

FAMS Final Report

# FANS

The Agency for Flexible Mobility Services "on the move" IST-2001-34347





www.famsweb.com





# The Agency for Flexible Mobility Services "on the move"

Version number: 1.3

Date: 30<sup>th</sup> April, 2004

Editors : Giorgio Ambrosino, Andrea Ferrari, Neri di Volo, Brian Masson

### Contributors to this report

Andrea Ferrari, SITA (IT) Giorgio Ambrosino, ATAF (IT) Neri di Volo, ATAF (IT) Fabrizio Pettinelli, ATAF (IT) Piero Sassoli, ATAF (IT) Claudia Binazzi, ATAF (IT) Marco Boero, Softeco Sismat (IT) Brendan Finn, ETTS (UK) Pekka Eloranta, Mobisoft (FI) Antonio Liberato, MemEx (IT) John Nelson, UNEW (UK) Jenny Brake, UNEW (UK) Brian Masson, ATF (UK)

Layout and graphical work by Isabella Briata, Softeco Sismat SpA



© FAMS Consortium 2004 - www.famsweb.com







# **FAMS FINAL REPORT**

Document Type	Deliverable
Deliverable Number	FAMS Final Report
Work Package	All FAMS Project WPs
Editors	A. Ferrari, N. di Volo, B. Masson
Dissemination	Level Public
Version	9.7
Circulation	FAMS Network Transport Operators and Authorities
Contractual date of Delivery	April 2004
Actual date of Delivery	May 2004
Keywords	IST Take-up Action, Information and Communication Technologies, Demand Responsive Transport Services, Multimodal Transport services, Public Transport

# **DOCUMENT HISTORY**

Version	Date	Initials	Revised sections	Short description
0.1	05/03/04	GA, CB	All	DDP and Structure of the Deliverable
1.0	15/03/04	AF	All	First Draft
1.1	29/03/04	MB	All	Revised version of chapt. 2 and 3
1.2	15/04/04	AF, NdV	All	Revised version of chapt. 4 and 5
1.3	30/04/04	GA, BF, JFB, NdV	All	Final Version









# **TABLE OF CONTENTS**

FAMS FINAL REPORT	3
DOCUMENT HISTORY	3
INTRODUCTION: THE FAMS TAKE-UP ACTION	<mark>6</mark>
DRT CONCEPTS	10
2.1 THE DRT CONTEXT 2.2 OPERATIONAL MODEL 2.3 DRT ARCHITECTURE AND ENABLING TECHNOLOGIES	. 10 . 10 . 13
FAMS CONCEPTS	15
3.1 THE FAMS VIEW 3.2 FAMS ARCHITECTURE 3.3 THE FAMS PORTAL	. 15 . 17 . 20
FAMS TAKE-UP SITES	22
4.1 THE FLORENCE METROPOLITAN AREA	. 23 . 26
FAMS TRIALS	<b>29</b>
5.1 STATUS OF FLORENCE SERVICES	. 29 . 33
THE FAMS EVALUATION AND RESULTS	36
6.1 THE FAMS EVALUATION – MAIN RESULTS 6.2 Key Relevant Outputs from the FAMS Evaluation 6.3 High-level Conclusions from the FAMS Trials and Evaluation	. 39 . 41 . 43
THE FAMS BUSINESS CASE	<b>46</b>
<ul> <li>7.1 DEVELOPING A BUSINESS CASE FOR DRT</li> <li>7.2 THE NEED FOR A BUSINESS CASE FOR DRT</li> <li>7.3 BUSINESS CASE ISSUES</li></ul>	. 46 . 47 . 48 . 48 . 49 . 51
DISSEMINATION OF RESULTS	<b>53</b>
<ul> <li>8.1 THE FAMS WORKSHOPS</li> <li>8.2 THE FAMS HANDBOOK</li> <li>8.3 THE FAMS WEB SITE</li> <li>8.4 CONFERENCES AND WORKSHOPS ATTENDED BY CONSORTIUM MEMBERS</li> </ul>	. 53 . 55 . 55 . 56
LIST OF DELIVERABLES AND BIBLIOGRAPHY	57
9.1 LIST OF DELIVERABLES PRODUCED 9.2 USEFUL REFERENCES	. 57 . 57





# **List of Figures**

Figure 1: Intermediate Transport Services flexibility Vs cost	.6
Figure 2: The FAMS Project applied to Public Transport Operators and Citizens	.7
Figure 3: Location of FAMS Partners in Europe	.8
Figure 4: Four Reference DRT Services Schemes	12
Figure 5: Operational DRT Scheme	13
Figure 6: General ICT-based DRT Architecture	14
Figure 7: The Overall Flexible Mobility Agency: FAMS Concept	16
Figure 8: FAMS Physical Architecture	18
Figure 9: The FAMS Portal in Florence: On-line B2C Services for DRT Booking and	
Reservation	21
Figure 10: The FAMS Portal in Florence: B2B Services for Service Planning and	
Information Delivery to DRT Service Providers	21
Figure 11: Location of the FAMS Trial Sites	22
Figure 12: The FAMS Services in Florence and their Executives/Providers	25
Figure 13: Location of FAMS Services in the Florence Metropolitan Area	25
Figure 14: FAMS Services in Angus and their Executives/Providers	28
Figure 15: The Layers of the FAMS Evaluation Methodology	38
Figure 16: Change in Operating Cost/km offered (€) for the Florence Services	41
Figure 17: Campi Service Passenger Trends 1996-2003	42
Figure 18: The Pre-FAMS and Post-FAMS Evaluation Process	45
Figure 19: The Role of FAMS and the Breakthroughs Required in the Business and	
Transport Chain	47
Figure 20: Breakthrough Business Competences needed for DRT	51
Figure 21: The FAMS Book Front-Page	55

# List of Tables

-

Table 1: The FAMS Functions and Services	17
Table 2: FAMS Services in the Florence Metropolitan Area	24
Table 3: The FAMS Services in Angus	27
Table 4: Overall Status of DRT Services in Florence MA	32
Table 5: Overall Status of DRT Services in Angus	35
Table 6: Main Findings at the FAMS Sites	41
Table 7: Campi DRT Improvements to Service Accessibility with FAMS	41
Table 8: Trends in Campi Bisenzio DRT 1997-2003	42
Table 9: A 5-layer model for the evolution of DRT	46







# INTRODUCTION: THE FAMS TAKE-UP ACTION

Demand Responsive Transport (DRT) services are a flexible approach to the issues regarding the provision of public transport services. They provide various forms of intermediate services which lie on a continuum between taxis and the conventional bus services. They usually operate small size buses on flexible routes and schedules, basing their route choice on the users' requests.

Given their flexibility, DRT services are suitable to serve niche market customers such as those travelling in off-peak hours, low demand zones and making airport connections; users with mobility impairments (elderly, disabled); and in areas not accessible by conventional bus services. These factors contribute to giving a social role to these kinds of services.

The flexibility in the organisation of DRT services can vary considerably, according to the needs of users and of the service provider.



### Figure 1: Intermediate Transport Services flexibility Vs cost

During the last few years DRT applications have shown important advantages and benefits in several European cities and regions. DRT services are complementary to conventional, scheduled passenger transport as they usually serve dispersed mobility needs, either during hours of low demand, in areas of low population, or where target users are dispersed amongst the general population, e.g. the disabled and elderly, students, tourists.

Most often, DRT services have been (or are) operated as a single mode, by a single operator, with little or no integration with other transport schemes. However, the experience gained shows a great potential for improved operation and a large scale take up of DRT concepts, models and technologies.

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





By capitalising on the results, experience and practices gained in previous RTD projects, FAMS has implemented and trialled the Flexible Agency concept, evaluated the viability and impacts in real business cases and gathered knowledge and best practice to ensure dissemination and subsequent adoption at the European level.

FAMS was a European project funded by the EU-IST Programme which started on March 2002 and ended on February 2004 under the co-ordination of ATAF, the Public Transit Company for the Florence Metropolitan area.

FAMS has innovated solutions for DRT planning and operation by the implementation and trial of the Flexible Agency. Existing DRT management tools have been adapted and made interoperable within an e-Business collaborative environment allowing cooperation amongst transport service suppliers and the operation of a new service value chain which has allowed:

- Different transport operators to benefit from a shared IT infrastructure.
- Services for the management of the Flexible Services they are individually offering.
- The FAMS service operator to have a global view of travel needs and the service offer, ensuring the best match between users' demands and available services.
- DRT and Flexible Transport users and users' groups to benefit from a unique service centre able to serve their travel needs in the most integrated and best possible way.



### Figure 2: The FAMS Project applied to Public Transport Operators and Citizens

The FAMS Consortium was composed of 7 partners and 1 sub-contractor from 4 different countries:

- Two transport operators/authorities/Agencies SITA (I) and Angus Council (UK) – to implement the Flexible Agency concept in the Toscana and Angus regions respectively.
- Two IT suppliers, Mobisoft Oy (FI) and Softeco Sismat SpA (I) to provide the required technology transfer by adapting solutions obtained in previous EU RTD projects.
- One public transport service operator, ATAF (I) to provide a transfer of expertise on DRT planning and management and support the implementation of best practice in community transport and DRT at end-user organisations.
- Two IT and a transport consultancies, MemEx Srl (I) and ETTS (IE) to guarantee the co-ordination of technical trials and the common evaluation framework.
- A university research group, University of Newcastle (UK) subcontracted to support ATF and ETTS in site development and evaluation.

This FAMS Final Report (FFR) presents the overall FAMS project activities and results covering the defined approach, the Information and Communication Technologies





(ICT) architecture that has been developed, the DRT services trials that have been operated and the FAMS evaluation results.



Figure 3: Location of FAMS Partners in Europe

The primary target of the FFR is to promote and disseminate DRT services and the real results achieved by the FAMS project among transport operators, authorities, city and transport executives' associations, citizens' associations and to a European network.

In particular Chapter 2 provides the basic concepts of DRT services describing the context, operational model and the enabling technologies. Chapter 2 is the context that allowed the development of the FAMS project.

Chapter 3 gives an overview of the FAMS approach on which the Agency for the flexible mobility services is based. The FAMS architecture is described in terms of the functions, services and ICTs underlying the innovation in ICT tools and the FAMS Agency concept.

Chapter 4 provides a detailed description of the different DRT services involved and operated by the FAMS Agency in the two trial site of the Florence Metropolitan Area and the Angus region.

In Chapter 5 the FAMS trials carried out in the two sites of Florence and Angus are described in terms of service status and results.

Chapter 6 provides an analysis of the results obtained in the FAMS evaluation process in the two sites, describing some relevant results in terms of DRT indicators and drawing main conclusions deriving from the experience.

The FAMS business case is discussed in Chapter 7, which also provides an overview of the position of FAMS in the context of the overall transport chain and the research and development framework.





Chapter 8 reports on the various – and numerous – promotion and dissemination initiatives carried out during the project's life, together with the main results and achievements.

Finally, Chapter 9 presents a list of the FAMS deliverables produced during the project and a substantial bibliography for readers.











# 2.1 The DRT Context

During the last few years DRT applications have shown important advantages and benefits in several European cities and regions. DRT services are complementary to conventional, scheduled passenger transport as they usually serve dispersed mobility needs, either during hours of low demand, in areas of low population, or where target users are dispersed amongst the general population, e.g. disabled and elderly, students, tourists.

DRT solutions include a range of different transport services:

- Local buses on routes with some flexibility.
- True DRT as dial-a-bus services between stops or door-to-door. •
- Special needs transport.
- Community Transport.
- Shared taxis and car pooling.
- Some forms of Park and Ride, including those with advanced place booking.
- Car sharing and organised lift giving.

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

- A knowledge-acquiring function to understand the actual demand, or at least . the relevant variations on expected demand.
- An analysis function to determine what action to take in response to this known demand.
- A dispatching function to communicate the changes to assignment and operating personnel.

In some cases there may be a default route with variations applied as required. In other cases the service may be determined entirely from the specific demand for that trip. It is important to remember that the characteristics of both the DRT and the background conventional service offer varies dramatically depending on whether the location is urban, peri-urban or rural in nature.

# 2.2 Operational Model

DRT services can be defined as having at least one degree of freedom for the specific trip being offered. This allows the decision taker (the dispatch centre or the operator) to alter the service offer and cost parameters in response to the actual demand.

The three main dimensions in this respect are:

- The *route* taken.
- The *timing* of the service.
- The vehicle used.

### Routing

The most fundamental options relate to the route taken by the vehicle. The main options are presented below in order of increasing levels of flexibility:







- Offer a fixed route as default, serve points off the route on request, and return to the original route at the same point – all points on the fixed route are always served.
- Offer a fixed origin and destination pair and perhaps pre-determined intermediate points and section(s) of the route. Serve points off the route on request, and return to the fixed route at the optimal position. Some points on the normal route might not be served therefore booking is needed.
- Offer a fixed route service on the trunk section of the route, but have flexible routing at one or both ends of the route, thus providing a local collection/distribution role.
- Have a number of defined stops/collection points, and generate an optimal routing based on the specific trip demand.
- Generate the service from the requested origins and destinations on a free routing basis.

### Timing

A further level of flexibility can be achieved by adapting the timing of the offered service. The main options include:

- Advancing or delaying the departure time for the service.
- Pick-up or set-down at a time specified by the user.
- Adjusting the timing to meet/wait for another transport service for transfers.
- Choosing whether or not to operate a specific trip.
- Time period for switching between conventional and DRT operating mode.

### Vehicle Assignment

The vehicle assigned to carry out the trip can be altered for cost, operational or facilities reasons. The main options include:

- Assigning vehicles with wheelchair lifts (and trained drivers) or other special facilities on demand so that not all vehicles in the pool need this equipment.
- Upsizing/downsizing vehicles to match the expected number of passengers on the outbound or return trip.
- Assigning a smaller or more robust vehicle when requested to operate on smaller roads (e.g. in rural areas) or in traffic-calmed areas.
- Assigning a more appropriate vehicle/driver if the handling of packages/documents is offered as part of the service.
- Where there are very few passengers for the planned trip, pass the work to a taxi firm and do not operate the (mini)bus trip.

Based on the above operational choices, different types of service models can be implemented. Often, the different DRT schemes tend to fall within four basic types (Figure 4):

- 1. Fixed route lines with on-demand trips.
- 2. Fixed route lines with on-demand deviations.
- 3. Lines with flexible routes between stops.
- 4. "Door-to-door" free routes.









Regardless of the type of scheme implemented and the specific choices underlying the operational models adopted, the operation of the DRT service is usually organised in four main steps:

1. User calling the Travel Dispatch Centre (TDC) (trip booking)

A user contacts the TDC (or the driver directly at the terminal) in order to book a trip. The users' requests are submitted to the TDC operators.

The user has to specify the desired departure or arrival time and should specify the bus stop (meeting point) identification number for both pick-up and drop-off stops. The TDC is able to locate a suitable nearest bus stop if the user cannot identify one. Trips can be booked up to a predefined time limit (e.g. 30 minutes, 15 minutes) before the bus departure from the terminal.

- 2. User requested parameters (pick-up/drop-off point, departure/arrival time After the identification of customer journey parameters, the TDC operator has to input the data in the DRT planning and management server, in order to: (a) create a new trip, or (b) modify the existing trips, and carry on the negotiation phase with the user.
- 3. Service negotiation between the TDC operator and the user

The TDC operator obtains the possible trips meeting customer requirements from the DRT planning and management server within tolerances in terms of (a) journey time and (b) routing. The results of the negotiation phase are the acceptance/refusal by the users of one of the proposed trips.

4. **Confirmation, update and communication of trip variations to the driver** Upon the user's acceptance, the TDC operator (or, automatically, the supporting DRT software system; see the next section) updates the DRT trip database and communicates the trip variation to the driver.







# 2.3 DRT Architecture and Enabling Technologies

As can be seen from the description of the DRT operational model introduced in the previous section, no DRT scheme with more than just a minimal complexity in terms of user booking volumes, number of trips and size of vehicle fleet would be manageable or even possible without the support of adequate ICT-based tools. These include software modules for booking and dispatching, communication modules for exchange of data with DRT vehicles and automated vehicle location systems.

Usually, ICT-based architecture supporting DRT operations are organised around the concept of a TDC, as the main technological and organisational resource supporting the management of all four main steps that the DRT production workflow can be broken into.

Overall, the main elements of a generic DRT telematics architecture include (see Figure 6):

- The *Travel Dispatch Centre*, including several integrated software systems supporting the management of DRT service production operations (user's request handling, trip booking, service planning, vehicle dispatching, vehicle communications, system data management).
- A *communication system*, usually based on public or private long-range wireless telecommunication networks, supporting communication and information exchange (both data and voice) between the TDC and the DRT vehicles.
- **On-board systems**, installed on DRT vehicles to provide driver support functionalities during vehicle operations (e.g. dynamic journey information, route variations, passenger information, driver/dispatcher messages).







Several types of DRT user interfaces, enabling communication between the user and the TDC through different channels (e.g. phone, internet, GSM/SMS).



Figure 6: General ICT-based DRT Architecture

This general architecture can be implemented in different ways - and all existing DRT installations are realised through variations on this basic scheme. The implementation of such installations is made possible by a number of key enabling technologies, which allow the development of workable systems able to support the operators (planners, dispatchers) in offering a sustainable transport system to their customers.

Today, the most commonly used enabling ICTs include:

- Booking and reservation systems to manage the customer requests.
- Internet, IVRS and palm-top top devices (PDAs, smart phones, etc.) to assist customer booking.
- Dispatching software for allocating trips and optimising resources.
- Communication systems and equipment to link the TDC with drivers and customers.
- In-vehicle terminals and display units to support the driver.
- GPS-based or GMS-based vehicle location systems.
- Smart-card based fare collection systems.
- Management information systems and other data analysis systems.







# **FAMS CONCEPTS**

## 3.1 The FAMS View

To date, DRT services have been applied mostly as a single element of a potentially larger intermodal transport chain. Most often DRT schemes have been - or are - operated as a single mode, by a single operator, with little or no integration with other transport schemes. However, there are large opportunities for the improvement of service provision modalities and of the service model itself by strengthening the co-ordination of different intermediate services and their integration within the overall transport service chain.

FAMS aimed to improve DRT by addressing fundamental organisational and technical issues at the heart of this kind of transport model by improving communication, integration and co-operation amongst all the actors involved in the DRT domain, e.g. transport service planners, transport providers and end-users.

Existing DRT management tools have been adapted and made interoperable within an e-Business collaborative environment. Models and solutions to enable collaboration among transport operators are based on currently available *e-Commerce / e-Business* technologies such as n-tier web-based architectures, portal technology, distributed web services, internet communication and notification services, information and resources sharing techniques over the internet. These have allowed improved co-operation among transport service suppliers and the subsequent operation of a new transport service chain.

FAMS stands for Flexible Agency for Demand Responsive Collective Mobility Services, and essentially aimed at experimenting with concepts for a *Flexible Agency* enabling co-ordinated provision of DRT services in an area. Flexible here means not only flexibility in the transport schemes, as outlined in the previous chapter, but also flexibility in organising the provision of DRT services in a multi-service and multi-operator context. This flexibility of work and operation is embodied in the concept of a Flexible Agency, enabled by a number of e-Business and e-Commerce services.

Figure 7 shows the operational reference model for the FAMS Flexible Agency. The services offered by the Agency can be clustered as services targeted to customers/end-users (*B2C services*) and services targeted to the transport operators (*B2B services*). The services are supported by an effective communications platform. The used and developed ITS elements and applications are specified within this framework.

Essentially, the FAMS Agency enables the operation of a *virtual/extended enterprise* of transport operators. Despite the physical location of the operators, different types of fleet, booking systems, services provided, etc., the Agency manages the entire service chain - from customer booking to service planning, monitoring and control - operating as a unique entity, as if it were "one operator with one fleet and one booking system", providing an effective response to the mobility needs of the different users.

Overall, the following main elements can be identified:

- A common FAMS Service Centre (Extended TDC) sharing a number of services for planning, managing and monitoring the different types of flexible services. These include:
  - shared routes and service planning facilities
  - shared resources (vehicles) management
  - customers' management repository
  - service information and data repository.



FAMS FINAL REPORT



msweb.com



Figure 7: The Overall Flexible Mobility Agency: FAMS Concept

 Several e-Services between the Agency's DRT management service components and the different actors involved in the DRT process chain, both operators and users.

Specifically, these are grouped into two different service types:

 Business-to-Business (B2B) services, allowing interaction and teamwork among the different transport service providers co-operating through the Agency. Services provided include support for the management of resources (vehicles) according to availability, permission to share, request and delivery of trip orders and travel plans, and notification of events (e.g. service modifications, expected events).

**Business-to-Consumer (B2C)** services, supporting access to information and services for different associations, user groups and communities. Services provided include remote service information, booking facilities for associations and user communities, and enquiries and notifications.

• A communication network between the TDC and the vehicles operating the services, based on cellular technology (GSM and GPRS).

The flexibility of the Agency addresses not only the different needs of transport demand but also the different operational models and service provision schemes supported by the technical infrastructure.

Based on this, FAMS has run different trials and has evaluated and gathered best practice evidence about a number of operational schemes, looking in particular at:

- The co-ordinated management of the fleet belonging to the different transport operators and/or citizens associations federated through the Agency.
- The balancing of services among the different operators involved in coordinated service provision.
- Real-time monitoring of service operation through GPRS technology.
- Diversification of service access modalities for different end-users groups/categories.





ramsweb.com

FINAL REPOR

• The workflow and information flow along the entire service chain, from transport operators, to the DRT planning/operation service provider, to the end-users and customers of the transport services.

# **3.2 FAMS Architecture**

Taking as a background, the results of the User Needs work, i.e. stakeholders' identification, user requirements and objectives of the FAMS Agency, the FAMS concept has been developed and the general architecture defined, together with defining the main functionalities related to B2B and B2C services. Table 1 shows the list of functions and services defined for the FAMS Agency.

FAMS Functional Architecture: Functions Groups				
F1	Manage service information			
F2	Customer communication and feedback	End-user services	B2C	
F3	Service booking			
F4	Manage reservation data	<b>T</b>		
F5	Manage planning data	services	B2B	
F6	Manage transport resources data			
F7	Service data management	General management		
F8	Manage user access	services		
F9	Flexible Transport operations management		9	
F10	Flexible Transport operations control	Extended TDC operations		
F11	Fare collection/management			
F12	Management of vehicle communications		3	

### Table 1: The FAMS Functions and Services

The B2C Services area (functional groups F1-F3) includes all services and facilities supporting the interaction between DRT end-users and the Agency, i.e.:

- Booking and reservation facilities, based on web services and phone connections (TDC).
- Provision of extended feedback to DRT users (e.g. confirmation of booking, modifications to planned services) through e-mail, SMS and web services.
- Provision of general information and customer care services (e.g. general communication, users' enquiries, special service offers, events calendars).

The B2B Services area (functional groups F4-F5) covers the interaction between the different transport providers co-operating within FAMS and the Agency, providing each connected transport operator with support services for:

- Management of booking/reservation requests and information.
- Management of available resources (i.e. vehicles availability for service planning).
- Route planning, service scheduling and vehicle dispatching information.

The Extended TDC Services area (functional groups F9-F12) covers all core tasks related to the management and operation of flexible transport provision. These correspond, mainly, to the typical operations supported by a TDC, extended to cover the multi-service, multi-operator dimension of the Flexible Agency.

There are various ways of implementing the above functionalities and to produce a physical set up for the deployment of such services. In this respect, the two FAMS trial sites have adopted slightly different solutions. Figure 8 provides an overview of the general FAMS (physical) architecture which has served as a background reference







model for the specific FAMS implementations at the two sites.



Figure 8: FAMS Physical Architecture

At a general level, the main components of the general FAMS physical architecture can be described as follows.

• **The FAMS Portal.** This represents one of the two key building blocks of the FAMS architecture (the other being the TDC Platform) and provides implementation of all end-users web services, both the B2C and B2B components. The FAMS portal provides the main access point to the services offered by FAMS, for both DRT users and providers.

Each end-user category has dedicated interfaces providing access to and use of the different services ("portlets"). A separate section of the portal provides restricted access to configuration services for the FAMS operators. These allow proper configuration of portal sections and parameters related to the different users, supporting, for instance, all operations related to end-user registration and profiling for accessing the different B2C and B2B FAMS services

• **The TDC Platform.** This represents the second key building block of the FAMS architecture and provides the implementation of all services required to plan, manage and operate DRT services. This architectural component is intended for use by the TDC or FAMS Agency operators in the various phases and tasks underlying DRT service production.

In order to develop this building block of the FAMS physical architecture, two different solutions have been used in the trial sites, based on DRT management systems provided by the two local IT Partners: the







PersonalBus<sup>TM</sup> system in Florence, supplied by Softeco, and the Mobirouter<sup>TM</sup> system in Angus, supplied by Mobisoft UK. Both systems can be considered as state-of-the-art solutions in the DRT technology market, and provided the key functionalities that, after adaptation to the multi-service/multi-operator context of FAMS, are required to operate the "core" services of the Agency.

- The interface between the portal and the TDC platform. In order to provide proper functioning of the FAMS system and allow the end-users (both B2C and B2B) to exploit the various services and information provided by FAMS, the functionalities of the TDC platform and of the FAMS portal have to be interfaced to support the related information and work flows. Basically, this interface can be implemented using two main techniques:
  - A standard "web service" approach, using the SOAP / Http protocol based model to allow the exposure of TDC Platform services through the relevant portlets of the FAMS portal.
  - A common data repository, providing shared data between the TDC platform and the portal which allows the end-user services accessible through the portal to use and exchange data and contents with the TDC platform.

From a functional point of view, this physical component also implements the general data repository and the related management functionalities required by FAMS.

- The Configuration and Management Console. FAMS operators are able to manage and control all of the services provided by the FAMS system, i.e. the different service workflows related to the various B2C and B2B services provided by the Agency. In order to do this, the overall architecture includes the Configuration and Management Console as a dedicated overall management component implementing all operators' "back-office" services and interfaces required to properly configure and manage the FAMS IT infrastructure as well as the different services provided by the two main building blocks.
- DRT vehicle devices. On-board devices allow DRT vehicle drivers to carry out various operations related to the actual production of DRT journeys and services. These include for instance:
  - Getting updated trip information during the current or next service.
  - Sending trip-related information to the TDC/Agency (e.g. notification of passengers no-shows, trip status).

Carry out service related operations, such as on-board booking.

Basically, two types of in-vehicle devices are considered within the FAMS architecture, which are also largely representative of current vehicle technology:

- Dedicated, in-vehicle terminals installed on board of DRT vehicles.
- Handheld devices (e.g. PDAs, palm computers, smart phones) for use by DRT vehicle drivers.
- **External systems.** As an internet-based system accessible through the portal, the FAMS system is able to link and make accessible external contents of interest for the FAMS Agency provided by external parties. For instance, in the implementation of FAMS in Florence, two external systems have been linked to the FAMS portal which are related to other flexible mobility initiatives in the city: the Mobility Manager Portal, providing information and services related to intermediate mobility needs and solution in the Piana Fiorentina, and the portal for Disabled and Elderly DRT services developed in Florence under the supervision of the Florence Municipality.







# **3.3 The FAMS Portal**

The *FAMS portal* is the main channel of communication between the Agency and the different user categories, being the DRT service end-users (B2C services) or transport service providers or transport authorities (B2B services). There are of course many different solutions to structure and organise the information and end-user services on the FAMS portal. The analysis conducted in the two trial sites during the Take-up action has provided some general lines on the type of information and services to be included in the portal.

Overall, the FAMS portal has been designed and realised to provide access to the following services:

- B2C Services
  - Travel inquiry and information
  - Travel booking, modification, cancellation
  - Booking confirmation via web access, email and SMS
  - Customer claims and inquiries
  - Event notification
- B2B Services
  - Access to planning and booking information
  - Management of DRT resources (vehicle availability schedules)
  - Access to statistics and service data
  - Claims and inquiries
  - Event notification
- General Services
  - User profiling and management
  - General information, news
  - Events and calendaring
  - Mailing lists and on-line discussion fora (travel club members)

The implementation of this general structure is largely site dependent, and is based on the needs and requirements of local users (of both B2C and B2B FAMS services).

The pictures on the next page provide some examples of the type of interface available to B2C and B2B users through the FAMS portal. The examples are taken from the implementation of the portal in Florence.

Specifically, the figures show: the home page used to access the various portal services and the B2C service access for booking and reservation of DRT services (Figure. 8), an example of B2B service access, particularly related to DRT planning information delivered to the relevant DRT Transport service provider (Figure 9).

The FAMS portal in Florence is accessible at the following URL: <u>http://www.serviziflessibli.it</u>.











Figure 9: The FAMS Portal in Florence: On-line B2C Services for DRT Booking and Reservation



Figure 10: The FAMS Portal in Florence: B2B Services for Service Planning and Information Delivery to DRT Service Providers





# **FAMS TAKE-UP SITES**

The FAMS concepts have been implemented at two sites, in Italy (Florence) and the UK (Angus, Scotland), by two transport operators/authorities/Agencies - ATAF in Italy, Angus Transport Forum in the UK. Different transport service providers collaborate with the Flexible Agency in the two local implementations of the FAMS concept. The trial site in Angus did not have DRT applications previously.

Each site represents different environmental contexts (an urban/metropolitan area in Tuscany and a rural area with a very low level of public transport services in Angus) and different facets (three main fleets in Tuscany, provided by major transport operators; different small fleets provided by various small transport enterprises and associations in Angus) which are complementary for the application of IT support systems to the Flexible Agency for DRT. The sites are also different from the point of view of the IT facilities, practices and knowledge available about DRT services.

Taking into account these differences, each site implemented its own local project on the basis of a common architecture and an Agency service model to be designed within FAMS, in order to assess the entrepreneurial opportunities and the responses to the citizens/users mobility needs at each site.

Overall, this led to two approaches in FAMS: one site introducing DRT services and a flexible Agency in the rural environment, whereas the other has further developed the existing DRT services by introducing a Flexible Agency in the urban and metropolitan environment.



Figure 11: Location of the FAMS Trial Sites





# 4.1 The Florence Metropolitan Area

The FAMS trial site in Italy included Florence and the surrounding Metropolitan Area, with a total area of about 500 km<sup>2</sup>. The whole metropolitan area has about 590,000 inhabitants and huge commuter/tourist flows throughout the year.

The trial site in Florence had the base DRT technologies already in place and had already gained valuable knowledge about DRT and overall intermediate services, having managed a DRT system/service for several years (PERSONALBUS<sup>™</sup>) in the Florence Metropolitan area, and being involved in many R&D projects, as well as co-operating with other Transport Companies.

The site was in the ideal situation to scale-up the local systems, and to develop and test the technological infrastructure and the collaborative service models underlying the Flexible Agency concept.

In Florence, FAMS has built up upon and around the existing DRT services (Porta Romana, Campi Bisenzio, Scandicci, Sesto Fiorentino, etc.) with the view of gradually expanding, after successful implementation and evaluation of the trials, as the Agency for co-ordination of all intermediate transport services in the Florence Region.

### DRT Services in Florence

Since 1995 several collective intermediate transport services have been implemented gradually in the Florence Metropolitan Area (MA). They are currently operated by different transport service executives/providers answering the needs of different user categories by ensuring a certain level of flexibility in the service operation.

Service	Operator	Area Covered	Typology of Service	Number of Vehicles	Booking Modalities
s	4	Corridor between	Fixed times; fixed	2 buses	Via web
ainbu	F / SIT	and Central Station	booking the seats.	(12 m)	- Off-line booking, before 6 p.m.
No	VTA				- Immediate planning
	٩				- Immediate notification
L.		Whole of Campi Bisenzio town - Area 28,62 km <sup>2</sup> - Inhabitants 35.757	Many-to-many service, free routes and times according to users' requests	5 minibuses (6 in the peak hours)	Via phone/via web (only off-line)
Campi DR	TAF				- Off-line booking before 6 p.m.
	A				- On-line booking within 30 minutes before the requested trip
		Whole of Scandicci town	Many-to-many service, free routes	Maximum 5 minibuses	Via phone/via web (only off-line)
icandicci DRT	ŋ	- Area 59,59 km <sup>2</sup> - Inhabitants 51.500	and times according to users' requests	(peak hours)	- Off-line booking before 6 p.m.
	Li-ne				- On-line booking within 30 minutes before the requested trip
					- Immediate planning
					- Immediate notification

Table 2 summarises the FAMS services operated in the Florence MA with respect to each service executive/ provider and the main characteristics of the services.





23

2 F	AMS

Servic	Operate	Area Covered	Typology of Service	Number of Vehicles	Booking Modalities
Sesto DRT	Li-nea	Sesto Fiorentino town - Area 49,04 km <sup>2</sup> - Inhabitants 46.800	Fixed times, fixed route with deviations upon users' requests	1 bus (12 m)	Via phone/via web - Off-line booking, before 5 p.m. - Immediate planning - Immediate notification
Calenzano DRT	CAP	Calenzano town - Area 76,87 km <sup>2</sup> - Inhabitants 15.100	Fixed times, fixed route with deviations upon users' requests	1 bus (12 m)	Via phone/via web - Off-line booking, before 5 p.m. - Immediate planning - Immediate notification
Porta Romana DRT	Li-nea	Porta Romana district (Florence urban area) - Area 22,5 km <sup>2</sup> - Inhabitants 5.000	Fixed times, fixed route with deviations upon users' requests	2 minibuses	Via phone/via web (only off-line) - Off-line booking, before 5 p.m. - On-line booking within 30 minutes before the requested trip - Immediate planning - Immediate notification
Disabled	ATAF	Whole of Florence Metropolitan area - Area of Florence 101,42 km <sup>2</sup> - Inhabitants of Florence 385.000 - Area of Metropolitan area 481,89 km <sup>2</sup> - Inhabitants of Metropolitan area 586.000	Door-to-door service, free routes and times according to users' requests	5 minibuses equipped with special seats for disabled users and wheel chair locking device	Via phone/via web - Long-term off-line booking - Deferred planning - Deferred notification

### Table 2: FAMS Services in the Florence Metropolitan Area

a 5

The context diagram in the following figure provides a view of the general context investigated for the development of the FAMS concept and shows the DRT and flexible mobility services in the Florence site with respect to each service provider.







Figure 12: The FAMS Services in Florence and their Executives/Providers

Figure 13 shows the location of these services in the Florence Metropolitan Area.



Figure 13: Location of FAMS Services in the Florence Metropolitan Area







# 4.2 The Angus Region

The trial site in the Angus Region is new to DRT services and applications. It covers the rural Angus area surrounding the small towns of Alyth, Kirriemuir and Brechin. The site allows evaluation – both on the technical and organisational level – of the transferability of the DRT concepts and models developed so far in an environment totally new in terms of services and support technologies.

The aim at the Angus site was to create a co-ordination centre (a Flexible Agency) to administer a rural DRT system that did not exist at the time the FAMS project started. The centre was to take bookings for all residents and visitors wishing to access the rural areas of Angus. The objective was to maximise the use of existing resources and provide the residents of the pilot area with equal access to employment, training, childcare, health care and leisure activities.

### DRT Services in Angus

The aim in Angus was to maximise the use of commercial resources in the area. It was therefore essential that the resources used to provide school transport were utilised. A number of client based statutory body services were also provided in the area by the Scottish Ambulance Patient Transport Service, the Social Work Department and the day care centres. The three towns of Brechin, Kirriemuir and Alyth act as hubs for the FAMS project. The FAMS services operate between the hours of 07:00 and 19:00 from Monday to Friday and are open to all residents in and visitors to the pilot area.

A Travel Club has been created to establish the level of interest in over 90 activities. This information is held in the TDC and is 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 not possible to undertake the whole or part of the journey by a commercial service, a door-to-service link is provided. Customers are advised about the options available at the time of booking. If a taxi is used, the cost of the journey will be known before the journey is undertaken.

Where commercial operators are unable to provide a service due to low patronage, which would result in high charges for the user, it is possible for local groups that are affiliated to the Angus Transport Forum to have group members trained to MiDAS (Minibus Driver Awareness Scheme) standard. This allows groups to hire Angus Transport Forum accessible minibuses for journeys to planned club events in the evenings and at the weekends. Costs are adjusted to cover fuel, insurance, servicing and depreciation.

DRT services are booked the day before departure in the first instance, with the future goal of being allowed 2 hours before departure. This is allowing operators, drivers and customers to get used to the concept and to establish local demands. The vehicles used are fitted with MobiRouter systems developed by Mobisoft Oy. This allows, in principle, the TDC and vehicle to communicate throughout the operational day with GPRS communications.

Table 3 summarises the FAMS service characteristics at the Angus site.





Service	Operator	Area Covered	Typology of Service	Number of Vehicles	Booking Modalities	FAM
Glen Esk services	Glen Esk Travel	Glen Esk / Brechin area - Area 392 km <sup>2</sup> - Inhabitants 4084	Semi-fixed services at peak times Monday - Friday. Private hire to individuals off-peak Monday - Friday.	One 8 seat minibus	Via phone - Long-term off-line booking - Deferred planning - Deferred notification	<b>FANS</b>
Glen Isla services	James Donald Taxis	Glen Isla / Alyth corridor - Area 203 km <sup>2</sup> - Inhabitants 3996	Semi-fixed services at peak times Monday - Friday. Private hire to individuals off-peak Monday - Friday.	One 8 seat minibus	Via phone - Long-term off-line booking - Deferred planning - Deferred notification	b.com
Glen Clova services	Meffans Coaches	Glen Clova / Glen Prosen Kirriemuir corridor - Area 600 km <sup>2</sup> - Inhabitants 3867	Semi-fixed services at peak times Monday - Friday. Private hire to individuals off-peak Monday - Friday.	One 25 seat coach	Via phone - Long-term off-line booking - Deferred planning - Deferred notification	
Angus Disabled and Elderly services	Meffans Coaches, Glen Esk Travel, James Donald Taxis, Community Transport providers, Statutory bodies	All Angus Region - Area 2200 km <sup>2</sup>	Door-to-door service, free routes and times according to users' requests. Hub feeder service.	8 vehicles: mixture of taxis, minibuses and full size buses	Via phone - Long-term off-line booking - Deferred planning - Deferred notification	
Angus Regular an Special Events	Meffans Coaches, Glen Esk Travel, James Donald Taxis, Other commercial bus/taxi operators, Community Transport providers	All Angus Region - Area 2200 km <sup>2</sup>	Private individual and group hire: door-to-door service, free routes and times according to users' requests, where no commercial service available / not accessible	8 vehicles: mixture of taxis, minibuses and full size buses	Via phone - Long-term off-line booking - Deferred planning - Deferred notification	
Angus Group Hire	ATF Fleet, Community Education fleet Meffans Coaches, Glen Esk Travel, James Donald Taxis, Other commercial bus/taxi operators, Community Transport providers	All Angus Region - Area 2200 km <sup>2</sup>	Group hire: routes and times decided by group. Must use MiDAS accredited driver	11 vehicles: mixture of taxis, minibuses and full size buses	Via phone - Long-term off-line booking - Deferred planning - Deferred notification	

Table 3: The FAMS Services in Angus







Figure 14 shows the DRT and flexible mobility services operated in the Angus site together with the respective service executives/providers.



Figure 14: FAMS Services in Angus and their Executives/Providers









Trial operation activities started in **May 2003** in **Florence and Angus**. Trials were carried out until February 2004.

At both sites the preparatory work had been made in good time and sites were ready when the FAMS verification phase ended and the trial phase started.

The customer interfaces and dispatching functions were already well tested and practised when the trials started due to the long verification period in Angus and the experienced TDC personnel in Florence. 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 to be of great importance, mainly thanks to the suppliers who provided assistance and training throughout the project, since at both sites the objective was to continue the operation and keep the Agencies and application in operation permanently after the FAMS trials.

The following sections show the real status of the services after the implementation of the Agency. For each service the different DRT scenarios and the operational schemes related to the booking functionalities with respect to the use of the telephone and the FAMS portal are reported.

Each service is identified by its technical characteristics/level of flexibility, typology of booking, map of the service, etc. and by the achievements made within FAMS, in terms of success of the demonstration or negative feedback.

# 5.1 Status of Florence Services

The main features of the services set-up for FAMS trials in Florence can be summarised as follows:

### Agency and FAMS operators

- Services operate under public and/or private hire legislation.
- Most services operate between 06:30 and 20:30 Monday to Saturday.
- Except for specific dedicated services (e.g. disabled and elderly services) all services are open to all residents and visitors in the pilot area.
- Journeys operate on demand (completely free routes among stops) and on fixed routes with on-demand deviations, depending on the service scheme.
- For the FAMS trials, two operators are involved in the Agency during operational hours: one mainly devoted to the management of FAMS services related to Campi Bisenzio DRT (which has a very high rate of customer requests) while the second for the other schemes (with a lower rate of operations).

### B2B users

• The deployment option adopted for FAMS in Florence (the "*all-in-one scheme*") leads to a strongly centralised operational model where all the B2B services are managed by the FAMS Agency control room (the TDC is based at the ATAF Peretola depot).





- The FAMS Agency collects travel requests on behalf of the different transport operators, via the FAMS portal or direct phone call to the TDC.
- Transport operators provide the FAMS Agency with information about their own vehicles/drivers resources (e.g. vehicle availability time sheets).
- Transport operators receive the planned services from the FAMS Agency, based on the relevant requests collected by the Agency.
- Exchange of data between the transport operator and the FAMS Agency takes place via the relevant web B2B services.

### B2C users

- DRT customers can access the service by calling the TDC (toll-free number) or by accessing services through FAMS portal (http://ww.serviziflessibili.it)
- The FAMS TDC is open for calls between 08:00 and 17:30 Monday to Friday while the FAMS web portal operates 24 hours a day.
- Booking time in advance depends on:
- The type of DRT service scheme.
  - The type of booking (short term booking, mid-/long-term reservation).
- The type of interface access to the FAMS Agency (phone or portal) ranging from 15 minutes to the previous day.
- The customer gives 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 (time, place, cost, accessibility issues, capacity etc).
- Confirmation of reservation is sent to the clients via different channels, based on the customer's preferred choices (SMS, e-mail, direct access to the portal, phone call by the TDC operators).
- Complaints/suggestions can be registered through the portal (a specific module is accessible on the web site).
- Customer management services supported by the FAMS portal include:
  - Customer registration and profiling.
  - Service performance and follow-up.
  - Enquiries/suggestion surveys and complaints.
- Anyone can use the service to access to/from the area by contacting the TDC or accessing a service directly through the portal, provided he/she is a registered user of FAMS services in Florence.

Table 4 gives a synthesis of the Florence FAMS trials, showing the relevant service characteristics and the positive and negative feedbacks deriving from the trial. It can be seen that the results are quite promising, stimulating ATAF to continue with the experiment.

All the services have been fully deployed except for the Hotel Airport service: this has not started yet due to some operational and administrative problems.

During FAMS the Scandicci DRT service has changed from DRT to a regular line service as a result of the cost/benefit analysis carried out during FAMS. The FAMS evaluation results took into account the users Origins/Destinations (O/D) distribution and their relevant characteristics (hour of the trip, age, trip motivation, etc.) in order to redefine a suitable service for the users/citizens.

The DRT experience has been very useful in terms of collecting significant O/D data in order to plan the new services and in terms of a promotional campaign for public transport in order to regain users that had previously shifted to private car usage.







					2
		Scenario 3	Booking	today +	> today
		flexible routes & times	Time limit	> 30 mins	< 18:00
Campi Bisenzio			Planning	immediate	deferred
			Notification	immediate	deferred
Scandicci		Scenario 3 many-to-many DRT flexible routes & times	Мо	oved to co servio	nventional :e!!!
8	The Algorit - Head	Scenario 3 many-to-many DRT flexible routes & times		Not yet a Problem	active. s with
Hotel -Airport					ciations
	1.4	Scenario 4 door-to-door DRT	Booking	Long term	> today
	The second second		Time limit		< 18:00
			Planning	deferred	deferred
			Notification	deferred	deferred

Mobility Manager services are fully deployed and utilised by the different users (workers) and industrial companies (mainly for travel demand analysis through surveys/questionnaires).

Table 4: Overall Status of DRT Services in Florence MA

**Mobility Manager** 



# 5.2 Status of Angus Services

The main characteristics of the services operated by the Angus site are summarised as follows:

- Services operate between 07:00 and 19:00 hours Monday to Friday and are open to all residents and visitors to the pilot area.
- The TDC (based at Stracathro Hospital, Brechin) is open for calls between 08:00 and 17:30 Monday to Friday.
- The DRT service utilises vehicles currently used to provide school transport.
- The aim of the service is to allow access from/to the Glens in order to link with the existing commercial bus network and to increase equality of citizens.
- Clients can access the service by calling the TDC or by accessing services through the driver en route.
- Booking time in advance is initially 24 hours (the objective is 2 to 4 hours) until both customers and operators are used to concept and holes in the communication network are resolved.
- Participating operators receive passenger and goods requirements, route pick-up and drop-off details and times at 17:00 hours the previous day.
- Operators are e-mailed or faxed confirmation of the details for the next day.
- The customer calls giving 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 (time, place, cost, accessibility issues, capacity etc.).
- Door-to-door services are offered where no commercial services operate. Where it is not possible to undertake the whole route or part of the journey by a commercial service a door-to-service link is provided.
- Complaints/suggestions are registered.
- Confirmation of reservation is by phone, if needed or text message.
- Customer profiling is undertaken.
- There are no preconditions for service provision. Anyone can use the service to access the area by contacting the TDC or accessing a service direct through the driver en route.

A Travel Club has been created to establish the interest in over 90 activities. This information is held at the TDC and is used to plan events locally for groups in the evening and at weekends.

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 is undertaken. Matrix pricing based on each operator's rates is used to advise on all options and allow the customer to decide whether to accept the offer.

Where commercial operators are unable to provide a service due to low numbers – which would result in high charges for the user – it is possible for local groups (affiliated to the Angus Transport Forum) to have group members trained to Minibus Driver Assessment Scheme (MiDAS) standard. This allows groups to "hire" Angus Transport Forum accessible minibuses to undertake the journeys to planned club events. Costs are adjusted to cover fuel, insurance, servicing and depreciation.

Four vehicles have been fitted with the hardware needed to communicate with MobiRouter. This allows the TDC to communicate throughout the operational day, where there are no communication network gaps.

In addition to the Aplicom device that has been installed, other options were identified that could be used in the future which would more closely match the needs of operators: WinCE based PDAs and embedded Windows2000 devices (e.g. Sunit), both with touch screen. Units that can easily be transferred from vehicle to vehicle and be carried by drivers who can access information at any time would be preferred by some operators, e.g. in rural areas owner drivers do not sit in their vehicles all day.







In Glen Isla 4 semi-fixed services per day (Monday to Friday) were established after 5 months of operation. In Glen Clova, 2 flexible services have been introduced. Throughout the Angus Region a pool of vehicles is available for hire by groups and individuals. A weekly cinema club for young people in Brechin has been established along with a Disabled Ramblers Association.

Table 5 gives a synthesis of Angus FAMS trials, showing the relevant service characteristics and the positive and negative feedbacks deriving from the trial. As with Florence, it can be seen the results are quite promising and the experimental services are still being operated.







	Glen Esk	Scenario 1 Semi-fixed Route and Individual Hire	Booking Immediate planning Immediate notification
$\odot$	Glen Clova	Scenario 1 Semi-fixed Route and Individual Hire	Booking Immediate planning Immediate notification
	Glen Isla	Scenario 1 Semi-fixed Route and Individual Hire	Booking Immediate planning Immediate notification
	Angus: Disabled and Elderly services	Scenario 2 Hub feeder flexible service	Booking Immediate planning Immediate notification
	Angus: Regular and Special Events	Scenario 3 Flexible routes for Individual and Group Hire if fixed service not accessible	Booking Immediate planning Immediate notification
	Angus: Group Hire	Scenario 4 Group Hire: select own routes	Booking Immediate availability notification

Table 5: Overall Status of DRT Services in Angus



# THE FAMS EVALUATION AND RESULTS

The FAMS project has been carried out primarily in order to gain understanding so that decisions can be made by stakeholders at the sites, the suppliers and potential future sites.

FAMS had three main Strategic Objectives:

- SO1 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 – such as web-based access to information, booking and reservation for social service associations, shared resources planning – to support their operation within the Flexible Agency concept.
- SO2 To **build confidence** for authorities and investors (operator, communities and suppliers) giving the ability to plan, organise and deliver:
  - A quality product that meets the needs of users who have, until now, been marginalised by the transport offer.
  - Substitute mobility products that are cheaper and more attractive than non-viable conventional services.
- SO3 To *lead to deployment* of DRT and intermediate transport concepts based on innovative Flexible Agencies. The implementing Agency will need tools to support the business and organisational service models, such as hardware, software, communications, skills, training, leading to take-up of the outputs of the advanced telematics and support products.

FAMS has developed a layered approach to address the objectives (see Figure 14), so that each layer is clearly linked to the layers above and below it. In this way, all of the objectives within FAMS are clearly positioned and provide a clear logical framework for the project. Four layers have been developed, shown in order from highest to lowest:

- Layer 1 The three *Strategic Objectives* set out above.
- Layer 2 Seven *Evaluation Areas* which cover the key dimensions of the project.
- Layer 3 FAMS Level Objectives.
- Layer 4 *Micro-Objectives* which are practical and measurable.

The FAMS project has identified seven relevant Evaluation Areas:

- EA1 Generic ITS issues, supporting the Innovation strategic objective
- EA2 Angus site-specific issues, supporting the Build Confidence strategic objective
- EA3 Florence site-specific issues, supporting the Build Confidence strategic objective
- EA4 Generic Transport issues, supporting the Build Confidence strategic objective
- EA5 Take-up issues, supporting the Deployment strategic objective
- EA6 Regulatory and market environment issues, supporting the Deployment strategic objective
- EA7 Business Case issues, supporting the Deployment strategic objective.

The FAMS evaluation had two main dimensions:

SO4 **Objective measurements**, using the FAMS metric indicator set. These mostly covered the site-specific assessment. These have been measured according to the FAMS Evaluation Plan with pre-FAMS measurements in







early-2003, and post-FAMS measurement in the period September-November 2003. The detailed reference materials for Angus and Florence are contained in Annexes F and G of Deliverable 2, the FAMS Evaluation Plan.

SO5 **Non-metric measurements**, based on structured interview, logs and event records. These mostly covered the evaluation areas which are not site-specific. The structured interviews were carried out in September 2003 and are reported in detail for Angus and Florence in Annexes H and I respectively in Deliverable 2.









Figure 15: The Layers of the FAMS Evaluation Methodology



# 6.1 The FAMS Evaluation – Main Results

The FAMS Evaluation generated a large amount of information and data (reported in FAMS Deliverable D7 "*Comparative Evaluation and Business Case Assessment*").

Table 6 provides the main findings obtained at the two FAMS sites. In particular the most relevant ones are highlighted in bold format. Moreover, in Section 6.2 some key results are reported in order to outline the success of the FAMS project in the real services environment from the user perspective.

Category	General Comment			gnificant Data/Results	
ve transport vices	Florence: the services were already well established, so that the FAMS project was targeted to take the existing services to a different level of efficiency and effectiveness thanks to the new technologies and the new organisational model - the Agency and the related portal.		In Flo 200 n 30% and S of Ca Camp	In Florence, services are within 200 m of the population for 20- 30% of Porta Romana, Scandicci and Sesto Fiorentino users, 56% of Calenzano users, and <b>79% of</b> Campi users.	
A. Innovati ser	In Angus, many mobility services are now provided where previously none existed such as new semi-fixed and fully flexible services for individuals and for the disabled and elderly in the three Glens in the target area. Compared to the pre-existing situation, service frequencies and hours of coverage have been increased.		Angu succe stake the c over a conce	Angus Transport Forum succeeded in involving the stakeholders and community in the concept and service design: over 80% favoured the FAMS concept.	
organisational tform	The FAMS Virtual Agency (B2B/B2C) concept has been successfully implemented in Angus and Florence. In Florence the FAMS project introduced changes to the organisational structures and relationships, implemented the FAMS portal, and upgraded the system capabilities		hour, compared to 20 - 30 by erator, thus improving the access es for users. been substantial increase in the on of hardware and software ents, especially in relation to the		
B. Innovative pla	framework has been significantly extended so that multiple operators participate in the DRT service provision through a common TDC. In Angus, a totally new TDC has been setup.	portal, web, XML data structures and database access. In Angus, operators have high acceptance of the new TDC, with excellent/good opinion of all the service, operational and organisational aspects.			
o and	The new platforms and/or upgrades to the T been successfully implemented. A well-stru partnership with the ITS supplier and close of system development were critical factors to this the evaluation period, there were no significant	<b>DC system h</b> ctured collaboration ir s success. Du failures.	ave n the ring	In Florence more than 150 user/citizens were contacted by the local promotion activity and accessed the FAMS	
<sup>t</sup> ul Take-u <sub>l</sub> loyment	<b>Technology showed high levels of reliability and of usability</b> , even though, e.g. TDC staff in Florence considered that the user manual was 'poor', whereas B2B and B2C services were rated highly.		<b>ility</b> , user ed	Portal, mostly for the main service (Campi DRT). This permitted an improvement:, the amount of unanswered	
C. Successi Dep	Concerning Angus Transport Forum, ITS pro- delivered on time and functioned correctly of some characteristics still have to be improve user manuals and back-up must be better define areas of lowest population density and low com typically also those with poorest mobile phone have a negative impact on the core DRT level of	roducts were y on baseline, but oved (e.g. training, fined); furthermore, ommercial activity are el of service.calls due to busy phone lines has decreased by up to 6% in the case of Campi; as more customers use the FAMS portal, this number is expected to increase significantly.			







Categor	General Con	Significant Data/Results		
D. Acceptance by Personnel and Intermediate Users	<ul> <li>The direct users of the FAMS ters systems include:</li> <li>TDC personnel who accer make the reservations an dispatching.</li> <li>Drivers of the DRT service</li> <li>Transport operating cor managers and dispatcher</li> <li>The extent of their acceptance refore a the effectiveness of the systems, and their perception of how it help out their job.</li> </ul>	chnicalIn Fl acceept bookings, d manage the• In Fl accepet bookings, 	<ul> <li>In Florence TDC and operator acceptance is high, but is reduced compared to pre-FAMS, because of a small decrease in the system performance in terms of dispatching efficiency, speed of system, ease of use and quality of guidance (there is a reduction in those who rate it as 'good' or better).</li> <li>In Angus, overall TDC staff have a positive opinion of all the DRT issues except for the perception of TDC system capability to plan the shortest possible route, while drivers have a good opinion on all its characteristics.</li> </ul>	
E. Acceptance by end-users	In Florence, there was already a high overall baseline acceptance rate, so DRT was already a consolidated typology of service. In contrast, in Angus the concept and services were completely new. Previously, the people living in the three Glens had a very restricted public transport service.	<ul> <li>* 40-55% of users of the Florence DRT services and 68% of users of the STS Disabled service use the service 5 days per week. This shows a high loyalty by those who experience the services.</li> <li>* 45-50% of the users of Florence DRT services use it to get to work, showing a high confidence in the reliability of the services.</li> <li>* 45-50% of the users of Florence DRT services use it to get to work, showing a high confidence in the reliability of the services.</li> <li>* In Angus, about half of the surveyed passengers hold a valid driving license and could have made the trip by car if they had wished: about 60% of surveyed passengers have used the services instead of another mode they had used previously, and about 35% of surveyed passengers make more journeys since the services were introduced.</li> <li>* All users rate trip time as 'excellent' or 'good' and rate as 'excellent' or 'good' and rat</li></ul>		
F. Achieve cost effectiveness and efficiency	This section focuses on the Florence site for which there is financial data for pre-FAMS and post-FAMS situations, while data on cost benefits and efficiencies are not available for the Angus site due to the deregulated environment. The analysis has been carried out for all 7 services. One of the most significant results is the reductior in Florence DRT service costs. Data shows that at the whole of Florence level DRT is more a social service than a business perspective at the moment.	<ul> <li>In Florence booking passenger in Florence now ranging from € was €1.29 - €14.92.</li> <li>In Florence, all the improved, since the the services managone TDC per DRT is values is directly relactive service.</li> <li>The total operating were in the range € €31 - €61; the operarange €2.56 - €13.4 €7.25.</li> <li>The fare box ratio DRT services.</li> </ul>	g and dispatch cost per nce has been reduced by 70%, 0.37 - €4.48, whilst before FAMS it main economic data have a TDC cost is now shared among all ed by the FAMS Agency instead of tervice. The variability (range) of ated to the proportion of time in g costs per revenue hour pre-FAMS 39 - €113 and have been reduced to ating costs/km offered were in the 9 and have been reduced to €2.03 - is less than 15% for all the main	

>









Category	General Comment Sig		nificant Data/Results	
	Both sites have reported that despite the mobility opportunities and the very positive end-user response, there has been little revenue increase in the early months of implementation.		<ul> <li>In Florence the positive trend of DRT passengers increase is still on-going: this trend should have another boost with the increase in the FAMS portal usage, thus giving more booking possibilities to users.</li> </ul>	
enue increases	In the case of Florence, the FAMS portal has been running for too short a period in order to achieve a significant impact on the number of DRT users: the number of bookings per day made via the FAMS portal remains low at about 10 per day for all the services – this suggests that despite a strong acceptance of the DRT services by the users, they are slow to change from traditional interfaces.			
G. Achieve re	In contrast in Angus DRT services are a completely new offer: building the market is a slow process, so that <b>usage and revenue</b> <b>are slow to build-up</b> – potential users take time to understand and trust the new service and booking concepts; but stronger efforts should be put in this implementation process: the new service in itself is not enough – people must be led, involving different users groups and associations because groups are more likely to take initiatives than individuals, as has been shown by the history of Florence DRT.		<ul> <li>In Angus the current implementation is positive and seems promising, but many efforts still have to be undertaken in terms of service promotion and explanation.</li> </ul>	

### Table 6: Main Findings at the FAMS Sites

# 6.2 Key Relevant Outputs from the FAMS Evaluation

This section reports some key results that demonstrate the level of success obtained by FAMS from the perspective of users/citizens and services operators.

Table 7 shows the Campi DRT improvements obtained during the operation of the FAMS DRT services and the overall FAMS Agency in terms of the increase in service accessibility by the users.

	Before FAMS	After FAMS
Phone calls	30	60 new TDC with 2 operators active
via-web booking	-	300
Total possible connections	30	360

### Table 7: Campi DRT Improvements to Service Accessibility with FAMS

Figure 16 shows the results obtained in operating cost/km offered ( $\in$ ) for the Florence services before and after the FAMS implementation.



Pre-FAMS	
Post-FAMS	;







Figure 17 provides an overall overview of the increase in the number of passengers in the period 1996-2003 (start of DRT service June 1997) for the Campi DRT service.



With respect to the quality of access to services, Table 8 provides the trends for the DRT Campi Bisenzio services for 1997-2003 (Campi DRT started in mid-1997 and FAMS started in mid-2003) in terms of kilometres travelled, passengers carried and the important variable of unanswered calls. A good value has been achieved for these indicators during the FAMS project. In practical terms these results mean that the quality of the service offered increased with FAMS.

Year	Km	Passengers	Booking Modalities	FAMS Web services Users	% Unanswered Calls
1996	50.728	7.889	-	-	-
1997	70.789	29.573	phone	-	10,0
1998	120.576	69.565	phone	-	19,4
1999	229.778	94.547	phone	-	27,9
2000	286.869	108.062	phone	-	32,5
2001	321.883	116.305	phone	-	33,3
2002	310.099	116.544	phone	-	35,2
2003	321.569	117.058	phone/web	26	33,1

Table 8: Trends in Campi Bisenzio DRT 1997-2003







# 6.3 High-level Conclusions from the FAMS Trials and Evaluation

In order to encourage the correct development of the Agency, a very well structured process has been followed. The main actions undertaken before the implementation of the Agency (the pre-FAMS phase) were:

- Analysis of stakeholder objectives.
- Identification of user needs.
- Option development and selection.
- Decision to implement FAMS.

During the implementation and trial phase nine relevant FAMS themes (the FAMS themes) have been taken into account:

- Implement innovative transport services.
- Implement innovative organisational platforms.
- Achieve successful take-up and implementation.
- Achieve acceptance by personnel and users.
- Achieve acceptance by end-users.
- Gain cost reductions and efficiencies.
- Achieve revenue increases.
- Build confidence in the solutions.
- Identify and resolve structural barriers.

After the implementation and the start of the Agency some significant actions have been considered, such as:

- Retention/expansion of services at the FAMS sites.
- Take-up of FAMS concepts at other sites.
- Continued investment and marketing by ITS suppliers.

All the post-FAMS actions are actually occurring, which in itself is a significant result.

The high-level findings are summarised as follows:

- The technology has been transferred successfully to both sites.
- The Flexible Agency concept, and in particular the B2B and B2C concepts, have been successfully implemented.
- The ITS systems have performed well but faced some external constraints in Angus, especially in relation to the GSM coverage.
- Usage of the system identifies new system and functionality needs, which can be difficult to add.
- The technology has allowed new services to be implemented.
- There is mostly high acceptance by the technology users.
- Better flexibility, reliability and productivity have been achieved.
- Unit costs have been reduced by up to 46%.
- Throughput potential at the Florence site has been increased from 60 bookings per hour to 360 bookings per hour, although the current demand does not reach those levels.
- There is a high acceptance of services by the end-users.
- Nonetheless, usage and revenue have been slow to build-up.
- Confidence in the Agency concept has been established.
- There are significant structural barriers in both regulatory and institutional terms.







The FAMS Consortium considers that further assessment should be carried out after 12 and 24 months from the start of the service operation (i.e. in mid-2004 and mid-2005) in order to track the patronage and revenue trends. These are very important to understand the future viability of these mobility services.

The considerations listed above are shown in Figure 18 as a story board, also illustrating the pre-FAMS and post-FAMS phases.









Figure 18: The Pre-FAMS and Post-FAMS Evaluation Process



THE FAMS BUSINESS CASE

# 7.1 Developing a Business Case for DRT

The Generic FAMS Business Case for DRT is presented in FAMS Deliverable D7 "Comparative Evaluation and Business Case Assessment".

During the course of the project, the FAMS team considered how to develop a Business Case for DRT. It is clear that the forms of DRT to date have not been self-financing. Nonetheless, they show potential as an alternative form of mobility service. The question is how to turn this into practical business. This Chapter presents some of the issues considered by the FAMS team. However, the reader should understand that this discussion of the Business Case is not based directly on the FAMS Evaluation work, and should be considered separately from the findings presented in Chapter 6.

The FAMS project achievements suggest that the foreseeable evolution of DRT will involve five layers as shown in Table 9 with FAMS being at the third layer. The main purpose of the 5-layer model is to consider both the "road-map" for DRT services and organisation, and to foresee the technical and support requirements.

Note that the primary value-added of the FAMS project has been to allow the state-ofthe-art to move from layer 2 to layer 3, thus opening up business opportunities both for operators/authorities and for suppliers.

Layer	Category	Description	Example	Status
1	Basic	Dial/write-in flexible transport service, all bookings and assignment manual - no ITS support.	1970's dial-a- ride; most US paratransit	Proven, many
2	Stand- alone	Real-world commercial system with ITS- supported services. Ranges from one to many services through a single TDC.	Hasselt, Limburg, Florence, Gothenburg, Tuusula	Proven, some
3	Expanded agency	Collaboration of multiple service providers to provide integrated service from user viewpoint. Reduces tasks and overheads for operators. Exploits synergies and optimises resource utilisation. Business and organisational models still being tested and developed	FAMS project : Florence region, Italy; Angus region, Scotland	To be tested
4	Mature agency	Stable, viable integrated agency based on mature ITS platform. Well understood processes by customers, suppliers and agency. Not a problem to add new supplier, service or customer interface.		None yet
5	Interacting agencies	Layer 4 agencies retain own identities, but can optimise across territory, modes and/or service layers by either carrying each other's customers or organising transfers. Could be TDC to TDC exchange, supported by well understood processes and value proposition.		None yet

Table 9: A 5-layer model for the evolution of DRT





msweb.com



Figure 19: The Role of FAMS and the Breakthroughs Required in the Business and Transport Chain

# 7.2 The Need for a Business Case for DRT

Now that there is a new generation of tools available, there is a growing interest in DRT from both the transportation and business perspective. This has raised the obvious question of "how do we unlock the potential of DRT?".

The concept considered within FAMS is to innovate by seeking business-based concepts in the market definition, customer propositions, value-chains, delivery mechanisms, and organisational capabilities. In SAMPLUS, it was stated that we needed "to move from charity to business". In FAMS, **DRT needs to move "from the margins to the middle".** 

The Business Case is an effort to represent the key business dimensions and strategy that will allow promoters of DRT to achieve viable, sustainable services. These need to yield an acceptable return on capital employed after risk is factored in, and must take account of the financing and the expectations of the stakeholders.

This is far more than a financial projection of revenues and costs.

The Business Case tries to understand :

- the target markets, what to offer them, and where the effort should be concentrated

- how revenue streams are generated, how they are maintained or abated, and how the yields are managed.

- the processes needed to support the service offer, the key competences and support systems, and how to innovate in these both for customer satisfaction and efficiency

- how costs arise, how they can be managed them, and how to relate them to customers

The Business Case provides a logical framework which can be used to project the expected fiscal impacts of specific strategies.





w.tamsweb.com

# 7.3 Business Case Issues

DRT promoters have typically concentrated on the output – the achievement of the service production or technical functionality. They have reasoned that the business will follow. There is some logic to this, if they have well understood who their users are, and what they need.

However, this approach is totally insufficient to make a reliable assessment of the customer potential, and the revenue generation from the customer base. And the business case does need sound forecasting of revenue.

At each of the three business case layers, we need to change our focus to understand the value chain for the users within the system :

- What is our real market, and what market segments exits ?
- What are the relevant needs of these varied customers ?
- What are we actually offering from the perspective of our customers ?
- In what way does it add value to them, and is this sufficient to overcome inertia/apathy ?
- How do we compare to alternatives ?
- Can we turn the potential added-value into revenue ?

This should then be reflected in the customer proposition – in terms of product, availability, functionality, pricing, marketing, support and interface with potential and existing customers.

In reality, our customer base is not a theoretical percentage of a potential market. It reflects dynamic decisions by individuals who have a need, who become informed of a service, who choose to try it, who form an impression of whether it meets their needs, and who then choose to use it again or to reject it. We could express this through the following dimensions :

- Market segmentation
- Market share : either of the total market segment, or of the individual's transport budget
- · Customer acquisition, and how this changes over time
- Customer retention perhaps with different characteristics for first-try and experienced users
- Customer satisfaction with obvious links to retention and market share
- Customer profitability reflecting not only pricing strategy, but also where to draw the line with certain customers or segments

FAMS project considers that the Balanced Scorecard approach of Kaplan and Norton offers a potentially relevant framework for developing the DRT Business Case.

These issues are explored in detail in FAMS Deliverable D7 *Comparative Evaluation and Business Case Assessment*".

# 7.4 Revenue and Cost Models

The development of a revenue model and a cost model are each considered, based on understanding the dynamics rather than projection of past trends.

For the revenue model, this probably has two distinct phases :

First, we need to map out :

- The acquisition cycle
- The retention cycle







This provides the dynamic framework in which options can be developed and assessed.

Second, we need to then try to understand :

- Pricing strategy
- Yield management
- Volume forecasting
- Revenue forecasting
- When is a customer worth acquiring, worth retaining

The key issues can be summarised as :

- If an operator looks at a (potential) service area, how to figure out the volume and yield ?
- Which are the critical factors to understanding the customer cycle ?

The **Cost Model** should reflect the service, operational and technical approach to satisfying the requirements of the target customers. It should not only allow robust and accurate forecasting of the costs, but should also be used to identify potential efficiencies and which can target where innovations are needed to reduce the unit/process costs.

Some relevant factors to the cost model are :

- If we buy in service-kms to mitigate variability, redundancy or the risk in the costs, then the contractor will have to price this in – depends on his other business and resource utilisation
- How flexible are our costs, and how can we manage them ?
- Can we find lower-cost service kms and sell these ?
- Should we step back where there are higher cost kms, should we premium price or be selective about which customer we will take ?

There would be further advantages if we could recalculate our costs based on the work we are trying to do, and have already committed to do, since this is changing in real-time

- Can we know the costs, cost dynamics in (semi-) real-time ?
- Could we match this with the revenue forecast ?
- Could we link this to the specific customer mobility request ?

This leads us to the next potential step - could we calculate at the necessary timescale the profitability before making commitment of :

a) Service (operate, drop or hire-on service this week, today?)

- b) Trip (put on an extra trip ? avoid, refuse new requests?)
- c) Deviation (don't accept this request ?)

d) Individual customer (accept, haggle, negotiate price, refuse).

# 7.5 Turning Potential into Actual Business

The Balanced Score Card approach would challenge us to clearly understand, and then build our approach, systems, training, and product presentation in response :

- At what must we excel ?
- What gives us the edge, and where does it do so ?
- When we know this, how do we sell it, exploit it ?

The domain is DRT. In this area we are faced with a set of target customers who have mobility needs, many of which cannot be easily met by the conventional transport services (according to the criteria and value set of the individual).





In most locations there is already a viable level of mobility (much of it already happening by car, some suppressed), if only there was complete knowledge in sufficient time to plan and organise the most efficient transport resources, and if all potential users understood the options available to them. Not surprisingly, to date these ideal conditions have not arisen. New technologies allow at least some of the key barriers to be overcome.

For viable DRT, we need to excel at :

a) acquire knowledge of a mobility need, quickly, and while we can still influence the choices

b) Quickly propose a solution that we can afford, taking into account the price we offer

c) Optimise the set of individual solutions in (semi-)real time to minimise global cost

d) Assure service to at least fulfil the customer's expectations, and exceed them where possible

e) Analyse patterns to adapt the cost profiles, response times, customer satisfaction f) Innovate, and bring innovations quickly through to market

The 'edge' is what distinguishes the best practitioners from the ordinary. In the case of DRT which is still in the formative and non-viable phase, the 'edge' is what it will take to make the breakthrough in concepts, processes, costs and pricing so that DRT can be turned into a viable business.

Key capabilities that we need to develop include :

a) Understand the costs, and the dynamics of those costs

b) Understand the potential revenue

c) Understand the dynamics of customer satisfaction, retention and yield optimisation

d) Understand the processes, knowledge and training needed to support a, b, and c e) Exploit this knowledge to innovate and implement breakthrough changes in efficiency, cost, customer retention and yield, and

f) Develop the performance measures (e.g. Balanced ScoreCard) for both DRT and FAMS.

This is depicted in Figure 20 below.







Figure 20: Breakthrough Business Competences needed for DRT

# 7.6 Contribution of FAMS to the Generic Business Case

FAMS project has demonstrated the Flexible Agency concept, and adapted the technologies to support the Flexible Agency. This makes a significant contribution to advancing the Business Case for DRT in the following main areas:

- The B2B and B2C platform concept has been validated
- In both sites the individual services have been successfully offered to the customer as a collective mobility offer
- In both sites the various participants have been able to function as a Virtual Agency
- The B2C services have allowed multiple means of acquiring the customer mobility needs
- The communication channels and supporting technology have allowed a step increase in the number of bookings (up to 300.hour in Florence), eliminating a key bottleneck
- Total transaction time is acceptable to the user
- Service reliability has been high, meeting customers' expectations
- Unit costs per trip, per kilometer and per customer have been significantly reduced in Florence, improving the viability profile for services
- Major efficiencies in vehicle utilization has been achieved in Angus by organizing multiple uses for community, public agency and private vehicles







• Innovations have been defined, developed and successfully brought through to the marketplace in short timescales.

FAMS project does not claim to have achieved the Generic Business Case. However, it has made significant progress and demonstrated that major breakthroughs are possible.







leaflets distributed. 3 large promotion campaigns by mail and email.

10 sponsors.

WORKSHOP: SERVIZI DI TRASPORTO A CHIAMATA VERSO L'AGENZIA DEI SERVIZI FLESSIBILI DI MOBILITÀ

4-5 Dicembre, 2003 ntro Alfari, Piazza Adua 1

7~~~



The workshops mainly focused on DRT service results, the FAMS Agency and its role in public transport service provision, and the relationships and possible collaboration with other flexible transport schemes such as taxis, car sharing and car pooling systems.

The two workshops developed as highly important events in 2003 for public transport and Demand Responsive Transport services.

The first FAMS Workshop, jointly organised with UITP and ENEA (Italian National Energy, Environment and New Technologies Agency), was held in Florence (Italy) on 4-5 December 2003.

Some figures underline the importance of the event:

- 230 participants from Italy, Europe, North America, Japan, Middle East, etc
- More than 30 presentations.
- More than 40 international speakers.
- More than 6,500 English leaflets distributed and more than 7,000 Italian

**DISSEMINATION OF** 

RESULTS

8.1 The FAMS Workshops







# FINAL REPORT



The second FAMS Workshop was held in Carnoustie, Angus Region (Scotland) on 19 February 2004.

Some data demonstrate the importance of the workshop:

- 130 participants from 75 organisations. •
- 12 presentations. •
- 14 international speakers. •
- 2,000 English leaflets to promote workshop, more than 7,000 Italian leaflets. •
- 10 sponsors/demonstration corners. •



L REPOR







ramsweb.com

# 8.2 The FAMS Handbook

Thanks to the contribution of several authors, the FAMS Project has published, together with ENEA, UITP (the International Association of Public Transport), the hand book "Demand Responsive Transport Services: Towards Flexible Mobility Agency", as part of D9 deliverable "The FAMS Hand Book: Best Practice & Recommendations".

The book includes contributions from 28 authors from Belgium, Finland, Ireland, Italy, Sweden and United Kingdom. It presents a lot of valuable information related to DRT and Flexible Agencies such as the requirements and needs of users, the different service and scenarios, typologies the system architecture and technologies, the in-vehicle technologies, an overview of the most relevant experiences and applications of DRT in Europe and the organisational, institutional and juridical issues. Specific chapters are dedicated to collective taxis, car sharing and to the main actions required for sustainable urban mobility.

The last part is entirely dedicated to the FAMS project, mainly concerning the general approach, the experience in the two trial sites and the evaluation approach.



Figure 21: The FAMS Book Front-Page

The book is available for free by sending a request to ENEA, the Italian National Agency for New Technologies, Energy and the Environment. Interested readers can contact ENEA by e-mail (romanazzo@casaccia.enea.it).

# 8.3 The FAMS Web Site

The FAMS Project Website is online at the following URL: www.famsweb.com [/.org/.net].

The site provides general information about DRT systems and applications and about FAMS activities. A section with a number of internet links to sites (describing projects, applications and technologies) and resources of interest in the DRT domain is also included.



55



# 8.4 Conferences and Workshops Attended by Consortium Members

In order to disseminate the FAMS results and achievements, several papers and presentations have been given at international conferences. The following table summarises the main FAMS papers and presentations.

Date	Conference	Presentation title	
03.06.2002 Singapore	IEEE 5th International Conference on Intelligent Transportation Systems	e-business infrastructure for Flexible Mobility Services	
25-27.11.2002 Singapore	S2T Conference "Intelligent Transport System Solutions" Nanyang Technological	Demand Responsive Transport: A Key Player for the 21st Century	
	University, Singapore		
21.10.2002 Vilnius Lithuania	"Technologies for services" TELEBALT Conference	e-Business e-Work for Demand Responsive Mobility Virtual Agency: the European Fams project	
26-27.03.2003 02.07.2003	Mobility Manager training course	Florence Experience in FAMS project	
Rome (IT)			
4-5.05.2003 Madrid (ES)	UITP Conference	Stand of supplier	
9.05.2003 Thessaloniki (GR)	Mobility, Accessibility of People with Disabilities Design for All	Demand Responsive Transport services in Florence: the experience of ATAF towards the FAMS approach	
12.05.2003,	DRT services and Applications	DRTs and FAMS application in	
Turin (IT)	Workshop. Torino University	FLORENCE MA	
21-22.05.03,	FLEETS 2003 Conference	A succesfull story: FAMS project	
Milan (IT)			
4-5-6.06.03, Gdansk (PL)	CESURA Conference	FAMS: Developing a Flexible Agency for Flexible Mobility Services	
16.09.03 Edinburgh (Scotland)	STAR Conference	Accessibility to transport services for people with mobility difficulties & vulnerable users: the FAMS project approach	
23.10.03 Bologna (IT)	eChallenges e-2003	FAMS: An eBusiness Approach to Managing Flexible Collective Transport	
19.11.03	10th World Conference ITS	IT Infrastructures For Flexible Mobility	
Madrid (SP)	Madrid	Services: The European FAMS Project	
12.02.04 Manchester (UK)	Demand Responsive Transport: The PTE Experience	The evolution of DRT Services and Markets: 13 years of experience in Florence"	
27.02.04 Tokyo (JP)	ECOMO Workshop	Evolution of Demand Responsive Services to the Agency for Flexible Mobility Services: The EU-IST-FAMS project	







# LIST OF DELIVERABLES AND **BIBLIOGRAPHY**

# 9.1 List of Deliverables Produced

FAMS Project, Annex 1	<ul> <li>"Description of the Work" (2001)</li> </ul>
FAMS Project, Deliverable D3	- "Trial Site Context and Design" (2002)
FAMS Project, Deliverable D2	- "The FAMS Evaluation Plan" (2002)
FAMS Project, Deliverable D10	- "Dissemination and Use plan (DUP)" (2002)
FAMS Project, Deliverable D4	- "FAMS Architecture and Trial set-up" (2003)
FAMS Project, Deliverable D6	- "FAMS Trials Report: Testing and Evaluation" (2003)
FAMS Project, Deliverable D5	- "FAMS System Deployment" (2003)
FAMS Project, Deliverable D7	- "Comparative Evaluation and Business Case Assessment" (2004)
FAMS Project, Deliverable D9 (2004)	- "The FAMS Hand Book: Best Practice & Recommendations"
FAMS Project, Deliverable D11	- "Technology implementation" (2004)

# 9.2 Useful References

ABRAHAM J.E., "A Survey of Car sharing Preferences", Department of Civil Engineering, University of Calgary, 1998.

AMBROSINO G., FINN B., "FAMS: Developing a Flexible Agency for Flexible Mobility Services", Cesura '03, Gdansk, 2003.

AMBROSINO G., FERRARI A., "IT Infrastructures for Flexible Mobility Services: the European FAMS project", 10<sup>th</sup> World congress on IT Systems and Services, Madrid, 2003.

AMBROSINO G. et al., "Accessibility to transport services for people with mobility difficulties & vulnerable users: the FAMS project approach", *STAR Conference*, Edinburgh, September 16, 2003.

AMBROSINO G. et al., "eBusiness-eWork for Demand Responsive Mobility Virtual Agency: the European FAMS project", Telebalt Conference, Vilnius, Lithuania, October 2002.

AMBROSINO G. et al., "eBusiness Infrastructures for Flexible Mobility Services: the European FAMS project", ITSC2002 IEEE Conference, Singapore, September 2002.

AMBROSING G., LOGI F., SASSOLI P., "eBusiness application to flexible transport mobility service", EUNITE Conference, Tenerife, Spain, December 2001.

AMBROSINO G., SCHOLLIERS J., "In-Vehicle Terminal for Flexible Collective Transport Services", 2nd ITS in Europe Congress, Bilbao, Spain, June 20-23, 2001.

AMBROSINO G. et al., "The role of demand responsive transport services in sustainable mobility: the experience of Florence", ITS '01, Prague, May 31 - June 1, 2001.

AMBROSINO G., SASSOLI P., "Intermediate Transport based on Telematics for improving accessibility and environmental quality", EC Special Session "IST tools for better environmental integration in transport management", 7th ITS World Congress 2000, Torino, November 2000.

AMBROSINO G. et al., "Flexible Mobility Solutions in Europe Through Cooperation Between Operators, IT Suppliers and Authorities", 7th ITS World Congress 2000, Torino, November 2000.

AMBROSINO G. et al., "eBusiness Solutions for Flexible Mobility Services In Europe", eBusiness and eWork Conference and Exhibition, Madrid, October 18-20, 2000.

Area Development Management, "Rural Transport: A National Study from a Community Perspective", Dublin, 1999.

ASHFORD N., BELL W. (eds), "Mobility for the elderly and handicapped", Loughborough, Loughborough University of Technology, 1978.

ASM di Venezia, TRS, "Car sharing: il sistema di Venezia", Progetto ENTIRE 1998.

Bealtaine Ltd. (Taylor Lightfoot Transport Consultants) "Pay as you drive car sharing", Final report, 1997.







BAUM H., PESCH S., "Untersuchung der Eignung von car-sharing in Hinblick auf Reduzierung von Stadtverkehrsproblemen", Forschungsbericht FE-Nr 70421/93 im Auftrag des Bundesminister für Verkehr, Bonn, 1994.

Commission recommendation of 21 December 1999 on safe and efficient in-vehicle information and communication systems, 2000/53/EC, Official Journal of the European Communities, 25. 1. 2000, L19/64-68.

COUSINS S.H., "A model of car availability in car sharing schemes of different sizes", *Transport Engineering* and control, 1998.

Department of the Environment, Northern Ireland, "Rural Transport Fund: One Year On", Belfast, 1999.

Department of the Environment Transport and the Regions, "Transport 2010: the 10 year plan", *DETR*, London, 2000a.

Department of the Environment Transport and the Regions, "Social Exclusion and the provision and availability of public transport", *DETR*, London, 2000b.

Department for Transport, "The Flexible Future", DfT, London, 2002.

D'ESTE G., TAYLOR M.A.P., RADBONE I.G., "Demand-Responsive Public Transport for Australia: 1. The Trade-Offs", Papers of the Australasian Transport Research Forum 19, 1994.

Down District Partnership, "Down District: Community Transport Action Plan", submission to Rural Transport Fund, 1999.

DUFFELL J., "Journeys on Demand", Surveyor, pp. 12-14, January 24, 2002.

EcoPlan International. Car Sharing '98, Present Status, Future Prospects: A Casebook of Useful Sources, Paris, September 21, 1998.

European Commission, "European transport policy for 2010", EC, Luxembourg, 2001

European Conference of Ministers of Transport (ECMT) 2001, "Consolidated Resolution No 2001/3 on Accessible Transport", CEMT/CM(2001)15/FINAL/CORR1.

Federal Transport Administration, "Access to Jobs: A Guide to Innovative Practices in Welfare to Work Transportation", Washington, 1998.

FINN B.M., "Analysis of User Requirements for Demand Responsive Transport Systems", SAMPO Project Deliverable No. 3, European Commission DGXIII TR 1046, Dublin, 1996.

FINN B.M., "Requirements of Users of DRT Systems", SAMPLUS Project Deliverable No. 3, Dublin, 1999.

FINN B., AMBROSINO G., "Demand Responsive Transport: A key player for the 21<sup>st</sup> Century", *Proc. 3<sup>rd</sup> International Conference on Seamless and Sustainable Transport*, Singapore, November 2002.

GLAZEBROOK G., "Innovations in personal public transport: concept and applications", *Planning, co-ordinating and funding urban transport*, Sydney, 1993.

GLAZEBROOK G., MCCOMBIE K., "New technologies for personalising public transport", *Traffic Technology International*, 1995.

GLOTZ-RICHTER M., "The Bremen approach to car sharing and transport System integration", Bremen city Department for Environmental Protection, 1998.

GROSSO S., HIGGINS J., MAGEEAN J., NELSON J.D., "Demand Responsive Transport: towards best practice in rural applications", *Proc. AET European Transport Conference*, Cambridge, September 2002 [on CD].

HARMS S., TRUFFER B., "The Emergence of a Nation-wide Car sharing", report, 1998.

JONES M., "Demanding Times", Community Transport 21(2), pp. 20-25, March / April 2002.

LITMAN L., "Evaluating Car Sharing Benefits", Victoria Transport Policy Institute, 1999.

LEETE L., BANIA N., "The Impact of Welfare Reform on Labour Markets, Cleveland", *Centre on Urban Poverty and Social Change*, Case Western Reserve University, 1996.

MAGEEAN J.F., NELSON J.D., "Some observations on the organisation of demand responsive transport services", *Trasporti Europei 7(17)*, pp. 49-57, 2001.

MANNING R., "Does it bounce?" Frontline Solutions, Vol. 9, No 8, pp. 32-36, October 2000.

MASSOT M.H., ALLOUCHE J.F., BENÉJAM E., PARENT M., "Praxitèle: The Ambitious Station Car Experiment in France", *The journal of world transport policy & practice*, 1998.

MEIJKAMP R., "Car sharing in the Netherlands", B&A Groep, 1999.

MUHEIM P., "Mobility at Your Convenience: Car Sharing – the key to combined mobility", *Energie 2000, Transport Section*, Berne, Switzerland, 1998.

MUHEIM P., "Mobility at Your Convenience: Project Engineering 2000", Swiss Ministry of Transport, Berne, 1998.

NELSON J.D., "TORG showcases best practice for DRT", Traff Engng Control 43(1), pp. 8-9, January 2002.







NELSON J.D., MAGEEAN J.F., (Eds), "Evaluation and Verification Plan", Telematics Application Programme Transport Sector Project TR3321 Contract Report No. 7.1, Commission of the European Communities, Bruxelles, October 1998.

NELSON J.D., MAGEEAN J.F., (Eds), "Results of the Evaluation and Market Assessment of SAMPLUS Technologies", *Telematics Application Programme Transport Sector Project TR3321 Contract Report No. 7.2, Commission of the European Communities*, Bruxelles, November 1999.

NELSON J.D., SMITH F., MORGAN L.E., PICKUP L., "Evaluation of Telematics-Based Demand-Responsive Transport Services", *Proc. 4th World Congress on Intelligent Transport Systems*, Berlin, October 1997.

NEVILLE R.W., REYNOLDS E., MCLAUGHLIN K., "Recognizing the revolutionary nature of car sharing", Autoshare, 1999.

NOVY P., "Austria-CASUAL car sharing manual & comments", Autoteilen, Osterreich, 1998.

Ökoinstitut-ENEA, "La mobilità del XXI secolo – Verso il CarSharing", March 31, 1998.

OXLEY P., STÅHL A., "Taxis For All, Final Report January 2001", for Directorate General for Transport, Commission of the European Community, 2001.

PACT - Peninsula Community Transport, "Ards Peninsula: Community Transport Action Plan", *submission* to Rural Transport Fund, 1999.

PETZÄLL J., "Fordon och hjälpmedel för funktionshindrade i kollektivtrafiken. Problemin-ventering och nulägesbeskrivning", (In Swedish), Department of Traffic Planning and Engineering, Lund Institute of Technology, University of Lund, Sweden, 1996.

Proceedings of FAMS Workshop "Demand Responsive Transport Services: Towards the Flexible Mobility Agency", Florence, Italy, December 4-5, 2003.

RADBONE I.G., D'ESTE G., TAYLOR M.A.P., "Demand-Responsive Public Transport for Australia: 2. Meeting the needs", *Papers of the Australasian Transport Research Forum 19*, 1994.

Rural Lift for South West Fermanagh Partnership, "Action Plan for Rural LIFT for South West Fermanagh Partnership", *Submission to Rural Transport Fund*, 1999.

SCHOLLIERS J., GORINI M., KAISTO I., IACOMETTI A., "Architecture for an Intelligent in-vehicle terminal for multimodal flexible collective transport services", 7<sup>th</sup> World Congress on Intelligent Transport Systems, Turin, Italy, November 6-9, 2000.

SCHOLLIERS J., GORINI M., KAISTO I., ELORANTA P., "Development of an Intelligent in-vehicle terminal for regular and flexible collective transport services", 8<sup>th</sup> World Congress on Intelligent Transport Systems, September 30 - October 4, 2001, Sydney, Australia, (2001a).

SCHOLLIERS J., KAISTO I., BOERO M., SIUKONEN J., ALANEN J., "The IVT Protocol: an Ethernet Protocol for Distributed Architectures applied to Collective Transport", 2001,

http://www.vtt. fi/aut/kau/projects/invete/invete\_protocol. pdf, (2001b).

SCOTT S., PETERS J.S., BURKHOLDER R., "Final Report. Business Planning Study: Car Sharing in Portland, Oregon", Submitted to Oregon Department of Environmental Quality, July 31, 1997.

SHAHEEN S., SPERLING D., WAGNER C., "Car sharing in Europe and North America: Past, Present, and Future", *Transportation Quarterly, Vol. 52, No. 3, Summer*, pp. 35-52, 1998.

STÅHL A., WESTERLUND Y., Development of Accessible Multipurpose Vehicles, TRB 16<sup>th</sup> National Conference on Accessible Transportation & Mobility, Phoenix, Arizona, U.S.A., 1999.

STRID M., "Sweden Getting Mobilised", Swedish National Road Administration, 1999.

TEAL R.F., "Using Smart Technologies to Revitalize Demand Responsive Transit", Intelligent Vehicle Highway Systems (IVHS) Journal, 1(3), pp. 275-293, 1994.

THØGERSEN J., NORRE L., "Who Are the Early Adopters of Car Sharing?" Aarhus School of Business, 1999.

Transportation Research Board, TCRP Synthesis 24 AVL Systems for Bus Transit, Transportation Cooperative Research Program, National Academy Press, Washington, D.C., 1997.

United States Department of Transportation, NPTS Databook, Washington, D.C., 1995.

WESTERLUND Y., "DRT in Gothenburg – Flexline as a social tool", FAMS Workshop, Florence, Italy, December 2003.

WESTERLUND Y., STAHL A., NELSON J. and MAGEEAN J., "Transport Telematics for Elderly Users: Successful use of automated booking and call-back for DRT in Gothenburg", *Proceedings of the 7<sup>th</sup> ITS World Congress on Intelligent Transport Systems*, Torino, Italy, November 2000.

WHITE C., "Multimodal Public Transit System Routing and Scheduling", *In VERTIS (Ed), Steps Forward. VERTIS*, pp. 959-962, Tokyo, 1995.

WILHITE H., ATTALI S., Car Sharing in France: a study of the potential benefits, barriers and alternatives, ADEME, Paris, 2000.







ZEGRAS C., GAKENHEIMER R., "Car sharing organizations in Latin America: examining prospects for Santiago", *M. I. T. Department of Urban Studies and Planning*, April 1999.

ZHANG X., KOMPFNER P., SEXTON B., MALTBY D. and MORELLO S., "Guidebook for Assessment of Transport Telematics Applications", (CONVERGE Project), ERTICO, Bruxelles, 1996.





