo l'ultimo passo consiste nel generare il **calendario dei viaggi** a partire dal calendario delle varianti. Infatti, saranno proprio i viaggi le entità che potranno subire modifiche a seconda delle richieste degli utenti finali deviando progressivamente e in varie forme dal viaggio originale. Se fossimo nel caso del trasporto e delle linee tradizionali è chiaro che il calendario viaggi coinciderebbe sempre con il calendario varianti e avremmo solo un'inutile ridondanza. Nel nostro caso invece abbiamo così la possibilità di tracciare le linee nei due diversi momenti: quello iniziale predefinito (ideale) e quello in evoluzione (reale) dovuto alle richieste degli utenti.

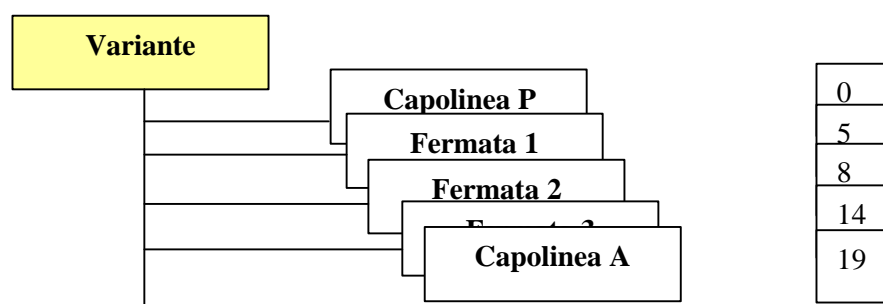
Potremmo quindi affermare che il calendario delle varianti descrive giorno per giorno le linee così come vengono concepite indipendentemente dagli utenti finali, mentre il calendario dei viaggi descrive esattamente come nelle realtà sono veramente andate le cose: quali persone sono state trasportate, dove sono salite, dove sono scese, a quale ora, se ci sono state deviazioni dal percorso predefinito, se sono state effettuate corse in più, dove, con quale vettura.

Schematizzando abbiamo:

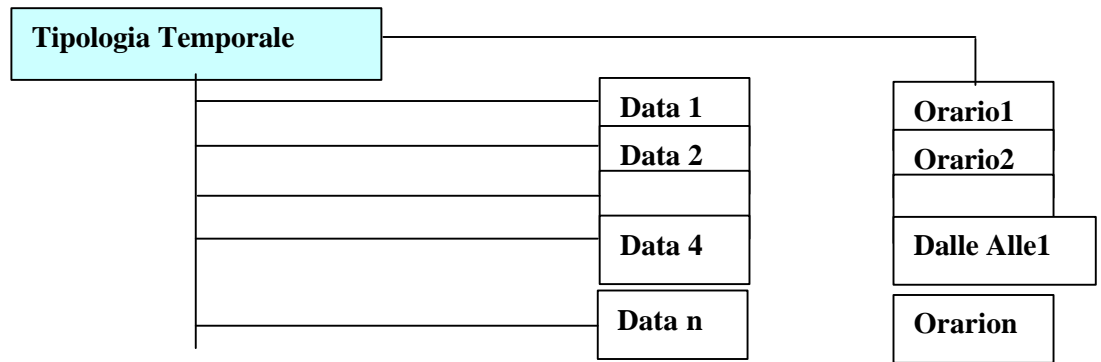
La linea che è astratta si concretizza di volta in volta in una delle n possibili varianti associate.



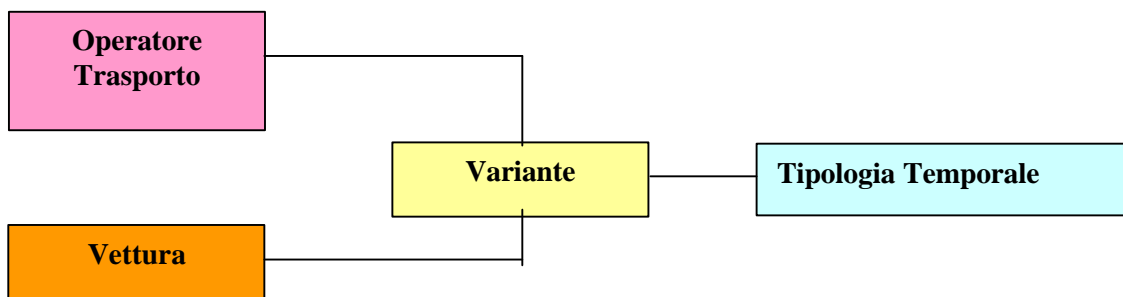
La variante descrive un percorso come sequenza di fermate e come tempi intercorrenti tra l'origine del percorso e le singole fermate.



La tipologia temporale (DAY TYPE) è un insieme di date, di orari di partenza e/o di fasce orarie di disponibilità al servizio.



La **variante** mette in relazione la specifica linea con un operatore di trasporto, una vettura e una tipologia temporale



Popolamento Calendario Varianti

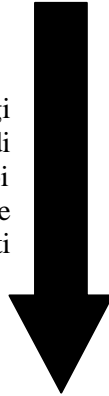
Questa è la fase che trasforma le singole varianti associate alle tipologie temporali da pure descrizioni a calendario effettivo dove per ciascun giorno è possibile intervenire per modificare lo specifico veicolo, lo specifico operatore di trasporto, l'orario di partenza gestendo quindi eventuali eccezioni alle regole codificate.

Calendario delle Varianti

Giorno per giorno specifica quali varianti vengono effettuate
A quale orario partono
Da quale operatore di trasporto vengono operate
Da quale vettura

Pianificazione viaggi

E' la fase in cui vengono generati i viaggi veri e propri su cui il sistema di assegnazione delle corse effettuerà i suoi ragionamenti e le sue verifiche e dove verranno applicate gli aggiornamenti dovuti alle richieste degli utenti.



- resource availability
- trip orders
- travel plans
- payments

Attraverso la FAMS Consolle è possibile definire tutto questo, previa creazione delle aree di sosta e delle fermate da parte dell'editor di PersonalBus. Poiché inoltre le fermate non possono essere definite senza la presenza di archi che a loro volta necessitano di nodi (incroci), appare evidente la necessità di predefinire la rete di servizio nella sua globalità prima di poter definire le linee.

Tuttavia, non è obbligatorio creare una rete perfettamente georeferenziata per tutti i servizi che sono indipendenti da PersonalBus. Infatti, la georeferenziazione occorre a PersonalBus per il computo dei tempi di percorrenza. Qualora il servizio sia indipendente da PersonalBus, sarà nella definizione delle varianti che verranno indicati esplicitamente i tempi di percorrenza e quindi è per questo motivo che la georeferenziazione di strade e fermate non è vincolante.